EBRSR

Chapter 10

UPPER EXTREMITY MOTOR REHABILITATION INTERVENTIONS



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Canadian Partnership for Stroke Recovery

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Welcome to the 21st Edition of the EBRSR!

The EBRSR was initiated in 2001 with funding from the Heart and Stroke Foundation of Canada. The first edition was published in 2002. It is now in its 21st edition. The Upper Extremity Motor Rehabilitation Interventions is chapter 10. This chapter has data on 1,623 RCTs published in English journals up to the end of 2024. Special thanks to Sarvenaz Mehrabi, Mohammad R. Safaei-Qomi, Cecilia Flores-Sandoval, Ben Luebke, Gunjan Patel and Pranav Vaishampayan for their work on updating this chapter. We are working on the next update.

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Chapter 10: Upper Extremity Motor Rehabilitation Interventions

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Intervention Categories

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1	Neurodevelopmental Techniques	15 (9)	19	19–39
2	Bilateral Arm Training	34 (12)	40	40–67
3	Exercise and Strength Training	93 (67)	68	68–146
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7	Trunk Restraint	6 (4)	278	278–287
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10	Mirror Therapy	68 (30)	332	332–370
11	Mental Practice	43 (24)	371	371–394
12	Action Observation	19 (9)	395	395–404
13	Cognitive and Dual-Task Training	8 (8)	405	405–413
14	Music Therapy and Rhythmic Auditory Stimulation	16 (13)	414	414–423
15	Telerehabilitation and Education	13 (12)	424	424–430
16	Robotics	197 (95)	431	431–516
17	Virtual Reality	125 (68)	517	517–567
18	Brain Computer Interfaces	21 (19)	568	568–579
19	EMG Biofeedback	23 (10)	580	580–591
20	Feedback-Based Training	12 (8)	592	592–607
21	Wearable Cueing and Reminder Devices	4 (4)	608	608–612
22	Neuromuscular Electrical Stimulation (NMES)	105 (50)	613	613–682
23	Transcutaneous Electrical Nerve Stimulation (TENS)	14 (9)	683	683–695
24	Thermal Stimulation	9 (5)	696	696–703
25	Muscle Vibration	16 (6)	704	704–712
26	Extracorporeal Shockwave Therapy	16 (12)	713	713–722
27	Additional Afferent and Peripheral Stimulation Methods	56 (38)	723	723–764
28	Invasive Cortical and Nerve Electrode Implant Stimulation	7 (3)	765	765–767
29	Repetitive Transcranial Magnetic Stimulation (rTMS)	101 (55)	768	768–826
30	Theta Burst Stimulation (TBS)	22 (12)	827	827–845
31	Transcranial Direct Current Stimulation (tDCS)	93 (55)	846	846–895
32	Other Non-Invasive Brain Stimulation Methods	5 (5)	896	896–899
33	Botulinum Toxin	66 (26)	900	900–927
34	Antispastic Medications	6 (6)	928	928–932
35	Nerve Block	7 (7)	933	933–938
36	Steroids	11 (10)	939	939–946
37	Cerebrolysin	3 (1)	947	947–948
38	Levodopa	6 (5)	949	949–951
39	Statins and Antihypertensives	5 (2)	952	952–955
40	Antidepressants	7 (3)	956	956–958
41	Central Nervous System Stimulants	6 (0)	959	959–963
42	Neuroprotectants and Regenerative Therapies	9 (9)	964	964–967
43	Other Pharmacological and Medical Interventions	13 (12)	968	968–975
44	Acupuncture	43 (26)	976	976–994
45	Electroacupuncture and Transcutaneous Electrical Acupoint Stimulation	16 (7)	995	995–1002
46	Meridian Acupressure and Massage Therapy	10 (5)	1003	1003–1008
47	Traditional Herbal Medicine	9 (6)	1009	1009–1014

RCT counts are as reported in the chapter's Index of Data Tables (page 18). Because some trials are cross-listed under more than one category, the column total exceeds the number of unique RCTs in the chapter

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Chapter Structure and Format

Each intervention is described in a table that includes the following:

Intervention vs Control		
Author (Year) PEDro Score Sample Size (Start) Sample Size (End) Time Post Stroke Study Design	E: Intervention C: Control Duration (Session length, frequency per week, number of weeks)	Outcome Measure Result (Direction of effect)

Interpretation of Results (Direction of Effect)

+exp indicates a statistically significant between groups difference at α=0.05 in favour of the experimental group

+exp1/+exp2/+exp3 indicates a statistically significant between groups difference at α=0.05 in favour of the first, second or third experimental group

+con indicates a statistically significant between groups difference at α=0.05 in favour of the control group

- indicates no statistically significant between groups differences at α=0.05

no stats/no between-group stat indicates the study did not report a between groups comparison for that outcome

Key Points Summary

Effect	Interpretation
+	**Favourable**
–	**Not Favourable**
=	**Mixed Evidence**

Modified Sackett Scale

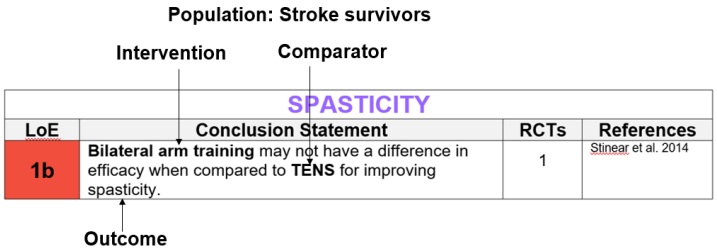
The Modified Sackett Scale was used to determine the level of evidence for each conclusion statement.

Level of evidence	Study design	Description
Level 1a	Randomized controlled trial (RCT)	More than 1 higher quality RCT (PEDro score ≥6).
Level 1b	RCT	1 higher quality RCT (PEDro score ≥6).
Level 2	RCT	Lower quality RCT (PEDro score <6).
	Prospective controlled trial (PCT)	PCT (not randomized).
	Cohort	Prospective longitudinal study using at least 2 similar groups with one exposed to a particular condition.
Level 3	Case Control	A retrospective study comparing conditions, including historical cohorts.
Level 4	Pre-Post	A prospective trial with a baseline measure, intervention, and a post-test using a single group of subjects.
	Post-test	A prospective post-test with two or more groups (intervention followed by post-test and no re-test or baseline measurement) using a single group of subjects
	Case Series	A retrospective study usually collecting variables from a chart review.
Level 5	Observational	Study using cross-sectional analysis to interpret relations. Expert opinion without explicit critical appraisal, or based on physiology, biomechanics or "first principles".
	Case Report	Pre-post or case series involving one subject.

PICO Conclusion Statements

Chapter 10: Upper extremity motor rehabilitation interventions synthesizes study results from only randomized controlled trials (RCTs), all levels of evidence (LoE) and conclusion statements are presented in the Population Intervention Comparator Outcome (PICO) format.

For example:

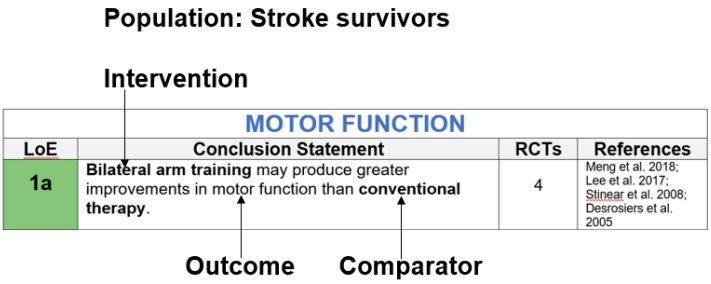


SPASTICITY			
LoE	Conclusion Statement	RCTs	References
1b	**Bilateral arm training** may not have a difference in efficacy when compared to **TENS** for improving spasticity.	1	Stinear et al. 2014

Red statements like above, indicate that the majority of study results when grouped together show no significant differences between intervention and comparator groups.

Green statements indicate that the majority of study results when grouped together show a significant between group difference in favour of the intervention group.

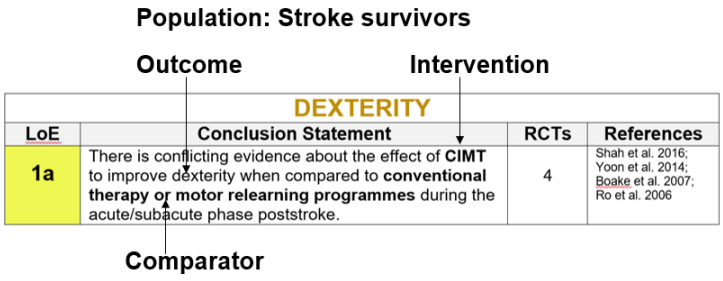
For example:



MOTOR FUNCTION			
LoE	Conclusion Statement	RCTs	References
1a	**Bilateral arm training** may produce greater improvements in motor function than **conventional therapy**.	4	Meng et al. 2018; Lee et al. 2017; Stinear et al. 2008; Desrosiers et al. 2005

Yellow statements indicate that the study results when grouped together are mixed or conflicting, some studies show benefit in favour of the intervention group, while others show no difference between groups.

For example:



DEXTERITY			
LoE	Conclusion Statement	RCTs	References
1a	There is conflicting evidence about the effect of **CIMT** to improve dexterity when compared to **conventional therapy or motor relearning programmes** during the acute/subacute phase poststroke.	4	Shah et al. 2016; Yoon et al. 2014; Boake et al. 2007; Ro et al. 2006

Outcome Measures

Relevant outcome measures, used in 5 or more RCTs, were categorized based on the International Classification of Functioning, Disability and Health (ICF) Domains:

1. Body Functions and Structures
- 1.1 Motor Recovery
- 1.2 Upper Limb Kinematics (Biomechanical Measures)
- 1.3 Muscle Strength
- 1.4 Spasticity
- 1.5 Range of Motion
- 1.6 Neurophysiological Measures
- 1.7 Aerobic Measures
- 1.8 Sensory/Proprioception
- 1.9 Pain
- 1.10 Shoulder Subluxation

2. Activities
- 2.1 Activities of Daily Living
- 2.2 Upper Limb Functional Capacity
- 2.3 Dexterity
- 2.4 Self-Reported Upper Limb Use and Function

3. Participation
- 3.1 Quality of Life

Other Associated Outcome Measures
- A. Mood and Psychological Measures
- B. Fatigue and Sleep
- C. Cognition, Perception and Language
- D. Lower Extremity and Mobility

1. Body Functions and Structures

1.1 Motor Recovery

Outcome Measure	Number of RCTs	Description
Fugl-Meyer Assessment (FMA)	916	This stroke-specific, performance-based impairment index assesses motor function, sensation, balance, joint range of motion, and joint pain in patients with post-stroke hemiplegia through observed movements.
Brunnstrom Recovery Stages (BRS)	83	6-stage scale describing the typical sequence of motor recovery after stroke, from flaccidity to normal coordinated movement.
National Institutes of Health Stroke Scale (NIHSS)	62	This 15-item impairment scale assesses overall stroke severity across consciousness, vision, motor, sensory, language, and neglect items.
Finger Oscillation Test (FOT) / Finger Tapping Test	22	Measures motor control and speed and is used to help detect brain damage through motor dysfunction by assessing the speed of finger movement. It measures the maximal tapping speed of the index finger of each hand by requiring the patient to work the lever arm of a mechanical counter up and down as fast as he or she can; the average number of taps in a 10-second interval is determined over five trials.
Rivermead Motor Assessment (RMA)	14	The assessment consists of three domains: gross function (13 items), leg and trunk movements (10 items), and arm movements (15 items). This three-part scale assesses gross function, leg/trunk movement, and arm movement after stroke.
Motor Status Scale (MSS)	13	A measure of upper limb impairment and disability following stroke. It is divided into 4 sections and assesses shoulder, elbow/forearm, wrist and hand movements on a 6-point scale (maximum score = 82 points). It is thought to provide a more complete measurement of upper limb motor function than the FMA, as it evaluates the complete range of motor function of the upper limb using a finer grading of isolated movements.
Chedoke-McMaster Stroke Assessment (CMSA)	12	Comprehensive measures used to assess both physical impairment and functional disability in individuals with stroke. It consists of two components: the Impairment Inventory, which evaluates recovery of the arm, hand, leg, foot, postural control, and shoulder pain, and the Activity Inventory, which assesses gross motor function and walking ability.
Reaching Performance Scale (RPS)	10	Observational scale rating the quality of hemiparetic reach-to-grasp movements toward near and far targets, including trunk compensation, smoothness of trajectory, and grasp.
Stroke Rehabilitation Assessment of Movement (STREAM)	8	Is a measure of how well stroke patients can perform functional tasks. This measure consists of 30 functional tasks which are then subdivided into 5 subsections: supine, sitting, standing, standing (while gripping a stable support) and standing plus walking activities.
Motor Evaluation Scale for UE in Stroke Patients (MES-UE)	7	A measure that assesses the quality of arm movement performance of the hemiparetic arm and hand in stroke patients. The scale encompasses 10 arm function items with six response categories (scores 0–5), nine hand function items with three response categories (scores 0–2), and three functional tasks with three response categories (scores 0–2).

Outcome Measure	Number of RCTs	Description
Quality of movement	5	Clinician- or instrument-rated assessment of the quality of upper limb movement (e.g., smoothness, accuracy, compensation), reported without a single standardized scale.
Neurological Function Deficit Scale (NFDS)	5	A measure of neurological deficits experienced by stroke survivors in both the upper and lower extremities. It contains 40 functional movements done with the guidance of a clinician (e.g., shoulder abduction, shoulder adduction, leg flexion/extension), evenly divided into upper extremity and lower extremity sections, with each movement measured on a 6-point scale (0=normal function, 5=severe stroke).

1.2 Upper Limb Kinematics (Biomechanical Measures)

Outcome Measure	Number of RCTs	Description
Kinematics (instrumented movement analysis)	120	Instrumented measures of upper limb movement obtained with motion capture, robotic, or sensor-based systems, such as movement time, trajectory, velocity, smoothness, joint excursions, and trunk displacement during reaching and other tasks.
Task performance/movement accuracy (device-assessed, non-specific)	6	Device-recorded task performance variables (e.g., movement accuracy, error, number of targets hit) captured during robotic or computer-based upper limb tasks; not a standardized scale.

1.3 Muscle Strength

Outcome Measure	Number of RCTs	Description
Grip strength/force	244	Dynamometer measurement of the maximal force generated during a hand grip.
Medical Research Council Scale (MRCS)	88	It is a measure of overall muscle strength a stroke survivor possesses. The measure consists of 33 functional tasks. Each task is then rated on a 4-point scale (0=cannot complete task, 3=completes task as well as the unaffected side).
Motricity Index (MI)	68	Weighted scale summing pinch grip, elbow flexion, and shoulder abduction (or ankle dorsiflexion, knee extension, hip flexion for the leg) to score limb motor strength after stroke.
Pinch strength/force	67	Pinch gauge or dynamometer measurement of maximal pinch force between the thumb and finger(s).
Muscle strength/resistance (dynamometer or non-specific manual test)	46	Muscle strength or resistance graded by manual muscle testing or measured with a dynamometer, without a named standardized protocol.
Isokinetic/Isometric muscle force	29	Dynamometer-measured maximal force a muscle group produces during a static, constant-velocity, or lengthening contraction.
Muscle thickness	7	Ultrasound or imaging measurement of muscle cross-sectional size, used as a proxy for muscle bulk/atrophy.

1.4 Spasticity

Outcome Measure	Number of RCTs	Description
Modified Ashworth Scale (MAS)	369	6-point clinical scale rating resistance felt during passive muscle stretch, used to grade spasticity. It can be applied to both upper and lower limb muscle groups by passively moving a limb through its range of motion.
Ashworth Scale (AS)	37	Original 5-point clinical assessment used to evaluate muscle spasticity and resistance to passive movement in individuals.
Tardieu Spasticity Scale	17	Clinical scale measuring spasticity by comparing muscle reaction to stretch at different velocities.
Modified Tardieu Spasticity Scale (MTS)	14	Refined Tardieu Scale assessing spasticity by testing muscle response to slow versus fast passive stretch. The MTS is considered more sensitive to the velocity-dependent nature of spasticity than the Ashworth-based scales.
Spasticity – no specific scale	12	Spasticity reported without a named or standardized measurement tool.
Composite Spasticity Index (CSI)	6	Assess upper and lower limb spasticity in individuals, and it evaluates spasticity using three components: tendon jerk, resistance to passive stretch, and clonus. The resistance-to-passive-stretch component is weighted more heavily because it best reflects muscle hypertonia.
Spasticity – Numeric Rating Scale (NRS)	5	Self- or clinician-rated numeric rating (typically 0–10) of spasticity severity.

1.5 Range of Motion

Outcome Measure	Number of RCTs	Description
Active Range of Motion (AROM)	170	Degrees of joint movement a person can achieve using their own muscle effort, measured with a goniometer.
Passive Range of Motion (PROM)	113	Degrees of joint movement achievable when an examiner moves the joint without the person's muscular effort.
Maximal Elbow Extension Angle During Reach (MEEAR)	5	A measure of the amount of elbow extension undergone by a stroke survivor while reaching for an object. The measure consists of one functional movement in which the patient reaches for an object and the rate of elbow extension is measured (the higher the rate of extension, the better the outcome).

1.6 Neurophysiological Measures

Outcome Measure	Number of RCTs	Description
Hmax/Mmax ratio	135	Ratio of the maximal H-reflex to the maximal M-wave on electromyography, reflecting spinal motoneuron excitability.
Motor Evoked Potential (MEP) amplitude	100	Amplitude of the motor evoked potential elicited by transcranial magnetic stimulation, reflecting corticospinal excitability.
Functional Magnetic Resonance Imaging (fMRI) parameters	57	Brain imaging measures neural activation patterns based on blood-oxygen-level changes during tasks or at rest.
Physiological parameters (e.g., blood levels, inflammatory cytokines)	40	Includes lab tests, blood markers, weight, body mass index, body composition and vital signs (except heart rate; see Aerobic Measures).

Outcome Measure	Number of RCTs	Description
Electroencephalography (EEG) parameters	35	Scalp-recorded measures of the brain's electrical activity.
Other neuroimaging outcomes (fNIRS, PET, TMS mapping)	9	Other neuroimaging outcomes such as functional near-infrared spectroscopy, positron emission tomography, or TMS motor mapping.

1.7 Aerobic Measures

Outcome Measure	Number of RCTs	Description
Heart rate	10	Number of heart beats per minute, measured at rest or during exercise.
Peak Oxygen Consumption (VO2 Peak)	5	Highest rate of oxygen uptake achieved during a maximal or symptom-limited exercise test, reflecting cardiorespiratory fitness.

1.8 Sensory/Proprioception

Outcome Measure	Number of RCTs	Description
Semmes-Weinstein Monofilament Test	18	Calibrated monofilaments applied to the skin to determine touch–pressure detection thresholds.
Two-Point Discrimination Test	11	Smallest distance at which two simultaneous points of contact on the skin are perceived as separate, assessing tactile discrimination.
Proprioception – no specific scale or test	10	Proprioception assessed without a named standardized scale or test.
Nottingham Sensory Assessment (NSA)	9	Standardized battery assessing tactile sensation, kinaesthesia, and stereognosis after stroke.
Erasmus Modification of the Revised Nottingham Sensory Assessment (emNSA)	8	Erasmus modification of the (revised) Nottingham Sensory Assessment, a standardized assessment of tactile and proprioceptive sensation after stroke.
Revised Nottingham Sensory Assessment (RNSA)	7	A measure of somatosensory perception in stroke survivors. The measure consists of one functional task repeated with 11 different objects, in which patients identify the objects with their eyes closed; a higher number of objects identified indicates a better outcome.
Joint Position Sense Test (JPST)	5	Test of a person's accuracy in reproducing or detecting a joint position without visual feedback.

1.9 Pain

Outcome Measure	Number of RCTs	Description
Pain – Visual Analogue Scale (VAS)	112	Self-reported pain intensity marked on a continuous line, typically 0 (no pain) to 10 (worst pain).
Pain – Numeric Rating Scale (NRS)	38	Self-reported pain intensity is rated as a whole number, typically 0 (no pain) to 10 (worst pain).
Pain – no specific scale	20	Pain reported by participants without a named or standardized measurement tool.

1.10 Shoulder Subluxation

Outcome Measure	Number of RCTs	Description
Shoulder subluxation	21	Degree of inferior displacement of the humeral head relative to the glenoid fossa (glenohumeral subluxation), measured clinically in fingerbreadths or radiographically.

2. Activities

2.1 Activities of Daily Living

Outcome Measure	Number of RCTs	Description
Barthel Index (BI)	200	Measure of functional independence in individuals with stroke and other neurological conditions. It assesses performance in 10 activities of daily living (ADLs), including feeding, bathing, grooming, dressing, continence, toileting, transfers, mobility, and stair climbing.
Functional Independence Measure (FIM)	168	Assessment of disability and functional independence commonly used in stroke rehabilitation. It consists of 18 items grouped into two domains: Motor (13 items) and Cognitive (5 items), covering areas such as self-care, mobility, communication, and social cognition.
Modified Barthel Index (mBI)	136	Expanded, more finely graded version of the Barthel Index for scoring independence in daily activities.
Modified Rankin Scale (MRS)	53	It is a single-item measure of global disability and functional independence after stroke. The MRS assesses overall functional outcome relative to a person's pre-stroke lifestyle rather than performance on specific tasks.
Canadian Occupational Performance Measure (COPM)	22	A measure of how well a stroke survivor engages in self-care, productivity and leisure. The measure consists of 25 functional items/tasks (e.g., bathing, ability to work at least part-time), with each task scored on a 10-point rating scale primarily measuring proficiency in each of the 3 sub-categories (self-care, productivity and leisure).
Disability Assessment Scale (DAS)	22	A measure of disability associated with upper limb spasticity in stroke survivors. The measure consists of functional tasks (e.g., brushing teeth, buttoning a shirt, limb positioning and pain) divided into 4 sections: hygiene, dressing, limb position and pain, with each rated from 0=no disability to 3=severe disability.
Goal Attainment Scale (GAS)	16	Individualized scale measuring the extent to which a person's own personalized rehabilitation goals were achieved.
Nottingham Extended ADL Scale (NEADL)	15	It is a measure of a stroke survivor's independence with regards to their performance on various activities of daily living. The measure consists of 22 functional tasks.
ADL – no specific test	13	Activities of daily living reported without a named or standardized measurement tool.
Lawton-Brody Instrumental Activities of Daily Living Scale	7	Questionnaire rating independence in instrumental activities of daily living such as using the telephone, shopping, food preparation, housekeeping, transportation, medications, and finances.
Frenchay Activities Index (FAI)	6	Questionnaire measuring the frequency of participation in everyday domestic, leisure, and work-related activities. Higher

Outcome Measure	Number of RCTs	Description
		scores indicate greater independence and engagement in everyday life.

2.2 Upper Limb Functional Capacity

Outcome Measure	Number of RCTs	Description
Action Research Arm Test (ARAT)	288	Assessment used to evaluate upper limb function and activity limitations. It consists of 19 items divided into four domains: grasp, grip, pinch, and gross movement.
Wolf Motor Function Test (WMFT)	258	It quantifies upper extremity (UE) motor ability in stroke survivors through timed and functional tasks.
Jebsen-Taylor Hand Function Test (JTHFT)	80	A measure used to evaluate fine motor skills with weighted and non-weighted hand functions. The test is derived from hand functions required for activities of daily living and is scored as the time taken (in seconds) to complete each subtest, with a maximum of 120 seconds permitted per subtest.
Manual Function Test (MFT)	50	An upper limb function assessment used for evaluating proximal arm movements as well as fine and gross dexterity of hemiparetic patients after stroke. The test includes 8 subtests including forward and lateral elevation of the arm, grasping, pinching, and pegboard manipulations, with ratings ranging from 0 (severely impaired) to 32 (full function).
Motor Assessment Scale (MAS)	48	Performance-based measures used to assess functional motor recovery after stroke. It evaluates 8 everyday motor tasks, including bed mobility, sitting balance, standing, walking, upper arm function, and hand activities.
Chedoke Arm and Hand Activity Inventory (CAHAI)	24	An upper limb measure that uses a 13-point quantitative scale to assess recovery of the arm and hand in performing activities of daily living after stroke. It is a performance test using 13 bimanually performed real-life items, designed to encourage bilateral upper limb use; scores represent the patient's relative ability to independently perform stabilisation or manipulation in ADL with the impaired upper limb.
Arm Motor Ability Test (AMAT)	20	A measure of upper extremity limitation for stroke survivors in performing activities of daily living. The measure consists of 13 common unilateral and bilateral tasks (e.g., manipulating objects such as utensils and telephones; donning/doffing a piece of clothing), with each task scored on two 6-point ordinal scales assessing functional ability and the quality of the movement performed.
Frenchay Arm Test (FAT)	14	A measure of upper extremity motor control that a stroke survivor possesses. The measure consists of 5 common tasks that require use of the upper extremity (e.g., stabilize a ruler/draw a line with a pencil, comb hair, clip a clothespin onto the edge of a table, grasp a cylinder, drink from a glass of water and set it down), with each task scored 0 (unsuccessful) or 1 (successful completion).
Upper Extremity Performance Test for the Elderly (TEMPA)	13	Performance-based test of upper extremity function using standardized unilateral and bilateral everyday tasks, scored for speed and functional rating (developed for elderly persons).

Outcome Measure	Number of RCTs	Description
Stroke Upper Limb Capacity Scale (SULCS)	10	A measure of basic arm capacities and overall arm strength in stroke survivors. The measure consists of 10 functional tasks (e.g., carrying a briefcase, typing on a computer, writing on a notepad), subdivided into upper limb capacity with no control, basic control, or advanced control from the wrist and fingers, with each task scored on a 3-point scale (0=cannot complete task, 2=completes task as well as the unaffected side).
Functional Test of the Hemiparetic Upper Extremity (FTHUE)	9	Hierarchical test of the hemiparetic upper extremity in which graded functional tasks are ordered by difficulty across seven levels.
Rancho Los Amigos Functional Test for the Hemiparetic UE	8	A measure used to quantify functional movement ability of the hemiparetic arm in stroke patients. The test consists of a series of 17 timed activities of daily living that focus on completion of everyday tasks involving the impaired limb (e.g., zipping a jacket, placing a pillow in a pillowcase), arranged in seven levels by degree of difficulty ranging from simple single-joint movements at the shoulder to complex multi-joint movements involving the hand and arm.
Upper Extremity Function Test (UEFT)	8	A measure of total upper extremity dexterity and function in stroke survivors. The measure consists of 15 functional tasks (e.g., moving a jar around, stacking coins, reaching and grabbing a cup) across 3 subsections (speed of execution, functional rating, task analysis), with each task measured on a 6-point scale (−3=cannot complete task, +3=completes task as well as the unaffected side).
Modified Motor Assessment Scale (MMAS)	8	A revised version of the Motor Assessment Scale developed to improve scoring consistency and ease of use. The general tonus item was removed, and some item descriptions were clarified while maintaining the original focus on functional motor performance after stroke.

2.3 Dexterity

Outcome Measure	Number of RCTs	Description
Box and Block Test (BBT)	241	A simple and widely used assessment of unilateral gross manual dexterity in individuals with stroke and other neurological conditions. During the test, participants are required to transfer as many blocks as possible, one at a time, from one compartment of a box to another within 60 seconds.
Nine Hole Peg Test (9HPT)	85	Simple, performance-based tests used to assess fine motor dexterity and finger coordination of the upper extremity. During the test, individuals place and remove nine pegs from a pegboard as quickly as possible using one hand at a time.
Purdue Pegboard Test (PPT)	33	A measure of precision grip strength and speed in stroke survivors. Patients are asked to place as many pins as they can onto the pegboard in 30 seconds, and then repeat the exercise with the other hand; patients are scored on the number of pins placed in the given time.
Minnesota Manual Dexterity Test (MMDT) / Minnesota Rate of Manipulation Test	6	A measure of fine motor control and general dexterity in stroke survivors consisting of 2 functional tasks: placing wooden discs into a cylinder, then turning the discs clockwise

Outcome Measure	Number of RCTs	Description
		180 degrees and closing the lid. Patients are scored on the number of discs inserted and the speed of completion.

2.4 Self-Reported Upper Limb Use and Function

Outcome Measure	Number of RCTs	Description
Motor Activity Log (MAL)	223	A patient-reported measure of the use and quality of movement of the impaired arm. The measure consists of 30 functional tasks (e.g., handling utensils, buttoning a shirt, combing hair), with each task measured on a 6-point scale (0=complete inability to use the affected arm).
ABILHAND	18	A measure of how well a stroke survivor utilizes their hands to complete various manual tasks. The measure consists of 23 common bimanual activities (e.g., hammering a nail, wrapping gifts, cutting meat, buttoning a shirt, opening mail), with each task scored on a 3-point scale (0=impossible, 1=difficult, 2=easy) assessing overall ability.
Disabilities of the Arm, Shoulder and Hand – short form (QuickDASH)	17	A shortened version of the DASH — a patient-reported outcome measure intended for upper extremity disorders. It consists of 11 items from the original 30-item DASH questionnaire, where each item has 5 response options, with scaled scores ranging from 0 (no disability) to 100 (most severe disability).
Shoulder Pain and Disability Index (SPDI/SPADI)	9	Self-report index rating shoulder pain and shoulder-related difficulty in daily activities.

3. Participation

3.1 Quality of Life

Outcome Measure	Number of RCTs	Description
Stroke Impact Scale (SIS)	142	It is a stroke-specific, self-report, health status measure designed to assess multidimensional stroke outcomes, including strength, hand function, Activities of Daily Living / Instrumental Activities of Daily Living (ADL/IADL), mobility, communication, emotion, memory and thinking, and participation.
EuroQol Group Standardised Measure of Quality of Life (EQ-5D)	32	It is a non-disease-specific measure of health-related quality of life consisting of six domains which include mobility, self-care, main activity, social relationships, pain, mood and three levels within each domain.
Stroke Specific Quality of Life Scale (SS-QOL)	31	The Stroke Specific Quality of Life scale (SS-QOL) is a patient-centered outcome measure intended to provide an assessment of health-related quality of life (HRQOL) specific to patients with stroke.
Short Form-36 (SF-36)	20	Patient-reported measure of health-related quality of life (HRQoL). It consists of 36 items across eight domains: physical functioning, role limitations due to physical health, bodily pain, general health, vitality, social functioning, role limitations due to emotional problems, and mental health.

Outcome Measure	Number of RCTs	Description
EuroQol Visual Analogue Scale (EQ-VAS)	11	Single visual analogue scale on which respondents rate their overall current health state.
Nottingham Health Profile (NHP)	10	It is a measure of any health-related problems. It consists of two parts. The first part covers six areas including sleep, physical mobility, energy, pain, emotional reactions, and social isolation. The second part focuses on areas of daily life that would be most impacted by health status including employment, social life, interests, etc.
Caregiver strain/burden	6	Questionnaire measuring the level of strain experienced by an informal caregiver.
WHOQOL-BREF	5	26-item generic questionnaire assessing quality of life across physical, psychological, social, and environmental domains.

Other Associated Outcome Measures

A. Mood and Psychological Measures

Outcome Measure	Number of RCTs	Description
Beck Depression Inventory (BDI)	17	Self-report questionnaire for assessing the severity of depressive symptoms in adolescents and adults, including individuals with stroke. It consists of 21 items covering emotional, cognitive, and physical symptoms of depression.
Hamilton Depression Rating Scale (HAMD)	15	Scale used to stratify severity of depression, to guide treatment and inform progress in patients with already identified depressive disorder.
Hospital Anxiety and Depression Scale (HADS)	12	A self-report screening tool used to identify symptoms of anxiety and depression in individuals with medical conditions, including stroke. It consists of 14 items, with 7 items assessing anxiety (HADS-A) and 7 items assessing depression (HADS-D).
Geriatric Depression Scale (GDS)	9	Self-report screening tool designed to identify depression in older adults, including individuals recovering from stroke. The original version contains 30 yes/no questions that assess mood, interests, life satisfaction, and other symptoms of depression.
Stroke Self-Efficacy Questionnaire (SSEQ)	7	Self-report questionnaire rating confidence (self-efficacy) in performing functional tasks and self-management activities after stroke.
Center for Epidemiologic Studies Depression Scale (CES-D)	6	20-item self-report questionnaire screening for depressive symptoms in the general population.

B. Fatigue and Sleep

Outcome Measure	Number of RCTs	Description
Fatigue – Visual Analogue Scale (VAS)	8	Self-rated fatigue intensity marked on a visual analogue line.
Fatigue Severity Scale (FSS)	6	9-item scale measures the severity of fatigue and its effect on a person's activities and lifestyle in patients with a variety of disorders.

C. Cognition, Perception and Language

Outcome Measure	Number of RCTs	Description
Mini-Mental State Examination (MMSE)	24	Screening tools for assessing cognitive function and detecting cognitive impairment. It consists of 11 tasks that evaluate orientation, attention, memory, language, calculation, and visuospatial abilities.
Montreal Cognitive Assessment (MoCA)	17	A cognitive screening tool designed to detect mild cognitive impairment (MCI) and subtle cognitive deficits that may not be identified by the Mini-Mental State Examination (MMSE). It evaluates multiple cognitive domains, including attention, concentration, executive function, memory, language, visuospatial ability, abstraction, calculation, and orientation.
Other cognition outcome measures	13	Cognitive outcomes measured with other instruments not separately coded.
Neglect outcome measures	12	Assessments of unilateral spatial neglect, such as line bisection, cancellation tasks, and the Behavioural Inattention Test.
Trail Making Test A/B	7	Timed test of visual attention and task-switching, connecting numbered (Part A) or alternating numbered and lettered (Part B) circles in sequence.
Stroop Tests	7	Cognitive test measuring selective attention and processing speed via interference between word reading and color naming.
Digit Span Test (forward/backward)	5	Test short-term memory capacity by recalling increasingly long sequences of digits or spatial locations.

D. Lower Extremity and Mobility

Outcome Measure	Number of RCTs	Description
Fugl-Meyer Assessment – Lower Extremity (FMA-LE)	35	Lower extremity subsection of the Fugl-Meyer Assessment scoring leg motor impairment after stroke.
Berg Balance Scale (BBS)	27	Assessment used to evaluate balance and postural control in individuals with stroke. It consists of 14 functional tasks assessing both static and dynamic balance.
10-Metre Walk Test (10MWT)	26	Time taken to walk 10 metres at a comfortable or fast pace, used to calculate walking speed.
6-Minute Walk Test (6MWT)	22	Total distance walked in 6 minutes, used to assess walking endurance and sub-maximal aerobic capacity.
Timed Up and Go Test (TUG)	21	Time taken to rise from a chair, walk 3 meters, turn, walk back, and sit down, assessing basic sequential functional mobility.
Trunk Impairment Scale (TIS)	11	17-item, performance-based assessment of static sitting balance, dynamic sitting balance, and trunk coordination following stroke. Scores range from 0–23, with higher scores indicating better trunk function.
Functional Ambulation Category (FAC)	10	6-point clinical scale used to assess walking ability and the level of assistance required during ambulation. The FAC focuses on the amount of human support needed rather than walking speed or endurance.
Sit-to-Stand Test	9	Timed or repetition-based test of the ability to rise from and/or return to a seated position.

Outcome Measure	Number of RCTs	Description
Functional Reach Test	9	A clinical outcome measure and assessment tool for ascertaining dynamic balance in a simple task. It measures the distance between the length of an outstretched arm in a maximal forward reach, while maintaining a fixed base of support.
Gait velocity/speed	8	Walking speed is reported without specifying the distance or method used to obtain it.
Trunk Control Test (TCT)	8	Is a measure that assesses the level of motor impairment a stroke patient has in the trunk/abdominal region. This measure consists of 4 functional tasks. For each task the patient receives points for a maximum of 100 points.
Rivermead Mobility Assessment	6	15-item scale assessing a range of mobility skills from turning in bed to running.
Gait kinematics	5	Instrumented kinematic measures of gait, such as joint angles and spatiotemporal parameters.
Other gait assessments	5	Gait assessed with other scales or parameters not separately coded.

Chapter 10: Upper Extremity Motor Rehabilitation Interventions

Index of Data Tables

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3	Exercise and Strength Training	93 (67 new)	30	68
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5	Sensorimotor Training	11 (8 new)	8	224
6	Constraint-Induced Movement Therapy (CIMT)	91 (31 new)	19	233
7	Trunk Restraint	6 (4 new)	6	278
8	Stretching Programs	24 (19 new)	10	288
9	Orthotics and Taping	58 (35 new)	20	308
10	Mirror Therapy	68 (30 new)	18	332
11	Mental Practice	43 (24 new)	15	371
12	Action Observation	19 (9 new)	11	395
13	Cognitive and Dual-Task Training	8 (8 new)	6	405
14	Music Therapy and Rhythmic Auditory Stimulation	16 (13 new)	10	414
15	Telerehabilitation and Education	13 (12 new)	11	424
16	Robotics	197 (95 new)	63	431
17	Virtual Reality	125 (68 new)	34	517
18	Brain Computer Interfaces	21 (19 new)	10	568
19	EMG Biofeedback	23 (10 new)	12	580
20	Feedback-Based Training	12 (8 new)	9	592
21	Wearable Cueing and Reminder Devices	4 (4 new)	4	608
22	Neuromuscular Electrical Stimulation (NMES)	105 (50 new)	40	613
23	Transcutaneous Electrical Nerve Stimulation (TENS)	14 (9 new)	10	683
24	Thermal Stimulation	9 (5 new)	7	696
25	Muscle Vibration	16 (6 new)	6	704
26	Extracorporeal Shockwave Therapy	16 (12 new)	7	713
27	Additional Afferent and Peripheral Stimulation Methods	56 (38 new)	38	723
28	Invasive Cortical and Nerve Electrode Implant Stimulation	7 (3 new)	3	765
29	Repetitive Transcranial Magnetic Stimulation (rTMS)	101 (55 new)	33	768
30	Theta Burst Stimulation (TBS)	22 (12 new)	9	827
31	Transcranial Direct Current Stimulation (tDCS)	93 (55 new)	42	846
32	Other Non-Invasive Brain Stimulation Methods	5 (5 new)	5	896
33	Botulinum Toxin	66 (26 new)	17	900
34	Antispastic Medications	6 (6 new)	3	928
35	Nerve Block	7 (7 new)	6	933

36	Steroids	11 (10 new)	8	939
37	Cerebrolysin	3 (1 new)	1	947
38	Levodopa	6 (5 new)	4	949
39	Statins and Antihypertensives	5 (2 new)	5	952
40	Antidepressants	7 (3 new)	1	956
41	Central Nervous System Stimulants	6 (0 new)	3	959
42	Neuroprotectants and Regenerative Therapies	9 (9 new)	5	964
43	Other Pharmacological and Medical Interventions	13 (12 new)	12	968
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45	Electroacupuncture and Transcutaneous Electrical Acupoint Stimulation	16 (7 new)	7	995
46	Meridian Acupressure and Massage Therapy	10 (5 new)	4	1003
47	Traditional Herbal Medicine	9 (6 new)	4	1009

Therapy Based Interventions

Neurodevelopmental Techniques



Adapted from: http://www.bobathconcept.eu/en/main-site/

There are several approaches that are considered to be neurodevelopmental techniques (NDT). These include the Bobath concept, Brunnstrom movement therapy and motor relearning programmes. The Bobath concept is a comprehensive, problem-solving treatment approach that focuses on motor recovery (e.g. function, movement and tone) of an individual's affected side after a lesion in the central nervous system (Michielsen et al. 2017). Prior to its introduction in the 1950's, stroke rehabilitation largely assumed a compensatory approach towards the unaffected side for rehabilitation (Kollen et al. 2009). The Bobath concept like other neurodevelopmental techniques relies on the tenets of neuroplasticity, in that motor recovery of the affected side is possible through individualised treatment plans that focus on how tasks are completed, facilitation of movements through therapeutic handling, movement analysis, modification of the environment and appropriate use of verbal cues from therapists (Michielsen et al. 2017). Brunnstrom movement therapy focuses on retraining motor movements through emphasis of the synergistic and reflexive muscle movements that develop during recovery from hemiplegia. The approach encourages the use of abnormal or spastic muscle movements of the flexors and extensors during early recovery to regain muscle

synergies, contrary to the Bobath concept which inhibits these movements (Pandian 2012; Brunnstrom 1970). The motor relearning programme employs practice of task-specific activities to remediate specific motor skills needed to perform that task. Motor tasks are practiced in context relevant environments to enhance sensory input and modulate performance (Pandian 2012).

A total of fifteen RCTs were found that evaluated neurodevelopmental techniques for upper extremity motor rehabilitation. One RCT compared motor relearning programmes combined with other interventions with mirror therapy (Jan et al. (2019)). One RCT compared brunnstrom movement therapy combined with other interventions with motor relearning programmes (Pandian et al. (2012)). One RCT compared different approaches to neurodevelopmental techniques (bobath approach) (Tang et al. (2014)). One RCT evaluated proprioceptive Neuromuscular Facilitation (PNF) combined with other interventions (Morreale et al. (2016)). Two RCTs compared different approaches to motor relearning programmes (Iosa et al. (2013); Boyd & Winstein (2003)). One RCT compared motor relearning programmes with no treatment (Carey et al. (2002)). Two RCTs compared motor relearning programmes combined with other interventions with neurodevelopmental techniques (bobath approach) or neuromuscular electrical stimulation (El-Bahrawy et al. (2012); Langhammer & Stanghelle (2000)). One RCT compared repetitive Facilitative Exercise (RFE) combined with other interventions with repetitive facilitative exercise (rfe) (Hokazono et al. (2022)). Two RCTs compared neurodevelopmental techniques (bobath approach) with conventional therapy (Brock et al. (2022); Gelber et al. (1995)). One RCT compared motor relearning programmes with conventional therapy (Walker et al. (2012)). One RCT compared brunnstrom movement therapy combined with other interventions with mirror therapy (Nimra et al. (2024)). One RCT compared proprioceptive Neuromuscular Facilitation (PNF) combined with other interventions with proprioceptive neuromuscular facilitation (PNF) (Sahin et al. (2012)).

In addition, 30 RCTs in which neurodevelopmental techniques formed part of a combined or comparative intervention are cross-referenced at the end of Table 1; their primary listings appear in other tables.

The methodological details and results of all fifteen RCTs are presented in Table 1.

Table 1. RCTs Evaluating Neurodevelopmental Techniques for Upper Extremity Motor Rehabilitation

Authors (Year) **Study Design (PEDro Score)** **Sample Size start** **Sample Size end** **Time post stroke category** **Study design**	**Interventions** **Duration: Session length, frequency per week for total number of weeks**	**Outcome Measures** **Result (direction of effect)**
Motor relearning programmes combined with other interventions compared to mirror therapy		
Jan et al. (2019) RCT (5) NStart=66 NEnd=66 TPS=Not Reported A vs B *Also in Table 10 (Mirror Therapy)*	E: Motor learning program C: Mirror therapy Duration: 2Hr, 3x/wk, 6wk	E vs C: Motor Assessment Scale Upper limb: (+exp) Hand: (+exp) Advance Hand: (+exp)
Brunnstrom movement therapy combined with other interventions compared to motor relearning programmes		
Pandian et al. (2012) RCT (6) NStart=30 NEnd=30 TPS=Chronic A vs B	E: Brunnstrom hand manipulation treatment + Conventional occupational therapy C: Motor relearning programme based hand protocol + Conventional occupational therapy Duration: 60min/d, 3d/wk, for 4wks	E vs C: FMA wrist and hand (+exp) Brunnstrom recover stages hand (-)
Different approaches to neurodevelopmental techniques (bobath approach) compared against one another		
Tang et al. (2014) RCT (6)	E: Early Sitting, Standing and Walking With Bobath Training (a bobath approach developed by the researchers)	E vs C: Berg Balance Scale (+exp)

NStart=56 NEnd=48 TPS=Acute A1 vs A2	C: Bobath Training Duration: 50min, 5x/wk, 8wks	Stroke Rehabilitation Assessment of Movement (+exp) Upper (-) Lower (+exp) Mobility (+exp)
Proprioceptive Neuromuscular Facilitation (PNF) combined with other interventions compared to control		
Morreale et al. (2016) RCT (7) NStart=340 NEnd=302 TPS=Acute A1 vs A2 vs B *Also in Table 13 (Cognitive and Dual-Task Training)*	E1: Proprioceptive neuromuscular facilitation (PNF) early E2: PNF late E3: Cognitive therapeutic exercise (CTE) early E4: CTE late Duration: 2.5hr/d, 14wk, or 1.3hr/d, 5d/wk, 38wk	E1/E3 vs E2/E4: mRankin score (-) BI (-) 6min walking test (-) Motricity index (+exp1, +exp3) MMSE (-) Beck depression Inventory (-)
Different approaches to motor relearning programmes compared against one another		
Iosa et al. (2013) RCT (4) NStart=40 NEnd=37 TPS=Subacute A1 vs A2	E1: Bilateral Transfer with Low Skilled Hand then High Skilled Hand E2: Bilateral Transfer with High Skilled Hand then Low Skilled Hand Duration: 2 sessions	E1 vs E2: Velocity of Execution of 9HPT (-) 9 Hole Peg Test (+exp1)
Boyd & Winstein (2003) RCT (5) NStart=10 NEnd=10 TPS=Chronic A1 vs A2	E: Explicit Information on motor learning Task C: No Explicit Information on motor learning task Duration: 1 session/d, 3ds	E vs C: Response Time (+con) reaction time + movement time, t includes both reaction time (cognitive processing) and movement time (motor execution)
Motor relearning programmes compared to no treatment		
Carey et al. (2002) RCT Crossover (5) NStart=10 NEnd=10 TPS=Chronic A vs 0	E: Finger movement tracking training C: Waitlist Duration: 45-60min/session, 2-5sessions/wk, 4-5wks	E vs C: BBT (-) Finger tracking test (+exp) MRI parameters
Motor relearning programmes combined with other interventions compared to neurodevelopmental techniques (bobath approach) or neuromuscular electrical stimulation		
El-Bahrawy et al. (2012) RCT (8) NStart=40 NEnd=40 TPS=Chronic A + B vs A + C *Also in Table 22 (Neuromuscular Electrical Stimulation (NMES))*	E: Motor relearning+electrical stim C: Bobath treatment+electrical stim Duration: 2hr session/d, 3d/wk, 6wk + 30min electrical stim/session	E vs C: Jamar hand dynamometer (+con) Purdue pegboard test (-) modifed Ashworth scale (-) resting angle of the wrist ulnar deviation was measured by electro-goniometer
Langhammer & Stanghelle (2000) RCT (6) NStart=61 NEnd=57 TPS=Acute A vs B	E1: Motor Relearning Programme (MRP) E2: Bobath program Duration: 40min/d, 5d/wk, until discharge	E1 vs E2: Motor Assessment Scale (+exp) Barthel Index (-) Grip Strength Paretic Hand (-) Non-Paretic Hand (-) 6-Minute Walk Test (-)

		Berg Balance Scale (-) Timed Up and Go Test (-) Instrumental Activities of Daily Living (-) Modified Ashworth Scale (-)
Repetitive Facilitative Exercise (RFE) combined with other interventions compared to repetitive facilitative exercise (rfe)		
Hokazono et al. (2022) RCT (7) NStart=40 NEnd=40 TPS=Chronic A + B vs A/B *Also in Table 33 (Botulinum Toxin)*	E: repetitive facilitative exercise (RFE) + BoNT-A injection + conventional self-training + conventional rehab C: repetitive facilitative exercise (RFE) + conventional self-training + conventional rehab Duration: 40min/d, 6d/wk, 4wks RFE	E vs C: FMA (+exp) ARAT (+exp) BBT (+exp) AROM; elbow, wrist (+exp) MAS; elbow (+exp) wrist (-) finger (-)
Neurodevelopmental techniques (bobath approach) compared to conventional therapy		
Brock et al. (2022) Pilot RCT (8) NStart=56 NEnd=53 TPS=Subacute A vs 0	E:Bobath Neurorehab +conventional rehab C: conventional rehab + sham TENS Duration: 1hr/d, 3d/wk, 2wks	E vs C: PreFULT(+exp) STREAM(+exp) CAHAI(-) Grip strength(-)
Gelber et al. (1995) RCT (4) NStart=27 NEnd=23 TPS=Acute A vs B	E: Neurodevelopment treatment C: Traditional functional retraining Duration: Not Reported	E vs C: FIM(-) BBT(-) 9HPT(-) gait kinematics
Motor relearning programmes compared to conventional therapy		
Walker et al. (2012) RCT (7) NStart=70 NEnd=64 TPS=Acute A vs 0	E: Motor relearning programme (functional dressing with neuropsychological approach) C: Conventional functional dress practice Duration: 3d/wk for 6wk	E vs C: Nottingham Stroke Dressing Assessment (-) 10-hole peg transfer test (-) Line Cancellation Test (+exp) Object Decision (-) Gesture Imitation (-)
Brunnstrom movement therapy combined with other interventions compared to mirror therapy		
Nimra et al. (2024) Pilot RCT (5) NStart=26 NEnd=26 TPS=Acute A vs B *Also in Table 10 (Mirror Therapy)*	E: Brunnstrom movement therapy + conventional therapy C: Mirror Therapy + Conventional therapy Duration: BMT/MT: 12 sessions over 4 weeks; CT: 10min/d, 3d/wk, 4wks	E vs C: FMA Wrist (+exp) Hand (+exp) Coordination and speed (+exp) Brunnstrom hand recovery (+exp)
Proprioceptive Neuromuscular Facilitation (PNF) combined with other interventions compared to proprioceptive neuromuscular facilitation (PNF)		
Sahin et al. (2012) RCT (6) NStart=44 NEnd=42 TPS=Chronic A + B vs A/B	E: PNF + NMES C: PNF Duration: 15min, 5d/wk for 4wk	E vs C: modified Ashworth scale (+exp) PROM (+exp) BRS (+exp) FIM (+exp) Fmax/Mmax ratio (-)

Also in Table 22 (Neuromuscular Electrical Stimulation (NMES))		
Cross-Referenced RCTs: Combined or Comparative Interventions Involving Neurodevelopmental Techniques (results included in this table's levels of evidence)		
Lee et al. (2024a) RCT (7) NStart=28 NEnd=20 TPS=Acute A + B vs A/B *Primary listing: Table 29 (Repetitive Transcranial Magnetic Stimulation (rTMS))*	E: HF-rTMS + Motor training + Conventional therapy C: Sham rTMS + Motor training + Conventional Therapy Duration: 30 mins/d (20 mins of rTMS/sham rTMS and 10 mins of motor therapy), 5ds/wk, 2wks	E vs C: FMA Upper extremity (-) Lower extremity (-) Total (-) BBT (-)
Akter et al. (2023) RCT (9) NStart=25 NEnd=25 TPS=Chronic A + B vs 0 *Primary listing: Table 22 (Neuromuscular Electrical Stimulation (NMES))*	E: FES + Brunnstrom Hand rehab + conventional rehab C: Conventional Rehab Duration: 60min/d(20min hand rehab, 15min FES, 25min conventional rehab), 5d/wk, 4wks	E vs C: FMA-UE (+exp) wrist (+exp) hand (+exp) MAS (+exp) JTHF (+exp) Grip strength (+exp)
Shim & Lee (2023) RCT (6) NStart=33 NEnd=30 TPS=Subacute A + B vs A/B *Primary listing: Table 29 (Repetitive Transcranial Magnetic Stimulation (rTMS))*	E: High-frequency rTMS + Motor Learning C: Sham rTMS +Motor Learning Duration: 20min/d, 3d/wk, 4wks	E vs C: FMA-UE (-) BBT (-) Muscle strength measured by dynamometer (+exp) Korean Modified Barthel Index (-)
Ohnishi et al. (2022) RCT (4) NStart=101 NEnd=99 TPS=Acute A + B vs A vs B vs 0 *Primary listing: Table 22 (Neuromuscular Electrical Stimulation (NMES))*	E1: NMES + conventional exercise E2: RFE + conventional exercise E3: RFE under NMES + conventional exercise C: conventional training Duration: 1hr/d, 7d/wk, 4wks	E1/E2/E3 vs C: MAS (no stat), SIAS; knee-mouth (-) finger-function (-) FMA-UE total (+exp3) wrist (+exp3) finger (+exp3) FIM; motor (no stat); cognitive (no stat)
Taud et al. (2021) RCT (9) NStart=40 NEnd=40 TPS=Chronic A + B1 vs A + B2 vs A *Primary listing: Table 31 (Transcranial Direct Current Stimulation (tDCS))*	E1: Visuo-Motor Grip Force Tracking Task Training of the paretic hand + Anodal Unilateral tDCS E2: Visuo-Motor Grip Force Tracking Task Training of the paretic hand+ Bilateral tDCS C: Visuo-Motor Grip Force Tracking Task Training of the paretic hand + Placebo tDCS Duration: 23min/d, 5d, with 60s rest period	E1/E2 vs C: FMA-UE (+exp1) WMFT (-) E1 vs E2: FMA-UE (-) WMFT (-)
Anandan et al. (2020) RCT (4) NStart=74 NEnd=50 TPS=Chronic A vs B	E: Task Specific Training C: Proprioceptive Neuromuscular Facilitation Duration: 60min/d, 10wks	E vs C: MAS (+exp) ARAT (+exp) BBS (+exp) dynamic gait index (+exp)

Primary listing: Table 4 (Task-Specific Training)		
Junior et al. (2019) RCT (6) NStart=48 NEnd=40 TPS=Chronic A + B vs A vs B *Primary listing: Table 17 (Virtual Reality)*	E1: PNF + VR (Nintendo Wii) E2: PNF E3: Wii Duration: 50min, 2x/wk, 2mo	E1 vs E2 vs E3: E1/E2/E3: Fugl-Meyers Assessment (-) Passive Motion and Pain (-) Sensory (-) Upper Extremity (-) Lower Extremity (-) Balance (-)
Jong-HoonMoon et al. (2018) Pilot RCT (5) NStart=18 NEnd=18 TPS=Acute A vs B *Primary listing: Table 4 (Task-Specific Training)*	E: Task oriented circuit training C: Neurodevelopmental techniques Duration: 30min, 5-6x/wk for 4wks	E vs C: Fugl-Meyer Assessment Upper Extremity (-) Shoulder/elbow (-) Wrist (-) Hand (-) Coordination (-) Motor Activity Log Amount of Use (+exp) Quality of Movement (-) Stroke Impact Scale (-) Arm Strength (+exp) Hand Grip Strength (+exp) Using Spoon & Chopsticks (+exp) Dress Top Up (-) Wash (-) Toenail (-) Doorknob (-) Can or Jar (-) Shoe Lace (-) Coin Grip (-) Recovery (-)
Ozkeskin et al. (2017) RCT (8) NStart=21 NEnd=21 TPS=Chronic A + B vs A/B *Primary listing: Table 29 (Repetitive Transcranial Magnetic Stimulation (rTMS))*	E: Low frequency (1Hz) Repetitive Transcranial Magnetic Stimulation to unaffected hemisphere + Brunnstrom movement therapy C: Sham Repetitive Transcranial Magnetic Stimulation + Brunnstrom movement therapy Duration: 90 min/d, 5d/wk for 2wk	E vs C: Brunnstrom Recovery Stages (-) Finger Touch Localization (-) Modified Ashworth Scale (-) Wrist Proprioceptive Evaluations (+exp)
Shah et al. (2016) RCT (6) NStart=45 NEnd=40 TPS=Subacute A vs B *Primary listing: Table 6 (Constraint-Induced Movement Therapy (CIMT))*	E1: CIMT E2: Motor relearning program Duration: CIMT for Unaffected UE: 80% of working hr; CIMT for affected UE: 3hr/d; motor relearning 30min/d, 14d ; all for 14d	E1 vs E2: Motor Activity Log (+exp) Nine Hole Peg Test (-) Fugl-Meyer Assessment (-)
Batool et al. (2015) RCT (6) NStart=42 NEnd=42 TPS=Subacute	E: CIMT C: Motor learning programme Duration: 2h/d, 6d/wk for 3wks CIMT or motor learning programme	E vs C: MAS (+exp) FIM (+exp)

A vs B *Primary listing: Table 6 (Constraint-Induced Movement Therapy (CIMT))*		
Lefebvre et al. (2015) RCT Crossover (5) NStart=19 NEnd=19 TPS=Chronic A + B vs A/B *Primary listing: Table 31 (Transcranial Direct Current Stimulation (tDCS))*	E: Dual tDCS + motor skill learning C: Sham dual tDCS + motor skill learning Duration: 30min for one session dual-tDCS or sham	E vs C: Purdue pegboard test (+exp) fMRI measures
McCabe et al. (2015) RCT (7) NStart=39 NEnd=35 TPS=Chronic A + B vs A + C vs A *Primary listing: Table 16 (Robotics)*	E1: Robotic training (InMotion ARM) + motor learning E2: Motor learning + functional electrical stimulation C: Motor learning Duration: 5hr/d, 5d/wk for 12wk	E1 vs E2 vs C: Arm Motor Ability Test: Function (-) Shoulder elbow (-) Wrist Hand (-) Fugl-Meyer Assessment: Shoulders and Elbows (-) Wrists/Hands (-)
Kwon et al. (2014) RCT Crossover (5) NStart=14 NEnd=14 TPS=Chronic A + B1 vs A + B2 *Primary listing: Table 29 (Repetitive Transcranial Magnetic Stimulation (rTMS))*	E1: Interleaved combination method (ICM) rTMS + motor training E2: Preconditioned combination method (PCM) rTMS + motor training Duration: 20 min/session, 2 sessions total; 1 session per condition (washout period 48 hours)	E1 vs E2: Purdue Pegboard Test: (-) Nine-Hole Peg Test: (-) Movement Time (Sequential Finger Motor Task) (-) Movement Accuracy (Sequential Finger Motor Task) (-) MEP amplitude
Lefebvre et al. (2013) RCT Crossover (6) NStart=18 NEnd=18 TPS=Chronic A + B vs A/B *Primary listing: Table 31 (Transcranial Direct Current Stimulation (tDCS))*	E: Dual tDCS + motor learning training C: Sham dual tDCS + motor learning training Duration: 30min/d for one session for each intervention	E vs C: Purdue pegboard test (+exp) Maximal hand grip force (-) motor skill learning index, motor performance index
Taub et al. (2013) RCT (5) NStart=45 NEnd=40 TPS=Chronic A + B vs A + C vs A *Primary listing: Table 3 (Exercise and Strength Training)*	E1: Shaping training + CIMT transfer package (TP) E2: Repetitive task practice + TP E3: Repetitive task practice C: Shaping training Duration: 3.5hr/d, 10d	E1/E2/E3 vs C: E1/E2 vs E3/C: Motor Activity Log (-) Wolf Motor Function Test (-)
Zhuang et al. (2012) RCT (7) NStart=295 NEnd=274 TPS=Subacute A + B vs A vs B *Primary listing: Table 44 (Acupuncture)*	E1: Acupuncture E2: Physiotherapy Bobath E3: Acupuncture + Physiotherapy Bobath Duration: 30min acupuncture, 1hr/d physio, 6d/wk, 4wk	E1 vs E2: Fugl-Meyer Assessment (-) Barthel Index (-) Neurologic Defect Scale (-) E1 vs E3: Fugl-Meyer Assessment (-) Barthel Index (-) Neurologic Defect Scale (-) E2 vs E3: Fugl-Meyer Assessment (-) Barthel Index (-)

		Neurologic Defect Scale (-)
Hüseyinsinoğlu et al. (2012) RCT (6) NStart=24 NEnd=22 TPS=Chronic A vs B *Primary listing: Table 6 (Constraint-Induced Movement Therapy (CIMT))*	E: CIMT C: Bobath therapy Duration: 1h/d Bobath training & 3h/d CIMT, 10d	E vs C: WMFT (-) FIM (-) Motor Activity Log (+exp) Motor Evaluation Scale for Arm in Stroke Patients (-)
Arya et al. (2012) RCT (8) NStart=103 NEnd=102 TPS=Subacute A vs B *Primary listing: Table 4 (Task-Specific Training)*	E: Task-specific training C: Standard training using the Bobath approach Duration: 1h/d, 4-5d/wk for 4wk	E vs C: Fugl-Meyer Assessment (+exp) Action Research Arm Test (+exp) Graded Wolf Motor Function Test (+exp) Motor Activity Log (+exp)
Platz et al. (2009) RCT (8) NStart=148 NEnd=144 TPS=Subacute A vs B vs 0 *Primary listing: Table 9 (Orthotics and Taping)*	E1: Impairment-oriented training E2: Inflatable Splint Arm Therapy C: Conventional therapy Duration: 45min/d, 5d/wk; 4wk	E1 vs E2 vs C: Fugl-Meyer Assessment (-) Upper Extremity Performance Test for the Elderly (-)
Bhatt et al. (2007) RCT (4) NStart=20 NEnd=20 TPS=Chronic A + B vs A/B *Primary listing: Table 22 (Neuromuscular Electrical Stimulation (NMES))*	E1: EMG-triggered NMES E2: Tracking training (a structured motor learning program) E3: EMG-triggered NMES + tracking training Duration: 1 hr/d, 5d/wk, for 2 wks (each group)	E1 vs E2 vs E3: Jebsen hand test (-) BBT (-) fMRI with finger tracking test
Carey et al. (2007) RCT Crossover (3) NStart=25 NEnd=20 TPS=Chronic A vs B *Primary listing: Table 15 (Telerehabilitation and Education)*	E: tracking training of finger and wrist (temporospatial processing) C: repetitive simple Movement training Duration: 2-8h/d, 10d, 2wks	E vs C: Box and Block test (+exp) Jebsen Taylor test (-) Finger range of motion test (+exp) Finger movement tracking test (-)
Fazekas et al. (2007) Pilot RCT (2) NStart=30 NEnd=30 TPS=Chronic A + B vs A/B *Primary listing: Table 16 (Robotics)*	E: Robot mediated physiotherapy + bobath therapy C: Bobath therapy Duration: 30min/d+30min intervention; 20d	E vs C: Rivermead motor assessment (no stat) FIM (no stat) FMA-UE (no stat) mod Ashworth scale (no stat) range of motion of shoulder and elbow (no stat)
Platz et al. (2005) RCT (8) NStart=62 NEnd=60 TPS=Subacute	E1: Impairment oriented training Arm BASIS + usual treatment E2: Bobath therapy + usual treatment C: usual treatment Duration: 45min/d, 5d/wk, 4wk	E1 vs E2: FMA arm motor score (+exp1) arm sensation (-) passive joint motion/pain (+exp1)

A vs B vs 0 *Primary listing: Table 4 (Task-Specific Training)*		Action Research Arm Test (-) Ashworth Scale (-) E1/E2 vs C: FMA arm motor score (-) arm sensation (-) passive joint motion/pain (no stat) Action Research Arm Test (-) Ashworth Scale (-)
Floel et al. (2005) RCT Crossover (5) NStart=9 NEnd=9 TPS=Chronic A + B vs A/B *Primary listing: Table 38 (Levodopa)*	E: Levodopa (100mg levodopa and 25mg of carbidopa) + Training (to make motor memory, it is like a motor learning training) C: Placebo + Training Duration: 2hrs before intake of single oral dose/session, 2 sessions; 24hr apart	E vs C: Blood pressure (no stat) heart rate (no stat) Motion kinematics (no stat) TMS evoked movement (+exp) MEP amplitude (no stat)
Daly et al. (2005) RCT (5) NStart=13 NEnd=12 TPS=Chronic A + B vs A + C *Primary listing: Table 16 (Robotics)*	E1: Robotics + motor learning E2: Functional Neuromuscular Stimulation + motor learning Duration: 5hr/d, 5d/wk, 12wk	E1 vs E2: Arm Motor Ability Test Shoulder/Elbow Wrist/hand Fugl-Meyer Upper Extremity Target Accuracy Smoothness of Movement
van Vliet et al. (2005) RCT (7) NStart=120 NEnd=99 TPS=Acute A vs B *Primary listing: Table 23 (Transcutaneous Electrical Nerve Stimulation (TENS))*	E1: Movement science based training E2: Bobath concept Duration: 23min, 5d/wk for 4wk	E1 vs E2: Motor Assessment Scale (-) Barthel Index (-) Extended activities of daily living scale (-) 10-hole peg test (-) 6m walk test (-) Modified Ashworth Scale (-) Rivermead Motor Assessment (-)
Byl et al. (2003) RCT Crossover (4) NStart=21 NEnd=18 TPS=Chronic A vs B *Primary listing: Table 5 (Sensorimotor Training)*	E: Sensory Training (the description is aligned with sensorimotor training) C: Motor Training (it is like a combination of motor learning concept and task specific) Duration: 1.5h/d, 1d/wk, 4wks -No washout	E vs C: Graphesthesia (No stats given) Kinesthesia (No stats given) Byl-Cheney-Boczai Test (No stats given) Digital Reaction Time (No stats given) Purdue Test (No stats given) Manual Muscle Test (No stats given) ROM (No stats given) WMFT (No stats given) California Functional Evaluation 40 (No stats given) Walking Velocity (No stats given)
van der Lee et al. (1999) RCT (7) NStart=66 NEnd=66 TPS=Chronic A vs B *Primary listing: Table 6 (Constraint-Induced Movement Therapy (CIMT))*	E: Forced use therapy using splint C: Bimanual training based on neuro-developmental treatment Duration: 6hr, 5d/wk for 2wk	E vs C: Action Research Arm Test (+exp) Motor Activity Log (+exp) Fugl-Meyer Assessment (-) Rehabilitation Activities Profile

Basmajian et al. (1987) RCT (5) NStart=29 NEnd=29 TPS=Subacute A vs B *Primary listing: Table 19 (EMG Biofeedback)*	E: Integrated behavioural and physical therapy with EMG biofeedback C: Exercise physical therapy (Bobath approach) Duration: 45min, 3d/wk, 5wk	E vs C: Upper extremity function test UEFT (-) finger oscillation test (-)

Abbreviations and table notes: C=control group; D=days; E=experimental group; H=hours; Min=minutes; RCT=randomized controlled trial; TPS=time post stroke category (Acute: less than 30 days, Subacute: more than 1 month but less than 6 months, Chronic: over 6 months); Wk=weeks.

+exp indicates a statistically significant between groups difference at α=0.05 in favour of the experimental group

+exp1/+exp2/+exp3 indicates a statistically significant between groups difference at α=0.05 in favour of the first, second or third experimental group

+con indicates a statistically significant between groups difference at α=0.05 in favour of the control group

- indicates no statistically significant between groups differences at α=0.05

1. Body Functions and Structures

MOTOR FUNCTION			
LoE	**Conclusion Statement**	**RCTs**	**References**
1b	Brunnstrom hand manipulation treatment with Conventional occupational therapy may produce greater improvements in motor function than Motor relearning programme based hand protocol with Conventional occupational therapy.	1	Pandian et al. (2012)
1b	Early Sitting, Standing and Walking With Bobath Training (a bobath approach developed by the researchers) may produce greater improvements in motor function than Bobath Training.	1	Tang et al. (2014)
2	Different approaches to motor relearning programmes may not have a difference in efficacy when compared with one another for improving motor function.	1	Boyd & Winstein (2003)
1b	Repetitive facilitative exercise (RFE) with botulinum toxin A injection, conventional self-training and conventional rehab may produce greater improvements in motor function than repetitive facilitative exercise (RFE) with conventional self-training and conventional rehab.	1	Hokazono et al. (2022)
1b	Impairment oriented training Arm BASIS with usual treatment may not have a difference in efficacy when compared to usual treatment for improving motor function.	1	Platz et al. (2005)
1b	There is conflicting evidence about the effect of Impairment oriented training Arm BASIS with usual treatment when compared to Bobath therapy with usual treatment for improving motor function.	1	Platz et al. (2005)
1b	Acupuncture may not have a difference in efficacy when compared to Physiotherapy Bobath for improving motor function.	1	Zhuang et al. (2012)
1b	Acupuncture may not have a difference in efficacy when compared to Acupuncture with Physiotherapy Bobath for improving motor function.	1	Zhuang et al. (2012)
1b	Physiotherapy Bobath may not have a difference in efficacy when compared to Acupuncture with Physiotherapy Bobath for improving motor function.	1	Zhuang et al. (2012)
2	Electromyography-triggered neuromuscular electrical stimulation may not have a difference in efficacy when compared to Tracking training (a structured motor learning program) or electromyography-triggered neuromuscular electrical stimulation with tracking training for improving motor function.	1	Bhatt et al. (2007)

1b	Constraint-induced movement therapy may not have a difference in efficacy when compared to Bobath therapy for improving motor function.	1	Hüseyinsinoğlu et al. (2012)
2	Tracking training of finger and wrist (temporospatial processing) may not have a difference in efficacy when compared to repetitive simple Movement training for improving motor function.	1	Carey et al. (2007)
2	Integrated behavioural and physical therapy with electromyography biofeedback may not have a difference in efficacy when compared to Exercise physical therapy (Bobath approach) for improving motor function.	1	Basmajian et al. (1987)
1b	Robotic training (InMotion ARM) with motor learning may not have a difference in efficacy when compared to Motor learning for improving motor function.	1	McCabe et al. (2015)
2	Shaping training with constraint-induced movement therapy transfer package (TP) may not have a difference in efficacy when compared to Shaping training for improving motor function.	1	Taub et al. (2013)
1b	Constraint-induced movement therapy may not have a difference in efficacy when compared to motor relearning program for improving motor function.	1	Shah et al. (2016)
1b	Proprioceptive neuromuscular facilitation with virtual reality (Nintendo Wii) may not have a difference in efficacy when compared to proprioceptive neuromuscular facilitation or Wii for improving motor function.	1	Junior et al. (2019)
2	Task Specific Training may produce greater improvements in motor function than Proprioceptive Neuromuscular Facilitation.	1	Anandan et al. (2020)
1b	Task-specific training may produce greater improvements in motor function than training using the Bobath approach.	1	Arya et al. (2012)
1b	Movement science based training may not have a difference in efficacy when compared to Bobath concept for improving motor function.	1	van Vliet et al. (2005)
1b	There is conflicting evidence about the effect of Visuo-Motor Grip Force Tracking Task Training of the paretic hand with Anodal Unilateral transcranial direct current stimulation when compared to Visuo-Motor Grip Force Tracking Task Training of the paretic hand with Placebo transcranial direct current stimulation for improving motor function.	1	Taud et al. (2021)
1b	Visuo-Motor Grip Force Tracking Task Training of the paretic hand with Anodal Unilateral transcranial direct current stimulation may not have a difference in efficacy when compared to Visuo-Motor Grip Force Tracking Task Training of the paretic hand with Bilateral transcranial direct current stimulation for improving motor function.	1	Taud et al. (2021)
2	Neuromuscular electrical stimulation with conventional exercise may produce greater improvements in motor function than conventional training.	1	Ohnishi et al. (2022)
1b	Functional electrical stimulation with Brunnstrom Hand rehab and conventional rehab may produce greater improvements in motor function than Conventional Rehab.	1	Akter et al. (2023)
1b	High-frequency repetitive transcranial magnetic stimulation with Motor Learning may not have a difference in efficacy when compared to Sham repetitive transcranial magnetic stimulation with Motor Learning for improving motor function.	1	Shim & Lee (2023)
1b	High-frequency repetitive transcranial magnetic stimulation with Motor training and Conventional therapy may not have a difference in efficacy when compared to Sham repetitive transcranial magnetic	1	Lee et al. (2024a)

	stimulation with Motor training and Conventional Therapy for improving motor function.		
1b	Neurodevelopmental techniques (Bobath approach) may produce greater improvements in motor function than conventional therapy.	1	Brock et al. (2022)
2	Brunnstrom movement therapy with conventional therapy may produce greater improvements in motor function than mirror therapy with conventional therapy.	1	Nimra et al. (2024)
1b	There is conflicting evidence about the effect of Forced use therapy using splint when compared to Bimanual training based on neuro-developmental treatment for improving motor function.	1	van der Lee et al. (1999)
1b	Impairment-oriented training may not have a difference in efficacy when compared to Conventional therapy for improving motor function.	1	Platz et al. (2009)
2	Task oriented circuit training may not have a difference in efficacy when compared to Neurodevelopmental techniques for improving motor function.	1	Jong-HoonMoon et al. (2018)

STROKE SEVERITY			
LoE	**Conclusion Statement**	**RCTs**	**References**
1b	Brunnstrom hand manipulation treatment with Conventional occupational therapy may not have a difference in efficacy when compared to Motor relearning programme based hand protocol with Conventional occupational therapy for improving stroke severity.	1	Pandian et al. (2012)
1b	Acupuncture may not have a difference in efficacy when compared to Physiotherapy Bobath for improving stroke severity.	1	Zhuang et al. (2012)
1b	Acupuncture may not have a difference in efficacy when compared to Acupuncture with Physiotherapy Bobath for improving stroke severity.	1	Zhuang et al. (2012)
1b	Physiotherapy Bobath may not have a difference in efficacy when compared to Acupuncture with Physiotherapy Bobath for improving stroke severity.	1	Zhuang et al. (2012)
1b	Low frequency Repetitive Transcranial Magnetic Stimulation to unaffected hemisphere with Brunnstrom movement therapy may not have a difference in efficacy when compared to Sham Repetitive Transcranial Magnetic Stimulation with Brunnstrom movement therapy for improving stroke severity.	1	Ozkeskin et al. (2017)
1b	Proprioceptive neuromuscular facilitation early may not have a difference in efficacy when compared to Cognitive therapeutic exercise (CTE) early or late for improving stroke severity.	1	Morreale et al. (2016)
2	Brunnstrom movement therapy with conventional therapy may produce greater improvements in stroke severity than mirror therapy with conventional therapy.	1	Nimra et al. (2024)
1b	PNF with NMES may produce greater improvements in stroke severity than PNF.	1	Sahin et al. (2012)

MUSCLE STRENGTH			
LoE	**Conclusion Statement**	**RCTs**	**References**
1b	Proprioceptive neuromuscular facilitation early may produce greater improvements in muscle strength than Cognitive therapeutic exercise (CTE) early or proprioceptive neuromuscular facilitation late or CTE late.	1	Morreale et al. (2016)

1b	Dual transcranial direct current stimulation with motor learning training may not have a difference in efficacy when compared to Sham dual transcranial direct current stimulation with motor learning training for improving muscle strength.	1	Lefebvre et al. (2013)
1b	Functional electrical stimulation with Brunnstrom Hand rehab and conventional rehab may produce greater improvements in muscle strength than Conventional Rehab.	1	Akter et al. (2023)
1b	High-frequency repetitive transcranial magnetic stimulation with Motor Learning may produce greater improvements in muscle strength than Sham repetitive transcranial magnetic stimulation with Motor Learning.	1	Shim & Lee (2023)
1b	Motor relearning with electrical stim may result in lesser improvements in muscle strength when compared to Bobath treatment with electrical stim.	1	El-Bahrawy et al. (2012)
1b	Neurodevelopmental techniques (Bobath approach) may not have a difference in efficacy when compared to conventional therapy for improving muscle strength.	1	Brock et al. (2022)
1b	Motor relearning programmes may not have a difference in efficacy when compared to neurodevelopmental techniques (Bobath approach) for improving muscle strength.	1	Langhammer & Stanghelle (2000)

SPASTICITY			
LoE	**Conclusion Statement**	**RCTs**	**References**
1b	Motor relearning with electrical stim may not have a difference in efficacy when compared to Bobath treatment with electrical stim for improving spasticity.	1	El-Bahrawy et al. (2012)
1b	Repetitive facilitative exercise (RFE) with botulinum toxin A injection, conventional self-training and conventional rehab may not have a difference in efficacy when compared to repetitive facilitative exercise (RFE) with conventional self-training and conventional rehab for improving spasticity.	1	Hokazono et al. (2022)
1b	Impairment oriented training Arm BASIS with usual treatment may not have a difference in efficacy when compared to usual treatment for improving spasticity.	1	Platz et al. (2005)
1b	Impairment oriented training Arm BASIS with usual treatment may not have a difference in efficacy when compared to Bobath therapy with usual treatment for improving spasticity.	1	Platz et al. (2005)
1b	Low frequency Repetitive Transcranial Magnetic Stimulation to unaffected hemisphere with Brunnstrom movement therapy may not have a difference in efficacy when compared to Sham Repetitive Transcranial Magnetic Stimulation with Brunnstrom movement therapy for improving spasticity.	1	Ozkeskin et al. (2017)
2	Task Specific Training may produce greater improvements in spasticity than Proprioceptive Neuromuscular Facilitation.	1	Anandan et al. (2020)
1b	Movement science based training may not have a difference in efficacy when compared to Bobath concept for improving spasticity.	1	van Vliet et al. (2005)
1b	Functional electrical stimulation with Brunnstrom Hand rehab and conventional rehab may produce greater improvements in spasticity than Conventional Rehab.	1	Akter et al. (2023)
1b	Constraint-induced movement therapy may produce greater improvements in spasticity than Motor learning programme.	1	Batool et al. (2015)
1b	Motor relearning programmes may not have a difference in efficacy when compared to neurodevelopmental techniques (Bobath approach) for improving spasticity.	1	Langhammer & Stanghelle (2000)

1b	PNF with NMES may produce greater improvements in spasticity than PNF.	1	Sahin et al. (2012)

RANGE OF MOTION			
LoE	**Conclusion Statement**	**RCTs**	**References**
1b	Repetitive facilitative exercise (RFE) with botulinum toxin A injection, conventional self-training and conventional rehab may produce greater improvements in range of motion than repetitive facilitative exercise (RFE) with conventional self-training and conventional rehab.	1	Hokazono et al. (2022)
2	Tracking training of finger and wrist (temporospatial processing) may produce greater improvements in range of motion than repetitive simple Movement training.	1	Carey et al. (2007)
1b	PNF with NMES may produce greater improvements in range of motion than PNF.	1	Sahin et al. (2012)

PROPRIOCEPTION			
LoE	**Conclusion Statement**	**RCTs**	**References**
1b	Low frequency Repetitive Transcranial Magnetic Stimulation to unaffected hemisphere with Brunnstrom movement therapy may produce greater improvements in proprioception than Sham Repetitive Transcranial Magnetic Stimulation with Brunnstrom movement therapy.	1	Ozkeskin et al. (2017)

2. Activities

ACTIVITIES OF DAILY LIVING			
LoE	**Conclusion Statement**	**RCTs**	**References**
2	Motor learning program may produce greater improvements in performance of activities of daily living than Mirror therapy.	1	Jan et al. (2019)
1b	Proprioceptive neuromuscular facilitation early may not have a difference in efficacy when compared to Cognitive therapeutic exercise (CTE) early or proprioceptive neuromuscular facilitation late or CTE late for improving performance of activities of daily living.	1	Morreale et al. (2016)
1b	Acupuncture may not have a difference in efficacy when compared to Physiotherapy Bobath for improving performance of activities of daily living.	1	Zhuang et al. (2012)
1b	Acupuncture may not have a difference in efficacy when compared to Acupuncture with Physiotherapy Bobath for improving performance of activities of daily living.	1	Zhuang et al. (2012)
1b	Physiotherapy Bobath may not have a difference in efficacy when compared to Acupuncture with Physiotherapy Bobath for improving performance of activities of daily living.	1	Zhuang et al. (2012)
1b	Constraint-induced movement therapy may produce greater improvements in performance of activities of daily living than Motor learning programme.	1	Batool et al. (2015)
1b	There is conflicting evidence about the effect of Constraint-induced movement therapy when compared to Bobath therapy for improving performance of activities of daily living.	1	Hüseyinsinoğlu et al. (2012)
1b	Robotic training (InMotion ARM) with motor learning may not have a difference in efficacy when compared to Motor learning for improving performance of activities of daily living.	1	McCabe et al. (2015)

2	Shaping training with constraint-induced movement therapy transfer package (TP) may not have a difference in efficacy when compared to Shaping training for improving performance of activities of daily living.	1	Taub et al. (2013)
1b	Constraint-induced movement therapy may produce greater improvements in performance of activities of daily living than motor relearning program.	1	Shah et al. (2016)
1b	Task-specific training may produce greater improvements in performance of activities of daily living than training using the Bobath approach.	1	Arya et al. (2012)
1b	Movement science based training may not have a difference in efficacy when compared to Bobath concept for improving performance of activities of daily living.	1	van Vliet et al. (2005)
1b	High-frequency repetitive transcranial magnetic stimulation with Motor Learning may not have a difference in efficacy when compared to Sham repetitive transcranial magnetic stimulation with Motor Learning for improving performance of activities of daily living.	1	Shim & Lee (2023)
1b	Neurodevelopmental techniques (Bobath approach) may not have a difference in efficacy when compared to conventional therapy for improving performance of activities of daily living.	2	Brock et al. (2022); Gelber et al. (1995)
1b	Motor relearning programmes may not have a difference in efficacy when compared to conventional therapy for improving performance of activities of daily living.	1	Walker et al. (2012)
1b	Forced use therapy using splint may produce greater improvements in performance of activities of daily living than Bimanual training based on neuro-developmental treatment.	1	van der Lee et al. (1999)
1b	PNF with NMES may produce greater improvements in performance of activities of daily living than PNF.	1	Sahin et al. (2012)
2	There is conflicting evidence about the effect of Task oriented circuit training when compared to Neurodevelopmental techniques for improving performance of activities of daily living.	1	Jong-HoonMoon et al. (2018)
1b	Motor relearning programmes may not have a difference in efficacy when compared to neurodevelopmental techniques (Bobath approach) for improving performance of activities of daily living.	1	Langhammer & Stanghelle (2000)

DEXTERITY			
LoE	**Conclusion Statement**	**RCTs**	**References**
2	There is conflicting evidence about the comparative effects of different approaches to Motor relearning programmes for improving dexterity.	1	Iosa et al. (2013)
2	Finger movement tracking training may not have a difference in efficacy when compared to Waitlist for improving dexterity.	1	Carey et al. (2002)
1b	Motor relearning with electrical stim may not have a difference in efficacy when compared to Bobath treatment with electrical stim for improving dexterity.	1	El-Bahrawy et al. (2012)
1b	Repetitive facilitative exercise (RFE) with botulinum toxin A injection, conventional self-training and conventional rehab may produce greater improvements in dexterity than repetitive facilitative exercise (RFE) with conventional self-training and conventional rehab.	1	Hokazono et al. (2022)
2	Interleaved combination method (ICM) repetitive transcranial magnetic stimulation with motor training may not have a difference in efficacy when compared to Preconditioned combination method (PCM) repetitive transcranial magnetic stimulation with motor training for improving dexterity.	1	Kwon et al. (2014)

1b	Dual transcranial direct current stimulation with motor learning training may produce greater improvements in dexterity than Sham dual transcranial direct current stimulation with motor learning training.	1	Lefebvre et al. (2013)
2	Dual transcranial direct current stimulation with motor skill learning may produce greater improvements in dexterity than Sham dual transcranial direct current stimulation with motor skill learning.	1	Lefebvre et al. (2015)
2	Electromyography-triggered neuromuscular electrical stimulation may not have a difference in efficacy when compared to Tracking training (a structured motor learning program) or electromyography-triggered neuromuscular electrical stimulation with tracking training for improving dexterity.	1	Bhatt et al. (2007)
2	Tracking training of finger and wrist (temporospatial processing) may produce greater improvements in dexterity than repetitive simple Movement training.	1	Carey et al. (2007)
1b	Constraint-induced movement therapy may not have a difference in efficacy when compared to motor relearning program for improving dexterity.	1	Shah et al. (2016)
1b	Movement science based training may not have a difference in efficacy when compared to Bobath concept for improving dexterity.	1	van Vliet et al. (2005)
1b	High-frequency repetitive transcranial magnetic stimulation with Motor Learning may not have a difference in efficacy when compared to Sham repetitive transcranial magnetic stimulation with Motor Learning for improving dexterity.	1	Shim & Lee (2023)
1b	High-frequency repetitive transcranial magnetic stimulation with Motor training and Conventional therapy may not have a difference in efficacy when compared to Sham repetitive transcranial magnetic stimulation with Motor training and Conventional Therapy for improving dexterity.	1	Lee et al. (2024a)
2	Neurodevelopmental techniques (Bobath approach) may not have a difference in efficacy when compared to conventional therapy for improving dexterity.	1	Gelber et al. (1995)
1b	Motor relearning programmes may not have a difference in efficacy when compared to conventional therapy for improving dexterity.	1	Walker et al. (2012)

Key Points

- Brunnstrom hand manipulation treatment with Conventional occupational therapy may be beneficial for improving motor function, but not stroke severity, after stroke when compared to Motor relearning programme based hand protocol with Conventional occupational therapy.
- Early Sitting, Standing and Walking With Bobath Training (a bobath approach developed by the researchers) may be beneficial for improving motor function after stroke when compared to Bobath Training.
- Repetitive facilitative exercise (RFE) with botulinum toxin A injection, conventional self-training and conventional rehab may be beneficial for improving motor function, dexterity, and range of motion, but not spasticity, after stroke when compared to repetitive facilitative exercise (RFE) with conventional self-training and conventional rehab.
- Impairment oriented training Arm BASIS with usual treatment may not be beneficial for improving motor function and spasticity after stroke when compared to usual treatment.
- Impairment oriented training Arm BASIS with usual treatment may not be beneficial for improving spasticity after stroke when compared to Bobath therapy with usual treatment; the literature is mixed regarding motor function.
- Acupuncture may not be beneficial for improving motor function, performance of activities of daily living, and stroke severity after stroke when compared to Physiotherapy Bobath.

- Acupuncture may not be beneficial for improving motor function, performance of activities of daily living, and stroke severity after stroke when compared to Acupuncture with Physiotherapy Bobath.
- Physiotherapy Bobath may not be beneficial for improving motor function, performance of activities of daily living, and stroke severity after stroke when compared to Acupuncture with Physiotherapy Bobath.
- Electromyography-triggered neuromuscular electrical stimulation may not be beneficial for improving motor function and dexterity after stroke when compared to Tracking training (a structured motor learning program) or electromyography-triggered neuromuscular electrical stimulation with tracking training.
- Constraint-induced movement therapy may not be beneficial for improving motor function after stroke when compared to Bobath therapy; the literature is mixed regarding performance of activities of daily living.
- Tracking training of finger and wrist (temporospatial processing) may be beneficial for improving dexterity and range of motion, but not motor function, after stroke when compared to repetitive simple Movement training.
- Integrated behavioural and physical therapy with electromyography biofeedback may not be beneficial for improving motor function after stroke when compared to Exercise physical therapy (Bobath approach).
- Robotic training (InMotion ARM) with motor learning may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Motor learning.
- Shaping training with constraint-induced movement therapy transfer package (TP) may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Shaping training.
- Constraint-induced movement therapy may be beneficial for improving performance of activities of daily living, but not motor function and dexterity, after stroke when compared to motor relearning program.
- Proprioceptive neuromuscular facilitation with virtual reality (Nintendo Wii) may not be beneficial for improving motor function after stroke when compared to proprioceptive neuromuscular facilitation or Wii.
- Task Specific Training may be beneficial for improving motor function and spasticity after stroke when compared to Proprioceptive Neuromuscular Facilitation.
- Task-specific training may be beneficial for improving motor function and performance of activities of daily living after stroke when compared to training using the Bobath approach.
- Movement science based training may not be beneficial for improving motor function, dexterity, performance of activities of daily living, and spasticity after stroke when compared to Bobath concept.
- The literature is mixed regarding the effect of Visuo-Motor Grip Force Tracking Task Training of the paretic hand with Anodal Unilateral transcranial direct current stimulation on improvement of motor function after stroke when compared to Visuo-Motor Grip Force Tracking Task Training of the paretic hand with Placebo transcranial direct current stimulation.
- Visuo-Motor Grip Force Tracking Task Training of the paretic hand with Anodal Unilateral transcranial direct current stimulation may not be beneficial for improving motor function after stroke when compared to Visuo-Motor Grip Force Tracking Task Training of the paretic hand with Bilateral transcranial direct current stimulation.
- Neuromuscular electrical stimulation with conventional exercise may be beneficial for improving motor function after stroke when compared to conventional training.
- Functional electrical stimulation with Brunnstrom Hand rehab and conventional rehab may be beneficial for improving motor function, spasticity, and muscle strength after stroke when compared to Conventional Rehab.
- High-frequency repetitive transcranial magnetic stimulation with Motor Learning may be beneficial for improving muscle strength, but not motor function, dexterity, and performance of activities of daily living, after stroke when compared to Sham repetitive transcranial magnetic stimulation with Motor Learning.
- High-frequency repetitive transcranial magnetic stimulation with Motor training and Conventional therapy may not be beneficial for improving motor function and dexterity after stroke when compared to Sham repetitive transcranial magnetic stimulation with Motor training and Conventional Therapy.
- Neurodevelopmental techniques (Bobath approach) may be beneficial for improving motor function, but not dexterity, performance of activities of daily living, and muscle strength, after stroke when compared to conventional therapy.

- Brunnstrom movement therapy with conventional therapy may be beneficial for improving motor function and stroke severity after stroke when compared to mirror therapy with conventional therapy.
- Forced use therapy using splint may be beneficial for improving performance of activities of daily living after stroke when compared to Bimanual training based on neuro-developmental treatment; the literature is mixed regarding motor function.
- Impairment-oriented training may not be beneficial for improving motor function after stroke when compared to Conventional therapy.
- Finger movement tracking training may not be beneficial for improving dexterity after stroke when compared to Waitlist.
- Motor relearning with electrical stim may not be beneficial for improving dexterity and spasticity after stroke when compared to Bobath treatment with electrical stim.
- Motor relearning with electrical stim may be less beneficial than Bobath treatment with electrical stim for improving muscle strength after stroke.
- Interleaved combination method (ICM) repetitive transcranial magnetic stimulation with motor training may not be beneficial for improving dexterity after stroke when compared to Preconditioned combination method (PCM) repetitive transcranial magnetic stimulation with motor training.
- Dual transcranial direct current stimulation with motor learning training may be beneficial for improving dexterity, but not muscle strength, after stroke when compared to Sham dual transcranial direct current stimulation with motor learning training.
- Dual transcranial direct current stimulation with motor skill learning may be beneficial for improving dexterity after stroke when compared to Sham dual transcranial direct current stimulation with motor skill learning.
- Motor relearning programmes may not be beneficial for improving dexterity and performance of activities of daily living after stroke when compared to conventional therapy.
- Motor learning program may be beneficial for improving performance of activities of daily living after stroke when compared to Mirror therapy.
- Proprioceptive neuromuscular facilitation early may be beneficial for improving muscle strength, but not performance of activities of daily living, after stroke when compared to Cognitive therapeutic exercise (CTE) early or proprioceptive neuromuscular facilitation late or CTE late.
- Constraint-induced movement therapy may be beneficial for improving performance of activities of daily living and spasticity after stroke when compared to Motor learning programme.
- Low frequency Repetitive Transcranial Magnetic Stimulation to unaffected hemisphere with Brunnstrom movement therapy may be beneficial for improving proprioception, but not spasticity and stroke severity, after stroke when compared to Sham Repetitive Transcranial Magnetic Stimulation with Brunnstrom movement therapy.
- Motor relearning programmes may not be beneficial for improving muscle strength, spasticity, and performance of activities of daily living after stroke when compared to neurodevelopmental techniques (Bobath approach).
- Proprioceptive neuromuscular facilitation early may not be beneficial for improving stroke severity after stroke when compared to Cognitive therapeutic exercise (CTE) early or late.
- PNF with NMES may be beneficial for improving stroke severity, spasticity, range of motion, and performance of activities of daily living after stroke when compared to PNF.
- Task oriented circuit training may not be beneficial for improving motor function after stroke when compared to Neurodevelopmental techniques; the literature is mixed regarding performance of activities of daily living.
- Different approaches to Motor relearning programmes may not have a difference in efficacy when compared with one another for improving motor function; the literature is mixed regarding dexterity.

Summary of Key Points: Neurodevelopmental Techniques

Intervention	Control(s)	Function domain(s)	Effect

Brunnstrom hand manipulation treatment with Conventional occupational therapy	Motor relearning programme based hand protocol with Conventional occupational therapy	Motor function	+
Brunnstrom hand manipulation treatment with Conventional occupational therapy	Motor relearning programme based hand protocol with Conventional occupational therapy	Stroke severity	−
Early Sitting, Standing and Walking With Bobath Training (a bobath approach developed by the researchers)	Bobath Training	Motor function	+
Motor relearning programmes	One another (different approaches compared)	Motor function	−
Motor relearning programmes	One another (different approaches compared)	Dexterity	=
Repetitive facilitative exercise (RFE) with botulinum toxin A injection, conventional self-training and conventional rehab	repetitive facilitative exercise (RFE) with conventional self-training and conventional rehab	Motor function, dexterity, range of motion	+
Repetitive facilitative exercise (RFE) with botulinum toxin A injection, conventional self-training and conventional rehab	repetitive facilitative exercise (RFE) with conventional self-training and conventional rehab	Spasticity	−
Impairment oriented training Arm BASIS with usual treatment	usual treatment	Motor function, spasticity	−
Impairment oriented training Arm BASIS with usual treatment	Bobath therapy with usual treatment	Spasticity	−
Impairment oriented training Arm BASIS with usual treatment	Bobath therapy with usual treatment	Motor function	=
Acupuncture	Physiotherapy Bobath	Motor function, performance of activities of daily living, stroke severity	−
Acupuncture	Acupuncture with Physiotherapy Bobath	Motor function, performance of activities of daily living, stroke severity	−
Physiotherapy Bobath	Acupuncture with Physiotherapy Bobath	Motor function, performance of activities of daily living, stroke severity	−
Electromyography-triggered neuromuscular electrical stimulation	Tracking training (a structured motor learning program) or electromyography-triggered neuromuscular electrical stimulation with tracking training	Motor function, dexterity	−
Constraint-induced movement therapy	Bobath therapy	Motor function	−
Constraint-induced movement therapy	Bobath therapy	Performance of activities of daily living	=
Tracking training of finger and wrist (temporospatial processing)	repetitive simple Movement training	Dexterity, range of motion	+
Tracking training of finger and wrist (temporospatial processing)	repetitive simple Movement training	Motor function	−
Integrated behavioural and physical therapy with electromyography biofeedback	Exercise physical therapy (Bobath approach)	Motor function	−

Robotic training (InMotion ARM) with motor learning	Motor learning	Motor function, performance of activities of daily living	–
Shaping training with constraint-induced movement therapy transfer package (TP)	Shaping training	Motor function, performance of activities of daily living	–
Constraint-induced movement therapy	motor relearning program	Performance of activities of daily living	+
Constraint-induced movement therapy	motor relearning program	Motor function, dexterity	–
Proprioceptive neuromuscular facilitation with virtual reality (Nintendo Wii)	proprioceptive neuromuscular facilitation or Wii	Motor function	–
Task Specific Training	Proprioceptive Neuromuscular Facilitation	Motor function, spasticity	+
Task-specific training	training using the Bobath approach	Motor function, performance of activities of daily living	+
Movement science based training	Bobath concept	Motor function, dexterity, performance of activities of daily living, spasticity	–
Visuo-Motor Grip Force Tracking Task Training of the paretic hand with Anodal Unilateral transcranial direct current stimulation	Visuo-Motor Grip Force Tracking Task Training of the paretic hand with Placebo transcranial direct current stimulation	Motor function	=
Visuo-Motor Grip Force Tracking Task Training of the paretic hand with Anodal Unilateral transcranial direct current stimulation	Visuo-Motor Grip Force Tracking Task Training of the paretic hand with Bilateral transcranial direct current stimulation	Motor function	–
Neuromuscular electrical stimulation with conventional exercise	conventional training	Motor function	+
Functional electrical stimulation with Brunnstrom Hand rehab and conventional rehab	Conventional Rehab	Motor function, spasticity, muscle strength	+
High-frequency repetitive transcranial magnetic stimulation with Motor Learning	Sham repetitive transcranial magnetic stimulation with Motor Learning	Muscle strength	+
High-frequency repetitive transcranial magnetic stimulation with Motor Learning	Sham repetitive transcranial magnetic stimulation with Motor Learning	Motor function, dexterity, performance of activities of daily living	–
High-frequency repetitive transcranial magnetic stimulation with Motor training and Conventional therapy	Sham repetitive transcranial magnetic stimulation with Motor training and Conventional Therapy	Motor function, dexterity	–
Neurodevelopmental techniques (Bobath approach)	conventional therapy	Motor function	+
Neurodevelopmental techniques (Bobath approach)	conventional therapy	Dexterity, performance of activities of daily living, muscle strength	–
Brunnstrom movement therapy with conventional therapy	mirror therapy with conventional therapy	Motor function, stroke severity	+
Forced use therapy using splint	Bimanual training based on neuro-developmental treatment	Performance of activities of daily living	+
Forced use therapy using splint	Bimanual training based on neuro-developmental treatment	Motor function	=

Impairment-oriented training	Conventional therapy	Motor function	–
Finger movement tracking training	Waitlist	Dexterity	–
Motor relearning with electrical stim	Bobath treatment with electrical stim	Dexterity, spasticity, muscle strength	–
Interleaved combination method (ICM) repetitive transcranial magnetic stimulation with motor training	Preconditioned combination method (PCM) repetitive transcranial magnetic stimulation with motor training	Dexterity	–
Dual transcranial direct current stimulation with motor learning training	Sham dual transcranial direct current stimulation with motor learning training	Dexterity	+
Dual transcranial direct current stimulation with motor learning training	Sham dual transcranial direct current stimulation with motor learning training	Muscle strength	–
Dual transcranial direct current stimulation with motor skill learning	Sham dual transcranial direct current stimulation with motor skill learning	Dexterity	+
Motor relearning programmes	conventional therapy	Dexterity, performance of activities of daily living	–
Motor learning program	Mirror therapy	Performance of activities of daily living	+
Proprioceptive neuromuscular facilitation early	Cognitive therapeutic exercise (CTE) early or proprioceptive neuromuscular facilitation late or CTE late	Muscle strength	+
Proprioceptive neuromuscular facilitation early	Cognitive therapeutic exercise (CTE) early or proprioceptive neuromuscular facilitation late or CTE late	Performance of activities of daily living	–
Constraint-induced movement therapy	Motor learning programme	Performance of activities of daily living, spasticity	+
Low frequency Repetitive Transcranial Magnetic Stimulation to unaffected hemisphere with Brunnstrom movement therapy	Sham Repetitive Transcranial Magnetic Stimulation with Brunnstrom movement therapy	Proprioception	+
Low frequency Repetitive Transcranial Magnetic Stimulation to unaffected hemisphere with Brunnstrom movement therapy	Sham Repetitive Transcranial Magnetic Stimulation with Brunnstrom movement therapy	Spasticity, stroke severity	–
Motor relearning programmes	neurodevelopmental techniques (Bobath approach)	Muscle strength, spasticity, performance of activities of daily living	–
Proprioceptive neuromuscular facilitation early	Cognitive therapeutic exercise (CTE) early or late	Stroke severity	–
PNF with NMES	PNF	Stroke severity, spasticity, range of motion, performance of activities of daily living	+
Task oriented circuit training	Neurodevelopmental techniques	Motor function	–
Task oriented circuit training	Neurodevelopmental techniques	Performance of activities of daily living	=

Bilateral Arm Training



Adapted from: https://www.newswise.com/articles/stroke-survivors-rehab-arms-with-in-home-device

A total of 34 RCTs were found that evaluated bilateral arm training for upper extremity motor rehabilitation. Nine RCTs compared bilateral arm training with conventional therapy (Arya et al. (2020); Easow et al. (2019); Lee et al. (2019); Meng et al. (2018); Lee et al. (2017a); Lee et al. (2013b); Stoykov et al. (2009); Morris et al. (2008); Desrosiers et al. (2005)). One RCT compared bilateral arm training combined with other interventions with exercise and custom physiotherapy protocols (Stinear et al. (2008)). Three RCTs evaluated bilateral arm training combined with other interventions (Bellay et al. (2015); Wu et al. (2010a); Cauraugh et al. (2005)). Two RCTs compared different approaches to bilateral arm training (RennerCIE et al. (2020); Summers et al. (2007)). Eight RCTs compared bilateral arm training combined with other interventions with unilateral arm training (Li et al. (2022d); Han & Kim (2016); Shim et al. (2015); Dispa et al. (2013); Yang et al. (2012); Whitall et al. (2011); Lin et al. (2010b); Cauraugh et al. (2009)). One RCT evaluated unilateral arm training combined with other interventions (Cauraugh et al. (2003b)). Five RCTs compared bilateral arm training combined with other interventions with conventional therapy (Mishr & Jose (2022); Wu et al. (2012a); Wu et al. (2011); Lin et al. (2009b); Luft et al. (2004)). Two RCTs compared bilateral arm training combined with other interventions with task-specific training (Stoykov et al. (2020); Waller et al. (2014)). Two RCTs compared bilateral arm training combined with other interventions with bilateral arm training (Fong et al. (2019); Song et al. (2015)). One RCT compared bilateral arm training with task-specific training (Kim et al. (2019b)).

In addition, 27 RCTs in which bilateral arm training formed part of a combined or comparative intervention are cross-referenced at the end of Table 2; their primary listings appear in other tables.

The methodological details and results of all 34 RCTs are presented in Table 2.

Table 2. RCTs Evaluating Bilateral Arm Training for Upper Extremity Motor Rehabilitation

Authors (Year) **Study Design (PEDro Score)** **Sample Size start** **Sample Size end** **Time post stroke category** **Study design**	**Interventions** **Duration: Session length, frequency per week for total number of weeks**	**Outcome Measures** **Result (direction of effect)**

Bilateral arm training compared to conventional therapy		
Arya et al. (2020) Pilot RCT (9) NStart=50 NEnd=50 TPS=Chronic A vs 0	E: Interlimb Coupling Exercises C: Conventional Neurophysiological Therapy Duration: 60min, 3x/wk, 8wks	E vs C: Fugl-Meyer Assessment (+exp) Upper Extremity (+exp) Lower Extremity (+exp) Rivermead Visual Gait Assessment (+exp) Functional Ambulation Category (+exp) Modified Rankin Scale (-)
Easow et al. (2019) RCT (7) NStart=30 NEnd=30 TPS=Acute A vs 0	E: Bilateral upper limb task training + Standard Care C: Standard Care Duration: 30min/d, 6d/wk, Standard Care; 20min/d, 6d/wk Bilateral training for duration of stay	E vs C: Action Research Arm Training (-) Functional Indepedence Measure (+exp) Nine-hole Peg Test (-)
Lee et al. (2019) RCT (6) NStart=30 NEnd=30 TPS=Subacute A vs 0	E: Bilateral Upper Arm Training C: General Upper Limb Rehabilitation Duration: 30min/d, 5d/wk, 4wks	E vs C: Fugl-Meyer Assessment (+exp)
Meng et al. (2018) RCT (7) NStart=128 NEnd=123 TPS=Acute A vs 0	E: Hand-Arm Bimanual Intensive Therapy C: Conventional Rehabilitation Program Duration: 1h (twice per d), 5d/wk for 2wk	E vs C: Fugl-Meyer Assessment (+exp) Action Research Arm Test (+exp) Neurophysiological Improvement Evaluation Motor evoked potentials amplitude (+exp) Resting Motion threshold (-) Central Motor Conduction Time (-)
Lee et al. (2017a) RCT (6) NStart=30 NEnd=30 TPS=Chronic A vs 0	E: Bilateral arm training C: Occupational therapy Duration: 1h/d, 5d/wk for 8wks	E vs C: FMA (+exp) BBT (+exp) modBI (+exp)
Lee et al. (2013b) RCT (6) NStart=26 NEnd=26 TPS=Chronic A vs 0	E: Bilateral training + conventional rehabilitation C: Conventional rehabilitation Duration: 30min, 3d/wk for 4wk	E vs C: Functional Independence Measure (+exp)
Stoykov et al. (2009) RCT (5) NStart=24 NEnd=24 TPS=Chronic A vs 0	E: Bilateral training C: Unilateral training Duration: 1hr/d, 3d/wk, 8wks	E vs C: Motor Assessment Scale upper arm function (+exp) advanced hand activity (-) hand movement (-) Motor Status Scale (-) shoulder/elbow (-) wrist/hand (-) Strength shoulder flexion (-) wrist flexion (-) wrist extension (-)

		elbow + grip (-)
Morris et al. (2008) RCT (8) NStart=106 NEnd=97 TPS=Acute A vs 0	E: Bilateral Arm Training C: Conventional unilateral Arm Training Duration: 20min/d, 5d/wk, 6wks	E vs C: Action Research Arm Test (-) Rivermead Motor Assessment (-) Nine-Hole Peg Test (-) Modified Barthel Index (-) Nottingham Health Profile (-) Hospital Anxiety and Depression Scale (-)
Desrosiers et al. (2005) RCT (6) NStart=41 NEnd=33 TPS=Subacute A vs 0	E: Bilateral training + conventional therapy C: Conventional therapy Duration: 45min, 15-20 sessions	E vs C: FMA (-) Grip strength (-) BBT (-) PPT (-) FNT (-) TEMPA, FIM, AMPS
Bilateral arm training combined with other interventions compared to exercise and custom physiotherapy protocols		
Stinear et al. (2008) RCT (5) NStart=32 NEnd=30 TPS=Chronic A + B vs A/B *Also in Table 3 (Exercise and Strength Training)*	E: Active-passive bilateral therapy (APBT) + Self-directed motor practice C: Self-directed motor practice on affected upper limb Duration: 10-15min, 3x/d, 7d/wk, 4wk	E vs C: grip strength (-) Fugl-Meyer Assessment (-) National Institutes of Health Stroke Scale (-)
Bilateral arm training combined with other interventions compared to control		
Bellay et al. (2015) RCT (5) NStart=40 NEnd=40 TPS=Subacute A vs B *Also in Table 6 (Constraint-Induced Movement Therapy (CIMT))*	E1: mCIMT + conventional physical therapy E2: HABIT (hand arm bimanual intensive training) + conventional physical therapy Duration: 30min/d, 6wk	E1 vs E2: Action Research Arm Test (+exp) Fugl-Meyer Upper Extremity (+exp)
Wu et al. (2010a) RCT (2) NStart=6 NEnd=6 TPS=Chronic A vs B *Also in Table 6 (Constraint-Induced Movement Therapy (CIMT))*	E1: Bilateral Arm Training E2: Constraint-Induced Therapy Duration: 2h/d, 5d/wk, 3wks	E1 vs E2: Fugl-Meyer Assessment (No stats) Action Research Arm Test (No stats) Motor Activity Log (No stats) fMRI (no stats)
Cauraugh et al. (2005) RCT (4) NStart=21 NEnd=21 TPS=Chronic A + B vs A + C *Also in Table 22 (Neuromuscular Electrical Stimulation (NMES))*	E1: Bilateral movements + active EMG-triggered neuromuscular stimulation E2: Unilateral + active EMG-triggered neuromuscular stimulation Duration: 90min/d, 4d/wk, 2wks	E1 vs E2: Reaction time (-) Movement time (+exp1) peak velocity (+exp1) deceleration time (+exp1)
Different approaches to bilateral arm training compared against one another		
RennerCIE et al. (2020) RCT (5)	E: Bilateral arm training C: Unilateral Training	E vs C: FMA UE total

NStart=69 NEnd=51 TPS=Subacute A vs B	Duration: 2x/d, 6wks	Proximal: (-) - Distal: (-) Grip force: (-) Grip Rate of rise of tension (-) Dorsal hand extension: (-) Isometric force and rate of rise of tension Rate of Rise of Tension DE: (-) Elbow flex: (-) Elbow extension: (-) Modified Ashworth Scale: (+Exp2)
Summers et al. (2007) RCT (6) NStart=12 NEnd=12 TPS=Chronic A vs B	E: Bilateral training C: Unilateral training Duration: 6d	E vs C: Modified Motor Assessment Scale (+exp) movement time (-)
Bilateral arm training combined with other interventions compared to unilateral arm training		
Li et al. (2022d) RCT (5) NStart=160 NEnd=160 TPS=Not Reported A vs B	E: Bilateral UL training + drug therapy C: Unilateral UL training + drug therapy Duration: 15min/d, 7d/wk, 8wks	E vs C: FMA-UE (-) UEFT (+exp) MBI (+exp) Brunnstrom (+exp)
Han & Kim (2016) RCT (4) NStart=25 NEnd=25 TPS=Chronic A vs B	E: Bilateral arm training C: Unilateral arm training Duration: 5x/wk for 6wk	E vs C: Box and Block Test (-) 3D motion analysis, Elbow Amplitude (-) Shoulder Amplitude (+exp) Shoulder variability (-) Elbow variability (-)
Shim et al. (2015) RCT (4) NStart=20 NEnd=20 TPS=Chronic A vs B	E: Bilateral training C: Unilateral training- affected hand Duration: 30min, 5x/wk for 6wk	E vs C: Manual Function Test affected (+exp) non-affected (-) Functional Independence Measure (+exp) motor (+exp) cognitive (-) Amount of activity affected hand (+exp) non-affected hand (-) Activity intensity- affected hand sedentary (+exp) light (-) lifestyle (-) moderate (+exp)
Dispa et al. (2013) Pilot RCT (7) NStart=10 NEnd=10 TPS=Chronic A + B1 vs A + B2	E: Bilateral repetitive task-oriented rehabilitation + rhythmic auditory cueing C: Unilateral repetitive task-oriented rehabilitation + rhythmic auditory cueing Duration: 60min/d, 3d/wk, 4wk	E vs C: Grip force (-) Purdue pegboard test (-) ABILHAND (-) SATIS-Stroke questionnaire for participation

Yang et al. (2012) Pilot RCT (6) NStart=21 NEnd=21 TPS=Chronic A1 vs A2 vs 0	E1: Unilateral robot-assisted training protocol E2: Bilateral robot-assisted training protocol C: Standard rehabilitation Duration: 90-105min/day, 5d/wk for 4wks	E1 vs E2 vs C: FMA (+exp1) Medical research council; Proximal (+exp2), Distal (+exp1) Grip strength(+exp1), Modified ashworth scale (-)
Whitall et al. (2011) RCT (6) NStart=111 NEnd=92 TPS=Chronic A + B vs C *Also in Table 14 (Music Therapy and Rhythmic Auditory Stimulation)*	E: Bilateral arm training with rhythmic auditory cueing C: Dose matched theraupetic unilateral therapeutic exercises (customized set of 4 exercises based on neurodevelopmental principles) Duration: 20min, 3d/wk for 6wks	E vs C: Fugl Meyer (-) Wolf Motor Arm Test (-) Elbow Strength (-) Shoulder Strength (-) SIS (-) emotion (-) hand (-) strength (-) fMRI (+exp) change Isokinetic strength paretic elbow extension (-) shoulder extension (-) wrist extension (+con) elbow flexion (-) Isokinetic strength nonparetic elbow extension (-) elbow flexion (+exp) should extension (-) wrist extension (-) wrist flexion (+exp)
Lin et al. (2010b) RCT (6) NStart=33 NEnd=33 TPS=Chronic A vs B	E: Bilateral training C: Unilateral training Duration: 2h, 5d/wk for 3wk	E vs C: Fugl Meyer Assessment (+exp) Functional Independence Measure (-) Motor Activity Log (-) kinematic outcomes
Cauraugh et al. (2009) RCT (5) NStart=30 NEnd=29 TPS=Chronic A + B1 vs A + B2 vs C *Also in Table 22 (Neuromuscular Electrical Stimulation (NMES))*	E1: Coupled bilateral training with load + EMG-triggered NMES E2: Coupled bilateral training with no load + EMG-triggered NMES C: unilateral arm training Duration: 90min/d, 4d/2wk	E1 vs C: BBT (+exp1) Motor reaction time (+exp1) E2 vs C: BBT (+exp1) Motor reaction time (-) E1 vs E2: BBT (-) Motor reaction time (+exp1) Sustained contraction task
Unilateral arm training combined with other interventions compared to control		
Cauraugh et al. (2003b) RCT (3) NStart=20 NEnd=20 TPS=Chronic A + B vs A + C *Also in Table 22 (Neuromuscular Electrical Stimulation (NMES))*	E1: Unilateral movement + EMG-NMES E2: Bilateral movement + EMG-NMES Duration: 6h over 2wks	E1 vs E2: EMG activation levels (+exp2)

Bilateral arm training combined with other interventions compared to conventional therapy		
Mishr & Jose (2022) Pilot RCT (5) NStart=20 NEnd=20 TPS=Chronic A + B vs 0	E: Resisted bimanual therapy with rhythmic auditory cues + Conventional therapy C: Conventional therapy Duration: 45-60 mins/d, 5ds/wk, 3wks	E vs C: WMFT (+exp) TIS (+exp) Berg balance scale (+exp) Dynamic gait index (+exp) 6-MWT peak heart rate (-) distance covered (-) heart rate recovery (-)
Wu et al. (2012a) RCT (8) NStart=42 NEnd=42 TPS=Chronic A + B vs A/B vs 0 *Also in Table 16 (Robotics)*	E1: Therapist-based Bilateral Arm Training E2: Robot-assisted Bilateral Arm Training C: Control treatment Duration: 90-105 min/d, 5d/wk, for 4 wks	E1 vs C: FMA (-) Proximal (-) Distal (+exp1) MAL (-) SIS (-) Unilateral task normalized movement time (+exp) normalized movement unit (+exp) Trunk NTD (+exp) Trunk contribution start (-) Trunk contribution middle (+exp) Angular change shoulder flexion (-) Angular change elbow extension (-) Bimanual task NMT (-) NMU (-) Trunk NTD (-) Trunk contribution start (-) Trunk contribution middle (+exp) Angular change shoulder flexion (-) elbow flexion (-) E2 vs C: Fugal-Meyer Assessment (-) MAL (-) SIS (+exp2) strength (+exp2) memory (-) emotion (-) communication (-) ADL/IADL (-) mobility (-) hand function (-) participation (-) physical function (+exp2) Unilateral task NMT (-) NMU (-) Trunk NTD (-) Trunk contribution start (-) Trunk contribution middle (-) Angular change shoulder flexion (+exp)

		Angular change elbow extension (-) Bimanual task NMT (-) NMU (-) Trunk NTD (-) Trunk contribution start (-) Trunk contribution middle (-) Angular change shoulder flexion (+exp) elbow flexion (-)
Wu et al. (2011) RCT (6) NStart=66 NEnd=64 TPS=Chronic A vs B vs 0 *Also in Table 6 (Constraint-Induced Movement Therapy (CIMT))*	E1: distributed constraint-induced therapy (dCIT) E2: Bilateral arm training C: control treatment Duration: 2h, 5d/wk, 3wk	E1 vs C: Wolf motor function test (+exp) Motor Activity Log (+exp) reaching kinematic variables in unilateral and bilateral tasks (+exp) E1 vs E2: Wolf motor function test (-) Motor Activity Log (+exp) E2 vs C: Wolf motor function test (-) Motor Activity Log (-) reaching kinematic variables in unilateral and bilateral tasks (+exp)
Lin et al. (2009b) RCT (8) NStart=60 NEnd=60 TPS=Chronic A vs B vs 0 *Also in Table 6 (Constraint-Induced Movement Therapy (CIMT))*	E1: Distributed Constraint-Induced Therapy E2: Bilateral Arm Training C: conventional care Duration: 2hr/d, 5d/wk, for 3wk	E1 vs C: Fugl-Meyer Assessment (+exp1) Proximal (-) Distal (+exp1) Functional Independence Measure (-) Self-care (-) Sphincter (-) Transfer Locomotion (+exp1) Communication (-) Social cognition (-) Motor Activity Log Amount of Use (+exp1) Quality of Movement (+exp1) Stroke Impact Scale (+exp1) Strength (-) Memory (-) Emotion (-) Communication (-) ADLs/IADLs (+exp1) Mobility (-) Hand function (+exp1) Participation E2 vs C: Fugl-Meyer Assessment (+exp2) Proximal (-) Distal (+exp2) Functional Independence Measure (-) Self-care (-) Sphincter (-) Transfer (-)

		Locomotion (-) Communication (-) Social cognition (-) Motor Activity Log Amount of Use (-) Quality of Movement (-) Stroke Impact Scale (-) Strength (-) Memory (-) Emotion (-) Communication (-) ADLs/IADLs (-) Mobility (-) Hand function (-) Participation (-) E1 vs E2: Fugl-Meyer Assessment (-) Proximal (-) Distal (-) Functional Independence Measure (-) Self-care (-) Sphincter (-) Transfer (-) Locomotion (+exp1) Communication (-) Social cognition (-) Motor Activity Log Amount of Use (+exp1) Quality of Movement (+exp1) Stroke Impact Scale (+exp1) Strength (-) Memory (-) Emotion (-) Communication (-) ADLs/IADLs (+exp1) Mobility (-) Hand function (-) Participation (+exp1)
Luft et al. (2004) RCT (6) NStart=26 NEnd=21 TPS=Chronic A + B vs 0 *Also in Table 14 (Music Therapy and Rhythmic Auditory Stimulation)*	E: Bilateral arm training + rhythmic auditory cueing C: Conventional therapy Duration: 1hr, 3d/wk for 6wk	E vs C: FMA (-) WMFT (-) UMAQ (-) Elbow strength (-) Shoulder strength (-) fMRI activation
Bilateral arm training combined with other interventions compared to task-specific training		
Stoykov et al. (2020) Pilot RCT (6) NStart=16 NEnd=15 TPS=Chronic A + B vs A + C	E: Bilateral motor priming (Bilateral training of wrist flexion and extension with mechanical assistance)+ task specific training C: Health care education + task specific training Duration: 2hr, 2-3x/wk, 15 x total	E vs C: Chedoke Arm & Hand Activity Index 9 (-) Fugl Meyer Upper Extremity (-)

Waller et al. (2014) RCT (7) NStart=30 NEnd=27 TPS=Chronic A + B vs A/B *Also in Table 4 (Task-Specific Training)*	E: Bilateral UE Training +Unilateral task-oriented training C: Unilateral task-oriented Training (using hand orthosis) Duration: 60min, 3x/wk, 6wk bilateral, 6wks unilateral & 60min, 3x/wk, 12 wk unilateral	E vs C: Fugl-Meyer Assessment (-) Wolf Motor Function Test (+exp) Box and Block Test (-) University of Maryland Arm Questionnaire for Stroke (-) Modified Ashworth Scale (-) fMRI activation (+exp)
Bilateral arm training combined with other interventions compared to bilateral arm training		
Fong et al. (2019) RCT (6) NStart=101 NEnd=96 TPS=Chronic A + B vs A/B *Also in Table 10 (Mirror Therapy)*	E: bilateral arm training with visual fb mirror therapy C: bilateral arm training without mirror therapy Duration: 30min x2/wk, 6wk	E vs C: FMA UE (-) Hand (+exp) ARAT (-) WMFT (-)
Song et al. (2015) RCT (4) NStart=40 NEnd=40 TPS=Chronic A + B vs A + C	E: Bilateral arm training + rhythmic auditory cueing C: Task-oriented bilateral arm training Duration: 30min, 5d/wk for 12wk	E vs C: BBT(+con) JTHFT(+con) mBI(+con)
Bilateral arm training compared to task-specific training		
Kim et al. (2019b) Pilot RCT (6) NStart=20 NEnd=20 TPS=Chronic A vs B *Also in Table 4 (Task-Specific Training)*	E: Occupation-based bilateral upper extremity training C: Task-based bilateral upper extremity training Duration: 30min, 5x/wk for 4wks	E vs C: Canadian Occupational Performance Measure: Performance (+exp), Satisfaction: (+exp)] [Stroke Impact Scale: Strength: (+exp) Activities of Daily Living and Instrumental Activities of Daily Living: (+exp) Mobility: (-) Hand Function: (-) Memory: (-) Communication: (-)Emotion: (+exp) Participant: (+exp)] [Action Research Arm Test: Grasp: (-) Grip: (-) Pinch: (-) Gross Movement: (-)] [Yonsei-Bilateral Activity Test: Quality of performance: (-), Satisfaction: (+exp)] [Accelerometer Use of unaffected side: (-) Use of affected side: (+exp)
Cross-Referenced RCTs: Combined or Comparative Interventions Involving Bilateral Arm Training (results included in this table's levels of evidence)		
Zhang et al. (2024c) RCT (6) NStart=50 NEnd=37 TPS=Subacute A + B vs A/B *Primary listing: Table 10 (Mirror Therapy)*	E: Mirror therapy + Bilateral arm training + Conventional therapy C: Bilateral Arm training + Conventional therapy Duration: Mirror therapy Group: 90 mins/d (60 mins of mirror therapy, 30 mins of bilateral hand function training), 5ds/wk, 4wks; Control group: 1 hour of additional conventional therapy and 30 mins of bilateral upper arm training, 5ds/wk, 4wks	E vs C: FMA-UE (+exp) Fractional amplitude of Low-frequency fluctuations contrealesional M1(+exp) ipsilesional superior frontal gyrus (+exp) bilateral precuneus (+exp) ipsilesional middle temporal gyrus (+con) Functional connectivity cM1-iM1 (+exp) cM1-Lignual gyrus (+con)
Lee et al. (2024b) RCT (8) NStart=35	E1: Unilateral mirror therapy + Unimanual training	E1 vs E2 vs E3 vs C: FMA - UE (-) CAHAI (-)

NEnd=32 TPS=Chronic A + B vs A + C *Primary listing: Table 10 (Mirror Therapy)*	E2: Unilateral mirror therapy + Bimanual training E3: Bilateral mirror therapy + Bimanual training C: Mirror therapy Duration: 60min/d, 5d/wk, 3-4wks (15 sessions)	EQ-5D (-) MAL (-) rNSA (-) E1 vs E2: FMA-UE (-) CAHAI (-) EQ-5D (-) MAL (-) rNSA (-) E2 vs E3: FMA-UE (-) CAHAI (+exp2) EQ-5D (+exp2) MAL (-) rNSA (-)
Choi & Kim (2022) RCT (4) NStart=20 NEnd=20 TPS=Subacute A + B vs A/B *Primary listing: Table 13 (Cognitive and Dual-Task Training)*	E: Occupation-Based Bilateral Upper Limb Training + Cognitive Behavioral Therapy C: Occupation-Based Bilateral Upper Limb Training + Conventional OT Duration: 30min/d, 5d/wk, 4wks	E vs C: ATQ-N (+exp) KDS (+exp) STAI-Korean (+exp) MFT (-) MAL (-) COPM (+exp)
Zhuang et al. (2021) RCT (8) NStart=36 NEnd=36 TPS=Subacute A + B vs A/B *Primary listing: Table 10 (Mirror Therapy)*	E1: Associated Mirror Therapy (Mirror Therapy + Bimanual Training) E2: Bimanual Training without mirroring + Conventional Care Duration: 30min, 5d/wk for 4wk	E1 vs E2: FMA (+exp) BBT (-) FIM (+exp)
Li Y.-C. et al. (2021) RCT (8) NStart=31 NEnd=31 TPS=Chronic A + B vs A + C *Primary listing: Table 16 (Robotics)*	E: Robotic Priming + MT (RMT) C: Robotic Priming + Bilateral Upper Limb Training (RBULT) Duration: 80-90min/d, 3d/wk, 6wks	E vs C: FMA-UE proximal (-) distal (+exp) rNSA (-) CAHAI (-) Accelerometer data (+exp)
Song Y.-H. & Lee H.-M. (2021) RCT (5) NStart=12 NEnd=10 TPS=Chronic A + B vs A/B *Primary listing: Table 17 (Virtual Reality)*	E: VR-based bilateral arm training + conventional rehab C: bilateral arm training Duration: 30min/d, 5d/wk, 4wks	E vs C: MFT (-) Two-point discrimination test (-) EMG (-) Proprioceptive test (+exp) EEG (-)
Smith et al. (2021) Pilot RCT (6) NStart=23 NEnd=19 TPS=Acute A + B vs 0 *Primary listing: Table 17 (Virtual Reality)*	E: Bimanual, lever-driven wheelchair (LARA) for stationary arm exercise and overground ambulation + Videogame C: Conventional Arm Exercices Duration: 30min/d, 5d/wk, 3wks	E vs C: FMA-UE (-) BBT (-) Grip Strength (-) MAS (-) Pain VAS (-) 10MWT (-)

Jiang et al. (2021b) RCT (9) NStart=60 NEnd=57 TPS=Chronic A1 vs A2 *Primary listing: Table 7 (Trunk Restraint)*	E1: Balance Training + Affected Hand at Low Back E2: Balance Training + Elevated Affected Shoulder C: Balance Training Duration: 30min/d, 5d/wk, 4wks	E1 vs E2 vs C: Fugl-Meyer Assessment- Upper Extremity (+exp2) Elbow Flexors Contraction Rate (+exp) Barthel Index (-) 10 metre walk test (+exp2)
Kale et al. (2019) RCT (4) NStart=30 NEnd=30 TPS=Not Reported A vs B *Primary listing: Table 6 (Constraint-Induced Movement Therapy (CIMT))*	E: Constraint Induced Movement Therapy C: Bilateral Arm Training Duration: 3hr/d, 5d/wk, 4wks CIMT, 1hr/d, 5d/wk, 4wks BAT	E vs C: Action Research Arm Test (-) Nine Hole Peg Test (-)
Jung et al. (2019) RCT (8) NStart=36 NEnd=36 TPS=Acute A vs B *Primary listing: Table 9 (Orthotics and Taping)*	E: Shoulder sling exercise (Sling Suspension System on Shoulder Subluxation) C: bilateral arm training Duration: 40min, 5x/wk for 4wks	E vs C: Subluxation (+exp) Shoulder Proprioception (+exp) Fugl-Meyers Upper Extremity (+exp) Manual Functional Test (+exp)
Li et al. (2019) RCT (6) NStart=23 NEnd=20 TPS=Chronic A vs B *Primary listing: Table 10 (Mirror Therapy)*	E1: Hospital-based task-oriented mirror therapy E2: Bilateral arm training Duration: 90min/d, 3d/wk, 4wks mirror therapy or bilateral arm training & 30-40min/d, 5d/wk, 4wks home training	E1 vs E2: Fugl-Meyer Upper Extremity: (-) Revised Nottingham Sensory Assessment (-) Chedoke Arm and Hand Activity Inventory: (-) Motor Activity Log (-) Stroke Impact Scale (+exp1)
Hung et al. (2019b) RCT (5) NStart=30 NEnd=30 TPS=Chronic A + B vs A + C vs A *Primary listing: Table 16 (Robotics)*	E1: Unilateral robot assisted therapy + mCIMT E2: Bilateral robot assisted therapy + bilateral arm training C: Robot assist therapy Duration: 40-45min robot + 45min BAT/mCIMT 3x/wk, for 6 wks 3x/wk for 6wk	E1 vs C: FMA (-) Chedoke arm and hand activity inventory (-) Goal attainment scale (+exp1) E2 vs C: FMA (-) Chedoke arm and hand activity inventory (-) Goal attainment scale (+exp2) E1 vs E2: FMA (-) Chedoke arm and hand activity inventory (-) Goal attainment scale (+exp2) MAS
Hsu et al. (2019) RCT (8) NStart=43 NEnd=43 TPS=Chronic A + B + C vs A/A + B *Primary listing: Table 16 (Robotics)*	E: Robot-Assisted Therapy with Bilateral Practice + Task-Specific Training C: Conventional Care + Task-Specific Training Duration: 50 min/d, 3d/wk, 4wks	E vs C: Motor Activity Log Amount of Use (+exp) Quantity of Movement (-) Fugl-Meyer Assessment Shoulder/ElbowForearm (+exp) Wrist (+exp) Hand (-)

Hung et al. (2019d) RCT (8) NStart=45 NEnd=44 TPS=Chronic A + B vs A + C vs A *Primary listing: Table 16 (Robotics)*	E1: Unilateral robot assisted therapy + CIMT (unilateral arm) E2: Bilateral robot assisted therapy + BAT (Bimanual tracking) C: Robot assisted therapy alone (both modes) Duration: 45min robot, 45min BAT/CIMT, 3x/wk, 6wk	E1 vs C: FMA (-) SIS (-) WMFT (-) NEADL (-) Kitchen (-) Living affairs (-) Leisure (-) Mobility (-) E2 vs C: FMA (-) SIS (-) WMFT (time, functional ability scale) (-) NEADL (-) Kitchen (-) Living affairs (-) Leisure (-) mobility (+con) E1 vs E2: FMA (+exp2) SIS (-) WMFT (time, functional ability scale) (-) NEADL (-) kitchen (-) living affairs (-) Leisure (-) Mobility (-)
Chuang et al. (2017) RCT (6) NStart=38 NEnd=38 TPS=Chronic A + B vs A + C *Primary listing: Table 22 (Neuromuscular Electrical Stimulation (NMES))*	E1: EMG-NMES + BAT E2: TENS +BAT Duration: 40min/d, 3d/wk for 4wk	E1 vs E2: FMA (-) Pain-NRS + Brief pain inventory
Lee et al. (2016c) RCT (6) NStart=20 NEnd=18 TPS=Chronic A + B vs A/B *Primary listing: Table 17 (Virtual Reality)*	E: VR bilateral arm training + conventional therapy C: Bilateral arm training + conventional therapy Duration: 30min/d, 3d/wk for 6wks bilateral training & 30min/d, 5d/wk for 6 wks conventional therapy	E vs C: JTHF (+exp) BBT (+exp) Grooved pegboard test (+exp) Digital manual muscle test (+exp)
Rodrigues et al. (2016) Pilot RCT (7) NStart=16 NEnd=16 TPS=Chronic A vs B *Primary listing: Table 10 (Mirror Therapy)*	E: Mirror therapy-based Bilateral Training C: Bilateral Training Duration: 1hr/d, 3d/wk, 4wk	E vs C: TEMPA Upper extremity performance test for the elderly (-)- Combined total (-) Unilateral tasks (-) Bilateral tasks (-) Functional scores (-) Unilateral tasks (-) Bilateral tasks (-) Task analysis (-) Unilateral tasks (-)

		Bilateral tasks (-) Fugl–Meyer Assessment (-); - proximal (-) - distal (-) Proprioception (-)
Wu et al. (2013a) RCT (7) NStart=53 NEnd=53 TPS=Chronic A1 vs A2 vs 0 *Primary listing: Table 16 (Robotics)*	E1: unilateral robot-assisted arm training E2: Bilateral robot-assisted arm training C: dose matched exercise Duration: 90-105 min/d, 5d/wk, 4 wk	E1/E2 vs C: Wolf Motor Function Test time (+exp) Motor Activity Log AOU (-) QOM (-) ABILHAND Questionnaire (-) functional ability scores (-) E1 vs E2: Wolf Motor Function Test time (+exp1) Motor Activity Log AOU (-) QOM (-) ABILHAND Questionnaire (-) functional ability scores (-) NMT andNMU variables in unilateral and bilateral tasks
van Delden et al. (2013) RCT (6) NStart=60 NEnd=55 TPS=Subacute A vs B vs 0 *Primary listing: Table 6 (Constraint-Induced Movement Therapy (CIMT))*	E1: Modified CIMT E2: Rhythmic auditory cueing bilateral training C: Dose-matched conventional treatment Duration: 1h, 3d/wk for 6wk	E1/E2 vs C: Action Research Arm Test (-) Nine Hole Peg Test (-) Motricity Index (-) Fugl-Meyer Assessment (-) Motor Activity Log (-) Stroke Impact Scale (-) Erasmus Modification of the Nottingham Sensory Assessment (-)
Brunner et al. (2012) RCT (8) NStart=30 NEnd=28 TPS=Subacute A + B vs A + C *Primary listing: Table 6 (Constraint-Induced Movement Therapy (CIMT))*	E: CIMT + Task-specific training C: Bimanual training + Task-specific training Duration: 4h/d, 7d/wk for 4wks	E vs C: Action research arm test (-) Nine hole peg test (-) MAL amount of use (-) quality of use (-)
Masiero et al. (2011) RCT (6) NStart=21 NEnd=21 TPS=Acute A vs B *Primary listing: Table 16 (Robotics)*	E: Robotic arm therapy (NeReBot) + conventional therapy C: Conventional therapy + proximal paretic arm exercise Duration: 120min, 5d/wk, 5wks	E vs C: Medical Research Council Scale Deltoid (-) Biceps (-) Triceps (-) Wrist Flexor (+exp) Wrist Extensor (-) Fugl-Meyer Assessment Shoulder, Elbow and Coordination subsections (-) Wrist and Hand subsections (-) total (-) Functional Independence Measure-motor (-)

		Modified Ashworth Scale (-) Frenchay Arm Test (-) Box and Block Test (-)
Cauraugh et al. (2011) RCT (6) NStart=18 NEnd=18 TPS=Chronic A + B1 vs A + B2 *Primary listing: Table 22 (Neuromuscular Electrical Stimulation (NMES))*	E1: Short-term bilateral arm training + EMG triggered NMES E2: Long-term bilateral arm training + EMG triggered NMES Duration: E1: 90 min, 1x/wk for 4 wks; E2: 90 min/session, 10 sessions over 16mo	E1 vs E2: BBT (+exp2) Reaction time (+exp2) Force produced (+exp2)
Hayner et al. (2010) RCT (4) NStart=13 NEnd=12 TPS=Chronic A vs B *Primary listing: Table 6 (Constraint-Induced Movement Therapy (CIMT))*	E1: mCIMT E2: Bilateral training Duration: 6h/d, 10d	E1 vs E2: WMFT (-) Canadian occupational performance measure (-)
Chan et al. (2009) RCT (8) NStart=20 NEnd=20 TPS=Chronic A + B vs A/B *Primary listing: Table 22 (Neuromuscular Electrical Stimulation (NMES))*	E: Bilateral arm training + FES + conventional OT C: Bilateral arm training + sham FES + conventional OT Duration: 90min/d, 3d/wk, 5wks	E vs C: Functional Test for the Hemiplegic Upper Extremity (+exp) FMA-UE (+exp) grip power (-) forward reaching distance (-) active range of motion of wrist (+exp) FIM (-) MAS (-)
Suputtitada et al. (2004) RCT (6) NStart=69 NEnd=69 TPS=Chronic A vs B *Primary listing: Table 6 (Constraint-Induced Movement Therapy (CIMT))*	E: CIMT C: Conservative treatment (bimanual-upper-extremity training by conservative neurodevelopmental technique) Duration: 6hr, 5d/wk, 2wk	E vs C: Action Research Arm Test (+exp) Dynamometer Pinch test (+exp) Dynamometer Hand grip strength (-)
Cauraugh & Kim (2003) RCT (3) NStart=26 NEnd=26 TPS=Chronic A + B1 vs A + B2 vs 0 *Primary listing: Table 22 (Neuromuscular Electrical Stimulation (NMES))*	E1: EMG-Triggered NMES (10s duration) with Bilateral Arm Training E2: EMG-Triggered NMES (5s duration) with Bilateral Arm Training C: Sham Stimulation with Bilateral Arm Training Duration: 90min, 2x/wk, 2wks	E1 vs E2: Box and Block Test (+exp1) Reaction Time (-) Sustained Muscle Contraction (-) E1/E2 vs C: Box and Block Test (+exp1, +exp2) Reaction Time (+exp1, exp2) Sustained Muscle Contraction (+exp1,+exp2)
van der Lee et al. (1999) RCT (7) NStart=66 NEnd=66 TPS=Chronic A vs B *Primary listing: Table 6 (Constraint-Induced Movement Therapy (CIMT))*	E: Forced use therapy using splint C: Bimanual training based on neuro-developmental treatment Duration: 6hr, 5d/wk for 2wk	E vs C: Action Research Arm Test (+exp) Motor Activity Log (+exp) Fugl-Meyer Assessment (-) Rehabilitation Activities Profile

Abbreviations and table notes: C=control group; D=days; E=experimental group; H=hours; Min=minutes; RCT=randomized controlled trial; TPS=time post stroke category (Acute: less than 30 days, Subacute: more than 1 month but less than 6 months, Chronic: over 6 months); Wk=weeks.

+exp indicates a statistically significant between groups difference at α=0.05 in favour of the experimental group

+exp1/+exp2/+exp3 indicates a statistically significant between groups difference at α=0.05 in favour of the first, second or third experimental group

+con indicates a statistically significant between groups difference at α=0.05 in favour of the control group

- indicates no statistically significant between groups differences at α=0.05

1. Body Functions and Structures

MOTOR FUNCTION			
LoE	**Conclusion Statement**	**RCTs**	**References**
1a	There is conflicting evidence about the effect of Bilateral arm training when compared to conventional therapy for improving motor function.	8	Arya et al. (2020); Easow et al. (2019); Lee et al. (2019); Meng et al. (2018); Lee et al. (2017a); Stoykov et al. (2009); Morris et al. (2008); Desrosiers et al. (2005)
2	Active-passive bilateral therapy (APBT) with Self-directed motor practice may not have a difference in efficacy when compared to Self-directed motor practice on affected upper limb for improving motor function.	1	Stinear et al. (2008)
2	Bilateral arm training combined with other interventions: some approaches may produce greater improvements in motor function than others.	1	Bellay et al. (2015)
2	Different approaches to bilateral arm training may not have a difference in efficacy when compared with one another for improving motor function.	1	RennerCIE et al. (2020)
1a	Bilateral arm training combined with other interventions may produce greater improvements in motor function than unilateral arm training.	5	Li et al. (2022d); Shim et al. (2015); Yang et al. (2012); Whitall et al. (2011); Lin et al. (2010b)
1a	There is conflicting evidence about the effect of Bilateral arm training combined with other interventions when compared to conventional therapy for improving motor function.	5	Mishr & Jose (2022); Wu et al. (2012a); Wu et al. (2011); Lin et al. (2009b); Luft et al. (2004)
1a	Distributed constraint-induced therapy may produce greater improvements in motor function than bilateral arm training.	2	Wu et al. (2011); Lin et al. (2009b)
1b	Bilateral UE Training with Unilateral task-oriented training may not have a difference in efficacy when compared to Unilateral task-oriented Training (using a hand orthosis) for improving motor function.	1	Waller et al. (2014)
1b	Bilateral arm training; visual fb mirror therapy may not have a difference in efficacy when compared to bilateral arm training without mirror therapy for improving motor function.	1	Fong et al. (2019)
1b	Bilateral arm training with functional electrical stimulation and conventional occupational therapy may produce greater improvements in motor function than Bilateral arm training with sham functional electrical stimulation and conventional occupational therapy.	1	Chan et al. (2009)
2	Constraint Induced Movement Therapy may not have a difference in efficacy when compared to Bilateral Arm Training for improving motor function.	1	Kale et al. (2019)
1b	Robotic arm therapy (NeReBot) with conventional therapy may not have a difference in efficacy when compared to Conventional therapy with proximal paretic arm exercise for improving motor function.	1	Masiero et al. (2011)

1b	Shoulder sling exercise (Sling Suspension System on Shoulder Subluxation) may produce greater improvements in motor function than bilateral arm training.	1	Jung et al. (2019)
2	Modified constraint-induced movement therapy may not have a difference in efficacy when compared to Bilateral training for improving motor function.	1	Hayner et al. (2010)
1b	There is conflicting evidence about the effect of Forced use therapy using splint when compared to Bimanual training based on neuro-developmental treatment for improving motor function.	1	van der Lee et al. (1999)
1b	Constraint-induced movement therapy may produce greater improvements in motor function than Conservative treatment (bimanual-upper-extremity training by conservative neurodevelopmental technique).	1	Suputtitada et al. (2004)
1b	Virtual reality bilateral arm training with conventional therapy may produce greater improvements in motor function than Bilateral arm training with conventional therapy.	1	Lee et al. (2016c)
1b	Hospital-based task-oriented mirror therapy may not have a difference in efficacy when compared to Bilateral arm training for improving motor function.	1	Li et al. (2019)
1b	Constraint-induced movement therapy with bilateral arm training may not have a difference in efficacy when compared to Bimanual task-related training for improving motor function.	1	Brunner et al. (2012)
2	Unilateral robot assisted therapy with modified constraint-induced movement therapy may not have a difference in efficacy when compared to Robot assist therapy for improving motor function.	1	Hung et al. (2019b)
2	Unilateral robot assisted therapy with modified constraint-induced movement therapy may not have a difference in efficacy when compared to Bilateral robot assisted therapy with bilateral arm training for improving motor function.	1	Hung et al. (2019b)
1b	Electromyography-triggered neuromuscular electrical stimulation with BAT may not have a difference in efficacy when compared to transcutaneous electrical nerve stimulation with BAT for improving motor function.	1	Chuang et al. (2017)
1b	Robot-Assisted Therapy with Bilateral Practice with Task-Specific Training may produce greater improvements in motor function than Conventional Care with Task-Specific Training.	1	Hsu et al. (2019)
1b	Unilateral robot assisted therapy with constraint-induced movement therapy (unilateral arm) may not have a difference in efficacy when compared to Robot assisted therapy alone (both modes) for improving motor function.	1	Hung et al. (2019d)
1b	Unilateral robot assisted therapy with constraint-induced movement therapy (unilateral arm) may result in lesser improvements in motor function when compared to Bilateral robot assisted therapy with BAT (Bimanual tracking).	1	Hung et al. (2019d)
1b	Associated Mirror Therapy (Mirror Therapy with Bimanual Training) may produce greater improvements in motor function than Bimanual Training without mirroring with Conventional Care.	1	Zhuang et al. (2021)
1b	Robotic Priming with mirror therapy (RMT) may not have a difference in efficacy when compared to Robotic Priming with Bilateral Upper Limb Training (RBULT) for improving motor function.	1	Li Y.-C. et al. (2021)
2	Virtual reality-based bilateral arm training with conventional rehab may not have a difference in efficacy when compared to bilateral arm training for improving motor function.	1	Song Y.-H. & Lee H.-M. (2021)
2	Occupation-Based Bilateral Upper Limb Training with Cognitive Behavioral Therapy may not have a difference in efficacy when	1	Choi & Kim (2022)

	compared to Occupation-Based Bilateral Upper Limb Training with Conventional occupational therapy for improving motor function.		
1b	Mirror therapy with Bilateral arm training and Conventional therapy may produce greater improvements in motor function than Bilateral Arm training with Conventional therapy.	1	Zhang et al. (2024c)
1b	Unilateral mirror therapy with Unimanual training may not have a difference in efficacy when compared to Mirror therapy for improving motor function.	1	Lee et al. (2024b)
1b	Unilateral mirror therapy with Unimanual training may not have a difference in efficacy when compared to Unilateral mirror therapy with Bimanual training for improving motor function.	1	Lee et al. (2024b)
1b	Unilateral mirror therapy with Bimanual training may not have a difference in efficacy when compared to Bilateral mirror therapy with Bimanual training for improving motor function.	1	Lee et al. (2024b)
2	Bilateral arm training with rhythmic auditory cueing may result in lesser improvements in motor function when compared to task-oriented bilateral arm training.	1	Song et al. (2015)
1b	Bilateral motor priming with task-specific training may not have a difference in efficacy when compared to health care education with task-specific training for improving motor function.	1	Stoykov et al. (2020)
1b	Unilateral robot-assisted arm training may produce greater improvements in motor function than Bilateral robot-assisted arm training.	1	Wu et al. (2013a)
1b	Modified constraint-induced movement therapy may not have a difference in efficacy when compared to Dose-matched conventional treatment for improving motor function.	1	van Delden et al. (2013)
1b	Bimanual, lever-driven wheelchair (LARA) for stationary arm exercise and overground ambulation with Videogame may not have a difference in efficacy when compared to Conventional Arm Exercises for improving motor function.	1	Smith et al. (2021)
1b	Mirror therapy-based Bilateral Training may not have a difference in efficacy when compared to Bilateral Training for improving motor function.	1	Rodrigues et al. (2016)
1b	Balance Training with Affected Hand at Low Back may not have a difference in efficacy when compared to Balance Training for improving motor function.	1	Jiang et al. (2021b)
1b	Balance Training with Elevated Affected Shoulder may produce greater improvements in motor function than Balance Training.	1	Jiang et al. (2021b)

STROKE SEVERITY			
LoE	**Conclusion Statement**	**RCTs**	**References**
2	Active-passive bilateral therapy (APBT) with Self-directed motor practice may not have a difference in efficacy when compared to Self-directed motor practice on affected upper limb for improving stroke severity.	1	Stinear et al. (2008)
2	Bilateral arm training combined with other interventions may produce greater improvements in stroke severity than unilateral arm training.	1	Li et al. (2022d)
1b	Bilateral arm training may not have a difference in efficacy when compared to conventional therapy for improving stroke severity.	1	Arya et al. (2020)

MUSCLE STRENGTH			
LoE	**Conclusion Statement**	**RCTs**	**References**
1b	Bilateral arm training may not have a difference in efficacy when compared to conventional therapy for improving muscle strength.	2	Stoykov et al. (2009); Desrosiers et al. (2005)
2	Active-passive bilateral therapy (APBT) with Self-directed motor practice may not have a difference in efficacy when compared to Self-directed motor practice on affected upper limb for improving muscle strength.	1	Stinear et al. (2008)
2	Different approaches to bilateral arm training may not have a difference in efficacy when compared with one another for improving muscle strength.	1	RennerCIE et al. (2020)
1b	Bilateral arm training with functional electrical stimulation and conventional occupational therapy may not have a difference in efficacy when compared to Bilateral arm training with sham functional electrical stimulation and conventional occupational therapy for improving muscle strength.	1	Chan et al. (2009)
1b	Robotic arm therapy (NeReBot) with conventional therapy may not have a difference in efficacy when compared to Conventional therapy with proximal paretic arm exercise for improving muscle strength.	1	Masiero et al. (2011)
1b	There is conflicting evidence about the effect of Constraint-induced movement therapy when compared to Conservative treatment (bimanual-upper-extremity training by conservative neurodevelopmental technique) for improving muscle strength.	1	Suputtitada et al. (2004)
1b	Virtual reality bilateral arm training with conventional therapy may produce greater improvements in muscle strength than Bilateral arm training with conventional therapy.	1	Lee et al. (2016c)
1b	Bilateral arm training with rhythmic auditory cueing may not have a difference in efficacy when compared to Conventional therapy for improving muscle strength.	1	Luft et al. (2004)
1b	Short-term bilateral arm training with electromyography triggered neuromuscular electrical stimulation may result in lesser improvements in muscle strength when compared to long-term bilateral arm training with electromyography triggered neuromuscular electrical stimulation.	1	Cauraugh et al. (2011)
1a	Bilateral arm training combined with other interventions may not have a difference in efficacy when compared to unilateral arm training for improving muscle strength.	3	Dispa et al. (2013); Yang et al. (2012); Whitall et al. (2011)
1b	Modified constraint-induced movement therapy may not have a difference in efficacy when compared to Dose-matched conventional treatment for improving muscle strength.	1	van Delden et al. (2013)
1b	Bimanual, lever-driven wheelchair (LARA) for stationary arm exercise and overground ambulation with Videogame may not have a difference in efficacy when compared to Conventional Arm Exercises for improving muscle strength.	1	Smith et al. (2021)

SPASTICITY			
LoE	**Conclusion Statement**	**RCTs**	**References**
2	Bilateral arm training: some approaches may produce greater improvements in spasticity than others.	1	RennerCIE et al. (2020)
1b	Bilateral UE Training with Unilateral task-oriented training may not have a difference in efficacy when compared to Unilateral task-oriented Training (using a hand orthosis) for improving spasticity.	1	Waller et al. (2014)

1b	Bilateral arm training with functional electrical stimulation and conventional occupational therapy may not have a difference in efficacy when compared to Bilateral arm training with sham functional electrical stimulation and conventional occupational therapy for improving spasticity.	1	Chan et al. (2009)
1b	Robotic arm therapy (NeReBot) with conventional therapy may not have a difference in efficacy when compared to Conventional therapy with proximal paretic arm exercise for improving spasticity.	1	Masiero et al. (2011)
1b	Bilateral arm training combined with other interventions may not have a difference in efficacy when compared to unilateral arm training for improving spasticity.	1	Yang et al. (2012)
1b	Bimanual, lever-driven wheelchair (LARA) for stationary arm exercise and overground ambulation with Videogame may not have a difference in efficacy when compared to Conventional Arm Exercises for improving spasticity.	1	Smith et al. (2021)

RANGE OF MOTION			
LoE	**Conclusion Statement**	**RCTs**	**References**
1b	Bilateral arm training with functional electrical stimulation and conventional occupational therapy may produce greater improvements in range of motion than Bilateral arm training with sham functional electrical stimulation and conventional occupational therapy.	1	Chan et al. (2009)

PROPRIOCEPTION			
LoE	**Conclusion Statement**	**RCTs**	**References**
1b	Shoulder sling exercise (Sling Suspension System on Shoulder Subluxation) may produce greater improvements in proprioception than bilateral arm training.	1	Jung et al. (2019)
1b	Hospital-based task-oriented mirror therapy may not have a difference in efficacy when compared to Bilateral arm training for improving proprioception.	1	Li et al. (2019)
1b	Robotic Priming with mirror therapy (RMT) may not have a difference in efficacy when compared to Robotic Priming with Bilateral Upper Limb Training (RBULT) for improving proprioception.	1	Li Y.-C. et al. (2021)
2	There is conflicting evidence about the effect of Virtual reality-based bilateral arm training with conventional rehab when compared to bilateral arm training for improving proprioception.	1	Song Y.-H. & Lee H.-M. (2021)
1b	Unilateral mirror therapy with Unimanual training may not have a difference in efficacy when compared to Mirror therapy for improving proprioception.	1	Lee et al. (2024b)
1b	Unilateral mirror therapy with Unimanual training may not have a difference in efficacy when compared to Unilateral mirror therapy with Bimanual training for improving proprioception.	1	Lee et al. (2024b)
1b	Unilateral mirror therapy with Bimanual training may not have a difference in efficacy when compared to Bilateral mirror therapy with Bimanual training for improving proprioception.	1	Lee et al. (2024b)
1b	Modified constraint-induced movement therapy may not have a difference in efficacy when compared to Dose-matched conventional treatment for improving proprioception.	1	van Delden et al. (2013)

2. Activities

ACTIVITIES OF DAILY LIVING			
LoE	**Conclusion Statement**	**RCTs**	**References**
1a	Bilateral arm training may not have a difference in efficacy when compared to conventional therapy for improving performance of activities of daily living.	6	Easow et al. (2019); Lee et al. (2017a); Lee et al. (2013b); Stoykov et al. (2009); Morris et al. (2008); Desrosiers et al. (2005)
1b	Bilateral arm training: some approaches may produce greater improvements in performance of activities of daily living than others.	1	Summers et al. (2007)
1a	There is conflicting evidence about the effect of Bilateral arm training combined with other interventions when compared to unilateral arm training for improving performance of activities of daily living.	4	Li et al. (2022d); Shim et al. (2015); Dispa et al. (2013); Lin et al. (2010b)
1a	Bilateral arm training combined with other interventions may not have a difference in efficacy when compared to conventional therapy for improving performance of activities of daily living.	3	Wu et al. (2012a); Wu et al. (2011); Lin et al. (2009b)
1a	Distributed constraint-induced therapy may not have a difference in efficacy when compared to bilateral arm training for improving performance of activities of daily living.	2	Wu et al. (2011); Lin et al. (2009b)
1b	Bilateral arm training with functional electrical stimulation and conventional occupational therapy may not have a difference in efficacy when compared to Bilateral arm training with sham functional electrical stimulation and conventional occupational therapy for improving performance of activities of daily living.	1	Chan et al. (2009)
1b	Robotic arm therapy (NeReBot) with conventional therapy may not have a difference in efficacy when compared to Conventional therapy with proximal paretic arm exercise for improving performance of activities of daily living.	1	Masiero et al. (2011)
2	Modified constraint-induced movement therapy may not have a difference in efficacy when compared to Bilateral training for improving performance of activities of daily living.	1	Hayner et al. (2010)
1b	Forced use therapy using splint may produce greater improvements in performance of activities of daily living than Bimanual training based on neuro-developmental treatment.	1	van der Lee et al. (1999)
1b	Hospital-based task-oriented mirror therapy may not have a difference in efficacy when compared to Bilateral arm training for improving performance of activities of daily living.	1	Li et al. (2019)
1b	Constraint-induced movement therapy with bilateral arm training may not have a difference in efficacy when compared to Bimanual task-related training for improving performance of activities of daily living.	1	Brunner et al. (2012)
2	There is conflicting evidence about the effect of Unilateral robot assisted therapy with modified constraint-induced movement therapy when compared to Robot assist therapy for improving performance of activities of daily living.	1	Hung et al. (2019b)
2	Unilateral robot assisted therapy with modified constraint-induced movement therapy may result in lesser improvements in performance of activities of daily living when compared to Bilateral robot assisted therapy with bilateral arm training.	1	Hung et al. (2019b)
1b	There is conflicting evidence about the effect of Robot-Assisted Therapy with Bilateral Practice with Task-Specific Training when compared to Conventional Care with Task-Specific Training for improving performance of activities of daily living.	1	Hsu et al. (2019)

1b	Unilateral robot assisted therapy with constraint-induced movement therapy (unilateral arm) may not have a difference in efficacy when compared to Robot assisted therapy alone (both modes) for improving performance of activities of daily living.	1	Hung et al. (2019d)
1b	Unilateral robot assisted therapy with constraint-induced movement therapy (unilateral arm) may not have a difference in efficacy when compared to Bilateral robot assisted therapy with BAT (Bimanual tracking) for improving performance of activities of daily living.	1	Hung et al. (2019d)
1b	Associated Mirror Therapy (Mirror Therapy with Bimanual Training) may produce greater improvements in performance of activities of daily living than Bimanual Training without mirroring with Conventional Care.	1	Zhuang et al. (2021)
1b	Robotic Priming with mirror therapy (RMT) may not have a difference in efficacy when compared to Robotic Priming with Bilateral Upper Limb Training (RBULT) for improving performance of activities of daily living.	1	Li Y.-C. et al. (2021)
2	There is conflicting evidence about the effect of Occupation-Based Bilateral Upper Limb Training with Cognitive Behavioral Therapy when compared to Occupation-Based Bilateral Upper Limb Training with Conventional occupational therapy for improving performance of activities of daily living.	1	Choi & Kim (2022)
1b	Unilateral mirror therapy with Unimanual training may not have a difference in efficacy when compared to Mirror therapy for improving performance of activities of daily living.	1	Lee et al. (2024b)
1b	Unilateral mirror therapy with Unimanual training may not have a difference in efficacy when compared to Unilateral mirror therapy with Bimanual training for improving performance of activities of daily living.	1	Lee et al. (2024b)
1b	There is conflicting evidence about the effect of Unilateral mirror therapy with Bimanual training when compared to Bilateral mirror therapy with Bimanual training for improving performance of activities of daily living.	1	Lee et al. (2024b)
2	Bilateral arm training with rhythmic auditory cueing may result in lesser improvements in performance of activities of daily living when compared to task-oriented bilateral arm training.	1	Song et al. (2015)
1b	Bilateral motor priming with task-specific training may not have a difference in efficacy when compared to health care education with task-specific training for improving performance of activities of daily living.	1	Stoykov et al. (2020)
1b	Unilateral robot-assisted arm training may not have a difference in efficacy when compared to Bilateral robot-assisted arm training for improving performance of activities of daily living.	1	Wu et al. (2013a)
1b	Modified constraint-induced movement therapy may not have a difference in efficacy when compared to Dose-matched conventional treatment for improving performance of activities of daily living.	1	van Delden et al. (2013)
1b	Occupation-based bilateral upper extremity training may produce greater improvements in performance of activities of daily living than Task-based bilateral upper extremity training.	1	Kim et al. (2019b)
1b	Balance Training with Affected Hand at Low Back may not have a difference in efficacy when compared to Balance Training for improving performance of activities of daily living.	1	Jiang et al. (2021b)
1b	Balance Training with Elevated Affected Shoulder may not have a difference in efficacy when compared to Balance Training for improving performance of activities of daily living.	1	Jiang et al. (2021b)

DEXTERITY			
LoE	**Conclusion Statement**	**RCTs**	**References**
1a	Bilateral arm training may not have a difference in efficacy when compared to conventional therapy for improving dexterity.	4	Easow et al. (2019); Lee et al. (2017a); Morris et al. (2008); Desrosiers et al. (2005)
1b	Bilateral arm training combined with other interventions may not have a difference in efficacy when compared to unilateral arm training for improving dexterity.	3	Han & Kim (2016); Dispa et al. (2013); Cauraugh et al. (2009)
2	Coupled bilateral training with load with electromyography-triggered neuromuscular electrical stimulation may not have a difference in efficacy when compared to Coupled bilateral training with no load with electromyography-triggered neuromuscular electrical stimulation for improving dexterity.	1	Cauraugh et al. (2009)
1b	Bilateral UE Training with Unilateral task-oriented training may not have a difference in efficacy when compared to Unilateral task-oriented Training (using a hand orthosis) for improving dexterity.	1	Waller et al. (2014)
2	Constraint Induced Movement Therapy may not have a difference in efficacy when compared to Bilateral Arm Training for improving dexterity.	1	Kale et al. (2019)
1b	Robotic arm therapy (NeReBot) with conventional therapy may not have a difference in efficacy when compared to Conventional therapy with proximal paretic arm exercise for improving dexterity.	1	Masiero et al. (2011)
1b	Short-term bilateral arm training with electromyography triggered neuromuscular electrical stimulation may result in lesser improvements in dexterity when compared to Long-term bilateral arm training with electromyography triggered neuromuscular electrical stimulation.	1	Cauraugh et al. (2011)
1b	Virtual reality bilateral arm training with conventional therapy may produce greater improvements in dexterity than Bilateral arm training with conventional therapy.	1	Lee et al. (2016c)
2	Electromyography-Triggered neuromuscular electrical stimulation with Bilateral Arm Training may produce greater improvements in dexterity than Sham Stimulation with Bilateral Arm Training.	1	Cauraugh & Kim (2003)
2	Electromyography-Triggered neuromuscular electrical stimulation with Bilateral Arm Training may produce greater improvements in dexterity than electromyography-Triggered neuromuscular electrical stimulation with Bilateral Arm Training.	1	Cauraugh & Kim (2003)
1b	Constraint-induced movement therapy with bilateral arm training may not have a difference in efficacy when compared to Bimanual task-related training for improving dexterity.	1	Brunner et al. (2012)
1b	Associated Mirror Therapy (Mirror Therapy with Bimanual Training) may not have a difference in efficacy when compared to Bimanual Training without mirroring with Conventional Care for improving dexterity.	1	Zhuang et al. (2021)
2	Bilateral arm training with rhythmic auditory cueing may result in lesser improvements in dexterity when compared to task-oriented bilateral arm training.	1	Song et al. (2015)
1b	Modified constraint-induced movement therapy may not have a difference in efficacy when compared to Dose-matched conventional treatment for improving dexterity.	1	van Delden et al. (2013)
1b	Bimanual, lever-driven wheelchair (LARA) for stationary arm exercise and overground ambulation with Videogame may not have a difference in efficacy when compared to Conventional Arm Exercises for improving dexterity.	1	Smith et al. (2021)

Key Points

- Bilateral arm training may not be beneficial for improving stroke severity, muscle strength, performance of activities of daily living, and dexterity after stroke when compared to conventional therapy; the literature is mixed regarding motor function.
- Active-passive bilateral therapy (APBT) with Self-directed motor practice may not be beneficial for improving motor function, stroke severity, and muscle strength after stroke when compared to Self-directed motor practice on affected upper limb.
- Bilateral arm training combined with other interventions may be beneficial for improving motor function and stroke severity, but not muscle strength, spasticity, and dexterity, after stroke when compared to unilateral arm training; the literature is mixed regarding performance of activities of daily living.
- Bilateral arm training combined with other interventions may not be beneficial for improving performance of activities of daily living after stroke when compared to conventional therapy; the literature is mixed regarding motor function.
- Distributed constraint-induced therapy may be beneficial for improving motor function, but not performance of activities of daily living, after stroke when compared to bilateral arm training.
- Bilateral UE Training with Unilateral task-oriented training may not be beneficial for improving motor function, spasticity, and dexterity after stroke when compared to Unilateral task-oriented Training (using a hand orthosis).
- Bilateral arm training; visual fb mirror therapy may not be beneficial for improving motor function after stroke when compared to bilateral arm training without mirror therapy.
- Bilateral arm training with functional electrical stimulation and conventional occupational therapy may be beneficial for improving motor function and range of motion, but not performance of activities of daily living, spasticity, and muscle strength, after stroke when compared to Bilateral arm training with sham functional electrical stimulation and conventional occupational therapy.
- Constraint Induced Movement Therapy may not be beneficial for improving motor function and dexterity after stroke when compared to Bilateral Arm Training.
- Robotic arm therapy (NeReBot) with conventional therapy may not be beneficial for improving motor function, dexterity, performance of activities of daily living, spasticity, and muscle strength after stroke when compared to Conventional therapy with proximal paretic arm exercise.
- Shoulder sling exercise (Sling Suspension System on Shoulder Subluxation) may be beneficial for improving motor function and proprioception after stroke when compared to bilateral arm training.
- Modified constraint-induced movement therapy may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Bilateral training.
- Forced use therapy using splint may be beneficial for improving performance of activities of daily living after stroke when compared to Bimanual training based on neuro-developmental treatment; the literature is mixed regarding motor function.
- Constraint-induced movement therapy may be beneficial for improving motor function after stroke when compared to Conservative treatment (bimanual-upper-extremity training by conservative neurodevelopmental technique); the literature is mixed regarding muscle strength.
- Virtual reality bilateral arm training with conventional therapy may be beneficial for improving motor function, dexterity, and muscle strength after stroke when compared to Bilateral arm training with conventional therapy.
- Hospital-based task-oriented mirror therapy may not be beneficial for improving motor function, performance of activities of daily living, and proprioception after stroke when compared to Bilateral arm training.
- Constraint-induced movement therapy with bilateral arm training may not be beneficial for improving motor function, dexterity, and performance of activities of daily living after stroke when compared to Bimanual task-related training.
- Unilateral robot assisted therapy with modified constraint-induced movement therapy may not be beneficial for improving motor function after stroke when compared to Robot assist therapy; the literature is mixed regarding performance of activities of daily living.

- Unilateral robot assisted therapy with modified constraint-induced movement therapy may not be beneficial for improving motor function after stroke when compared to Bilateral robot assisted therapy with bilateral arm training.
- Unilateral robot assisted therapy with modified constraint-induced movement therapy may be less beneficial than Bilateral robot assisted therapy with bilateral arm training for improving performance of activities of daily living after stroke.
- Electromyography-triggered neuromuscular electrical stimulation with BAT may not be beneficial for improving motor function after stroke when compared to transcutaneous electrical nerve stimulation with BAT.
- Robot-Assisted Therapy with Bilateral Practice with Task-Specific Training may be beneficial for improving motor function after stroke when compared to Conventional Care with Task-Specific Training; the literature is mixed regarding performance of activities of daily living.
- Unilateral robot assisted therapy with constraint-induced movement therapy (unilateral arm) may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Robot assisted therapy alone (both modes).
- Unilateral robot assisted therapy with constraint-induced movement therapy (unilateral arm) may not be beneficial for improving performance of activities of daily living after stroke when compared to Bilateral robot assisted therapy with BAT (Bimanual tracking).
- Unilateral robot assisted therapy with constraint-induced movement therapy (unilateral arm) may be less beneficial than Bilateral robot assisted therapy with BAT (Bimanual tracking) for improving motor function after stroke.
- Associated Mirror Therapy (Mirror Therapy with Bimanual Training) may be beneficial for improving motor function and performance of activities of daily living, but not dexterity, after stroke when compared to Bimanual Training without mirroring with Conventional Care.
- Robotic Priming with mirror therapy (RMT) may not be beneficial for improving motor function, proprioception, and performance of activities of daily living after stroke when compared to Robotic Priming with Bilateral Upper Limb Training (RBULT).
- Virtual reality-based bilateral arm training with conventional rehab may not be beneficial for improving motor function after stroke when compared to bilateral arm training; the literature is mixed regarding proprioception.
- Occupation-Based Bilateral Upper Limb Training with Cognitive Behavioral Therapy may not be beneficial for improving motor function after stroke when compared to Occupation-Based Bilateral Upper Limb Training with Conventional occupational therapy; the literature is mixed regarding performance of activities of daily living.
- Mirror therapy with Bilateral arm training and Conventional therapy may be beneficial for improving motor function after stroke when compared to Bilateral Arm training with Conventional therapy.
- Unilateral mirror therapy with Unimanual training may not be beneficial for improving motor function, performance of activities of daily living, and proprioception after stroke when compared to Mirror therapy.
- Unilateral mirror therapy with Unimanual training may not be beneficial for improving motor function, performance of activities of daily living, and proprioception after stroke when compared to Unilateral mirror therapy with Bimanual training.
- Unilateral mirror therapy with Bimanual training may not be beneficial for improving motor function and proprioception after stroke when compared to Bilateral mirror therapy with Bimanual training; the literature is mixed regarding performance of activities of daily living.
- Bilateral arm training with rhythmic auditory cueing may be less beneficial than task-oriented bilateral arm training for improving motor function, dexterity, and performance of activities of daily living after stroke.
- Bilateral motor priming with task-specific training may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to health care education with task-specific training.
- Unilateral robot-assisted arm training may be beneficial for improving motor function, but not performance of activities of daily living, after stroke when compared to Bilateral robot-assisted arm training.

- Modified constraint-induced movement therapy may not be beneficial for improving motor function, dexterity, performance of activities of daily living, proprioception, and muscle strength after stroke when compared to Dose-matched conventional treatment.
- Coupled bilateral training with load with electromyography-triggered neuromuscular electrical stimulation may not be beneficial for improving dexterity after stroke when compared to Coupled bilateral training with no load with electromyography-triggered neuromuscular electrical stimulation.
- Short-term bilateral arm training with electromyography triggered neuromuscular electrical stimulation may be less beneficial than long-term bilateral arm training with electromyography triggered neuromuscular electrical stimulation for improving muscle strength and dexterity after stroke.
- Electromyography-Triggered neuromuscular electrical stimulation with Bilateral Arm Training may be beneficial for improving dexterity after stroke when compared to Sham Stimulation with Bilateral Arm Training.
- Electromyography-Triggered neuromuscular electrical stimulation with Bilateral Arm Training may be beneficial for improving dexterity after stroke when compared to electromyography-Triggered neuromuscular electrical stimulation with Bilateral Arm Training.
- Bilateral arm training with rhythmic auditory cueing may not be beneficial for improving muscle strength after stroke when compared to Conventional therapy.
- Occupation-based bilateral upper extremity training may be beneficial for improving performance of activities of daily living after stroke when compared to Task-based bilateral upper extremity training.
- Bimanual, lever-driven wheelchair (LARA) for stationary arm exercise and overground ambulation with Videogame may not be beneficial for improving motor function, muscle strength, spasticity, and dexterity after stroke when compared to Conventional Arm Exercises.
- Mirror therapy-based Bilateral Training may not be beneficial for improving motor function after stroke when compared to Bilateral Training.
- Balance Training with Affected Hand at Low Back may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Balance Training.
- Balance Training with Elevated Affected Shoulder may be beneficial for improving motor function, but not performance of activities of daily living, after stroke when compared to Balance Training.
- Bilateral arm training combined with other interventions: some approaches may be more beneficial than others for improving motor function.
- Bilateral arm training: some approaches may be more beneficial than others for improving spasticity and performance of activities of daily living; different approaches to bilateral arm training may not have a difference in efficacy when compared with one another for improving motor function and muscle strength.

Summary of Key Points: Bilateral Arm Training

Intervention	Control(s)	Function domain(s)	Effect
Bilateral arm training	conventional therapy	Stroke severity, muscle strength, performance of activities of daily living, dexterity	–
Bilateral arm training	conventional therapy	Motor function	=
Active-passive bilateral therapy (APBT) with Self-directed motor practice	Self-directed motor practice on affected upper limb	Motor function, stroke severity, muscle strength	–
Bilateral arm training combined with other interventions	One another (different approaches compared)	Motor function	+
Bilateral arm training	One another (different approaches compared)	Motor function, muscle strength	–
Bilateral arm training combined with other interventions	unilateral arm training	Motor function, stroke severity	+
Bilateral arm training combined with other interventions	unilateral arm training	Muscle strength, spasticity, dexterity	–

Bilateral arm training combined with other interventions	unilateral arm training	Performance of activities of daily living	=
Bilateral arm training combined with other interventions	conventional therapy	Performance of activities of daily living	–
Bilateral arm training combined with other interventions	conventional therapy	Motor function	=
Distributed constraint-induced therapy	bilateral arm training	Performance of activities of daily living	–
Distributed constraint-induced therapy	bilateral arm training	Motor function	+
Bilateral UE Training with Unilateral task-oriented training	Unilateral task-oriented Training (using a hand orthosis)	Motor function, spasticity, dexterity	–
Bilateral arm training; visual fb mirror therapy	bilateral arm training without mirror therapy	Motor function	–
Bilateral arm training with functional electrical stimulation and conventional occupational therapy	Bilateral arm training with sham functional electrical stimulation and conventional occupational therapy	Motor function, range of motion	+
Bilateral arm training with functional electrical stimulation and conventional occupational therapy	Bilateral arm training with sham functional electrical stimulation and conventional occupational therapy	Performance of activities of daily living, spasticity, muscle strength	–
Constraint Induced Movement Therapy	Bilateral Arm Training	Motor function, dexterity	–
Robotic arm therapy (NeReBot) with conventional therapy	Conventional therapy with proximal paretic arm exercise	Motor function, dexterity, performance of activities of daily living, spasticity, muscle strength	–
Shoulder sling exercise (Sling Suspension System on Shoulder Subluxation)	bilateral arm training	Motor function, proprioception	+
Modified constraint-induced movement therapy	Bilateral training	Motor function, performance of activities of daily living	–
Forced use therapy using splint	Bimanual training based on neuro-developmental treatment	Performance of activities of daily living	+
Forced use therapy using splint	Bimanual training based on neuro-developmental treatment	Motor function	=
Constraint-induced movement therapy	Conservative treatment (bimanual-upper-extremity training by conservative neurodevelopmental technique)	Motor function	+
Constraint-induced movement therapy	Conservative treatment (bimanual-upper-extremity training by conservative neurodevelopmental technique)	Muscle strength	=
Virtual reality bilateral arm training with conventional therapy	Bilateral arm training with conventional therapy	Motor function, dexterity, muscle strength	+
Hospital-based task-oriented mirror therapy	Bilateral arm training	Motor function, performance of activities of daily living, proprioception	–
Constraint-induced movement therapy with bilateral arm training	Bimanual task-related training	Motor function, dexterity, performance of activities of daily living	–

Unilateral robot assisted therapy with modified constraint-induced movement therapy	Robot assist therapy	Motor function	–
Unilateral robot assisted therapy with modified constraint-induced movement therapy	Robot assist therapy	Performance of activities of daily living	=
Unilateral robot assisted therapy with modified constraint-induced movement therapy	Bilateral robot assisted therapy with bilateral arm training	Motor function, performance of activities of daily living	–
Electromyography-triggered neuromuscular electrical stimulation with BAT	transcutaneous electrical nerve stimulation with BAT	Motor function	–
Robot-Assisted Therapy with Bilateral Practice with Task-Specific Training	Conventional Care with Task-Specific Training	Motor function	+
Robot-Assisted Therapy with Bilateral Practice with Task-Specific Training	Conventional Care with Task-Specific Training	Performance of activities of daily living	=
Unilateral robot assisted therapy with constraint-induced movement therapy (unilateral arm)	Robot assisted therapy alone (both modes)	Motor function, performance of activities of daily living	–
Unilateral robot assisted therapy with constraint-induced movement therapy (unilateral arm)	Bilateral robot assisted therapy with BAT (Bimanual tracking)	Motor function, performance of activities of daily living	–
Associated Mirror Therapy (Mirror Therapy with Bimanual Training)	Bimanual Training without mirroring with Conventional Care	Motor function, performance of activities of daily living	+
Associated Mirror Therapy (Mirror Therapy with Bimanual Training)	Bimanual Training without mirroring with Conventional Care	Dexterity	–
Robotic Priming with mirror therapy (RMT)	Robotic Priming with Bilateral Upper Limb Training (RBULT)	Motor function, proprioception, performance of activities of daily living	–
Virtual reality-based bilateral arm training with conventional rehab	bilateral arm training	Motor function	–
Virtual reality-based bilateral arm training with conventional rehab	bilateral arm training	Proprioception	=
Occupation-Based Bilateral Upper Limb Training with Cognitive Behavioral Therapy	Occupation-Based Bilateral Upper Limb Training with Conventional occupational therapy	Motor function	–
Occupation-Based Bilateral Upper Limb Training with Cognitive Behavioral Therapy	Occupation-Based Bilateral Upper Limb Training with Conventional occupational therapy	Performance of activities of daily living	=
Mirror therapy with Bilateral arm training and Conventional therapy	Bilateral Arm training with Conventional therapy	Motor function	+
Unilateral mirror therapy with Unimanual training	Mirror therapy	Motor function, performance of activities of daily living, proprioception	–
Unilateral mirror therapy with Unimanual training	Unilateral mirror therapy with Bimanual training	Motor function, performance of activities of daily living, proprioception	–
Unilateral mirror therapy with Bimanual training	Bilateral mirror therapy with Bimanual training	Motor function, proprioception	–
Unilateral mirror therapy with Bimanual training	Bilateral mirror therapy with Bimanual training	Performance of activities of daily living	=
Bilateral arm training with rhythmic auditory cueing	task-oriented bilateral arm training	Motor function, dexterity, performance of activities of daily living	–

Bilateral motor priming with task-specific training	health care education with task-specific training	Motor function, performance of activities of daily living	−
Unilateral robot-assisted arm training	Bilateral robot-assisted arm training	Motor function	+
Unilateral robot-assisted arm training	Bilateral robot-assisted arm training	Performance of activities of daily living	−
Modified constraint-induced movement therapy	Dose-matched conventional treatment	Motor function, dexterity, performance of activities of daily living, proprioception, muscle strength	−
Coupled bilateral training with load with electromyography-triggered neuromuscular electrical stimulation	Coupled bilateral training with no load with electromyography-triggered neuromuscular electrical stimulation	Dexterity	−
Short-term bilateral arm training with electromyography triggered neuromuscular electrical stimulation	Long-term bilateral arm training with electromyography triggered neuromuscular electrical stimulation	Muscle strength, dexterity	−
Electromyography-Triggered neuromuscular electrical stimulation with Bilateral Arm Training	Sham Stimulation with Bilateral Arm Training	Dexterity	+
Electromyography-Triggered neuromuscular electrical stimulation with Bilateral Arm Training	electromyography-Triggered neuromuscular electrical stimulation with Bilateral Arm Training	Dexterity	+
Bilateral arm training	One another (different approaches compared)	Performance of activities of daily living, spasticity	+
Bilateral arm training with rhythmic auditory cueing	Conventional therapy	Muscle strength	−
Occupation-based bilateral upper extremity training	Task-based bilateral upper extremity training	Performance of activities of daily living	+
Bimanual, lever-driven wheelchair (LARA) for stationary arm exercise and overground ambulation with Videogame	Conventional Arm Exercises	Motor function, muscle strength, spasticity, dexterity	−
Mirror therapy-based Bilateral Training	Bilateral Training	Motor function	−
Balance Training with Affected Hand at Low Back	Balance Training	Motor function, performance of activities of daily living	−
Balance Training with Elevated Affected Shoulder	Balance Training	Motor function	+
Balance Training with Elevated Affected Shoulder	Balance Training	Performance of activities of daily living	−

Exercise and Strength Training



Adapted from: https://www.flintrehab.com/2018/arm-exercises-for-stroke-patients/

A total of 93 RCTs were found that evaluated exercise and strength training for upper extremity motor rehabilitation. Two RCTs evaluated strength training combined with other interventions (Hunter et al. (2018); Corti et al. (2012)). Nine RCTs compared strength training with conventional therapy (Shao et al. (2023); Salehi DehNo et al. (2021); Shang et al. (2021); Dhoka et al. (2020); El-Nashar et al. (2019); Gambassi et al. (2019); Park et al. (2019a); Jeon et al. (2016); Donaldson et al. (2009)). Thirty-one RCTs compared exercise and custom physiotherapy protocols with conventional therapy (Deng et al. (2024); García-Pérez et al. (2024); Ho et al. (2024); Mehraban et al. (2024); Alhusayni et al. (2023); Swanson et al. (2023); Fathi et al. (2022); Jarbandhan et al. (2022); Munawar A. et al. (2022); Chin et al. (2021); Chiu et al. (2021); Wang et al. (2021a); Epple et al. (2020); Eroglu et al. (2020); Khorvash et al. (2020); Swank et al. (2020); Bordoloi et al. (2019); MandehgaryNajafabadi et al. (2019); Dell'Uomo et al. (2017); Park et al. (2017); Pandian et al. (2015); Repsaite et al. (2015); Bai et al. (2014); Liu et al. (2014b); ShimodozoNo et al. (2013); Duncan et al. (2003); Rodgers et al. (2003); Wolfe et al. (2000); Lincoln et al. (1999); Duncan et al. (1998); Sunderland et al. (1992)). Nine RCTs compared different approaches to exercise and custom physiotherapy protocols (Wang et al. (2021b); Hogg et al. (2020); Abraha et al. (2018); Emmerson et al. (2017); Han et al. (2013); Hesse et al. (2011a); Langhammer et al. (2007); Wellwood et al. (2004); Logigian et al. (1983)). One RCT compared strength training with lower extremity exercise interventions (Mares et al. (2014)). One RCT compared graded repetitive arm supplementary program with conventional therapy (Dodzo et al. (2020)). Five RCTs compared different approaches to strength training (Kerimov et al. (2021); Agni & Kulkarni (2017); Kim et al. (2017a); Graef et al. (2016); Awad et al. (2015)). One RCT compared aerobic exercise with conventional therapy (Topcuoglu et al. (2015)). One RCT compared graded repetitive arm supplementary program combined with other interventions with exercise and custom physiotherapy protocols (Harris et al. (2009)). Two RCTs compared strength training combined with other interventions with stretching and positioning programs (Coroian et al. (2018); Khallaf et al. (2018)). Four RCTs compared exercise and custom physiotherapy protocols with no treatment (Natta et al. (2021); Lin et al. (2004); Hanlon et al. (1996); Werner & Kessler (1996)). One RCT compared lower extremity exercise interventions with conventional therapy (Ploughman et al. (2008)). Two RCTs compared aerobic exercise with no treatment (Hill et al. (2023); Nepveu et al. (2017)). Three RCTs compared strength training combined with other interventions with conventional therapy (Kim et al. (2017b); Lee et al. (2015c); Lin et al. (2015)). Two RCTs compared exercise and custom physiotherapy protocols combined with other interventions with conventional therapy (Simpson L.A. et al. (2024); Cirstea et al. (2006)). One RCT compared upper limb cycling with neurodevelopmental techniques (bobath approach) or thermal stimulation or stretching and positioning programs (Patil et al. (2014)). Three RCTs compared exercise and custom physiotherapy protocols combined with other interventions with exercise and custom physiotherapy protocols (Mayrhuber et al. (2024); Yamada et al. (2022); Taub et al. (2013)). One RCT compared lower extremity exercise interventions combined with other interventions with no treatment (Kwakkel et al. (1999)). One RCT compared upper limb cycling with conventional therapy (da Rosa Pinheiro et al. (2021)). One RCT compared graded repetitive arm supplementary program combined with other interventions with video game training (Dhanusia et al. (2023)). One RCT compared boxing training combined

with other interventions with no treatment (Ersoy & Iyigun (2024)). One RCT compared aerobic exercise combined with other interventions with task-specific training (Linder et al. (2024)). One RCT compared upper limb cycling combined with other interventions with conventional therapy (Simic-Panic et al. (2024)). One RCT compared aerobic exercise combined with other interventions with aerobic exercise (Carr & Jones (2003)). One RCT compared upper limb cycling combined with other interventions with task-specific training or exoskeleton robotics (Maguire et al. (2023)). Three RCTs compared exercise and custom physiotherapy protocols with lower extremity exercise interventions (Meyer et al. (2021); Sanchez-Sanchez et al. (2017); Pang et al. (2006)). One RCT compared strength training combined with other interventions with strength training or sham (Beaulieu et al. (2019)). One RCT compared strength training combined with other interventions with mirror therapy (Ehrensberger et al. (2019)). One RCT compared different approaches to tilt table (Kim & Kim (2018)). One RCT compared aerobic exercise with stretching and positioning programs (Quaney et al. (2009)).

In addition, 101 RCTs in which exercise and strength training formed part of a combined or comparative intervention are cross-referenced at the end of Table 3; their primary listings appear in other tables.

The methodological details and results of all 93 RCTs are presented in Table 3.

Table 3. RCTs Evaluating Exercise and Strength Training for Upper Extremity Motor Rehabilitation

Authors (Year) **Study Design (PEDro Score)** **Sample Size start** **Sample Size end** **Time post stroke category** **Study design**	**Interventions** **Duration: Session length, frequency per week for total number of weeks**	**Outcome Measures** **Result (direction of effect)**
Strength training combined with other interventions compared to control		
Hunter et al. (2018) RCT (6) NStart=288 NEnd=245 TPS=Acute A vs B *Also in Table 5 (Sensorimotor Training)*	E1: Functional strength training E2: Movement performance therapy Duration: 90min/d, 5d/wk, 6wks	E1 vs E2: ARAT (-) WMFT (-) Grip and pinch force (-)
Corti et al. (2012) RCT Crossover (6) NStart=14 NEnd=14 TPS=Chronic A vs B *Also in Table 4 (Task-Specific Training)*	E1: Dynamic resistance training (POWER) E2: Functional Task Practice (FTP) Duration: 90min/d, 3x/wk for 10wk	E1 vs E2: Fugl-Meyer Assessment Upper Extremity (-) Shoulder/Elbow (-) Modified Ashworth Scale (-) European Stroke Scale (-) Chedoke-McMaster Hand and Arm Inventory (-) Kinematic parameters mean velocity (-) elbow ext ROM (+exp1) trunk displacement (+exp1) ROM Shoulder Flexion (-) Shoulder Extension (-) Reintegration to Normal Living Index (-)
Strength training compared to conventional therapy		
Shao et al. (2023) RCT (6) NStart=139 NEnd=127	E: Strength Training + Conventional rehab C: Conventional Rehab Duration: 45min/d, 5d/wk, 6wks	E vs C: Berg Balance Scale (+exp) 6-MWT (+exp) mBI (-)

TPS=Acute A vs 0		Isokinetic peak torque (+exp)
Salehi DehNo et al. (2021) RCT (7) NStart=26 NEnd=26 TPS=Subacute A vs 0	E: Unilateral Strength Training + Conventional Physiotherapy C: Conventional Physiotherapy Duration: 60min/d (experimental) 45min/d (control), 3d/wk for 4wks	E vs C: Wrist Extension Strength (+exp) Fugl-Meyer Assessment (+exp) Modified Barthel Index (+exp) Modified Ashworth Scale (-) Cortical Excitability, resting motor threshold, active motor threshold, MEP amplitude
Shang et al. (2021) RCT (5) NStart=82 NEnd=76 TPS=Acute A vs 0	E: Intensive Grip Training + Conventional Care C: Conventional Care Duration: 50min/d,3d/wk, 12wks	E vs C: Grip strength (+exp) MoCA (+exp) White matter connectivity, local (+exp) global (-)
Dhoka et al. (2020) RCT (3) NStart=42 NEnd=42 TPS=Not Reported A vs 0	E: Scapular Muscle Strengthening C: Conventional Therapy Duration: 5x/wk, 4wks	E vs C: Berg Balance Scale (+exp) Voluntary Control Grading of Upper Limb (+exp) Scapular Muscle EMG (+exp)
El-Nashar et al. (2019) RCT (4) NStart=82 NEnd=30 TPS=Chronic A vs 0	E: Conventional Therapy with Core Stability Exercises C: Conventional Therapy Duration: therapy 30min, 3x/wk, 6wks + 30min core exercises	E vs C: Wolf Motor Function Test (-) Range of Motion - Shoulder (-) Trunk Impairment Scale Static Balance (-) Dynamic Balance (+exp) Coordination (-)
Gambassi et al. (2019) RCT (6) NStart=22 NEnd=22 TPS=Chronic A vs 0	E: Dynamic Resistance Training C: Conventional Therapy Duration: 2-3x/wk, 8wks	E vs C: Grip Strength (-) 10-Meter Walk Test (-) Timed Up and Go Test (+exp) Sit to Stand Test (+exp) BP heart rate autonomics (SDNN + rMSSD) lipid peroxidation carbonyls superoxide dismutase CAT nitrite
Park et al. (2019a) RCT (7) NStart=50 NEnd=45 TPS=Subacute A vs 0	E: Game-Based Hand Resistance Exercise (TPS System) C: Traditional Manual Hand Exercise Duration: 30min/d, 5d/wk for 6wks	E vs C: Manual Function Test (+exp) Box and Block Test (+exp) Hand Grip Strength (+exp)
Jeon et al. (2016) RCT (5) NStart=12 NEnd=12	E: Strength training program using Monkey Chair and Band system C: Conventional rehabilitation Duration: 30min/d, 3d/wk for 12wk	E vs C: Flexion and abduction range of motion (+exp) Visual Analogue Scale - Pain (+exp)

TPS=Chronic A vs 0		Modified Motor Assessment Scale (+exp)
Donaldson et al. (2009) RCT (8) NStart=30 NEnd=29 TPS=Acute A vs 0	E1: Functional strength training + conventional physical therapy E2: Conventional physiotherapy X2 C: Conventional therapy Duration: 1hr, 4d/wk for 6wks	E1 vs C: ARAT (+exp1) 9HPT (-) Grasp strength (-) E2 vs C: ARAT (-) 9HPT (-) Grasp strength (-) E1 vs E2: ARAT (-) 9HPT (-) Grasp strength (-) Hand grip force, Pinch Grip force, Isometric elbow flexion force, Isometric elbow extension force
Exercise and custom physiotherapy protocols compared to conventional therapy		
Deng et al. (2024) RCT (8) NStart=90 NEnd=90 TPS=Subacute A vs 0	E: Multidisciplinary Nursing-based Rehabilitation C: Conventional discharge care Duration: NR	E vs C: FMA-UE (+exp) FMA-LE (+exp) mBI (+exp) SF36 (+exp) physiological function (+exp) physiological functions (+exp) emotional function (+exp) social function (+exp) pain (+exp) mental state (+exp) vitality (+exp)
García-Pérez et al. (2024) RCT (8) NStart=62 NEnd=60 TPS=Acute A vs 0	E: Early OT program + Conventional rehabilitation C: Conventional rehabilitation Duration: NR- At least two weeks of therapy	E vs C: Stroke and Aphasia QoL Scale (+exp) Barthel Index (-) modified Rankin Scale (-) SIS-16 (-) FMA-UE (-) BBS (-) TUG (-) MoCA (+exp) Communicative Activity Log (-) Beck Depression Inventory-II (+exp) HAM-A (-)
Ho et al. (2024) RCT (7) NStart=127 NEnd=90 TPS=Acute A vs 0	E: WEAR System (wearable sensors and smartphone app) + Conventional therapy C: Conventional therapy Duration: Experimental group: 90 mins/d (30mins of WEAR and 60 mins of conventional therapy), 3ds/wk, 12 wks; Control group: 90 mins/d, 3ds/wk, 12wks	E vs C: MRS (+exp) NIHSS (-) BI (+exp) FIM (+exp) BRS (-) BBS (+exp) WMFT-FAS (+exp)
Mehraban et al. (2024) RCT (6)	E: iCF Core Sets Occupational therapy C: Conventional therapy	E vs C: FMA-UE (-)

NStart=30 NEnd=25 TPS=Chronic A vs 0	Duration: 45min/d, 3d/wk, 12wks	FMA-LE (-) Sensation (-) PROM (-) Pain (-) Balance (-) Total (-) COPM Performance (+exp) Satisfaction (+exp)
Swanson et al. (2023) RCT (6) NStart=27 NEnd=27 TPS=Subacute A vs 0	E: Customized physiotherapy program (tablet) C: Conventional Therapy Duration: 3hrs/wk(anytime), 3wks	E vs C: FMA-UE (+exp) BBT (-) 10-MWT (-) MAS (extension) (-) MAS (flexion) (-) VAP (-) MAL (AS) (no stat) MAL (HW) (no stat) EQ-5D-3L (no stat) EQ-VAS (no stat)
Alhusayni et al. (2023) Pilot RCT (4) NStart=26 NEnd=21 TPS=Acute A vs 0	E: Online personalized upper-limb physiotherapy (via Giraffe platform) + Custom physiotherapy protocol + Usual care C: Conventional therapy Duration: 75mins/d (30 mins online personalized upper-limb physiotherapy (via Giraffe platform), 45 minutes conventional physiotherapy), 5d/wk, 4wks	E vs C: ARAT (no stat) TIS (no stat) Modified Ashworth Scale (no stat)
Munawar A. et al. (2022) RCT (5) NStart=28 NEnd=28 TPS=Chronic A vs 0	E: Conventional rehab + Custom Physiotherapy "HABIT" C: conventional rehab Duration: 60mins/d, 3d/wk, 4wks	E vs C: DASH (+exp) ARAT (+exp) WMFT (+exp)
Fathi et al. (2022) Pilot RCT (5) NStart=36 NEnd=24 TPS=Chronic A vs 0	E: UE coordination exercises based on fatigue prediction using the Kinect + conventional therapy C: Conventional occupational therapy Duration: E: 45 mins/d (30 mins of Kinect + 15 mins of conventional therapy), 3 ds/wk, 6wks; C: 45 mins/d, 3ds/wk, 6wks	E vs C: BBT (-) PPT affected hand (-) two hand (+exp) montage (-) WMFT functional ability (-) time (-) ARAT (-) Manual ability measurement-16 (-) Grip strength (-) Shoulder position sense test (+exp) Elbow position sense test (-) COPM performance (-) satisfaction (-) SH-Barthel Index (-) Multidimensional fatigue inventory (+exp)

Jarbandhan et al. (2022) Pilot RCT (6) NStart=30 NEnd=24 TPS=Chronic A vs 0	E: Home-based semi-supervised physiotherapy program C: conventional care Duration: 70min/d, 3d/wk, 8wks (4wk supervised, 4wk tele-coaching)	E vs C: 6MWT (-) BBS (-) DASH (-) hand grip strength (-)
Wang et al. (2021a) RCT (8) NStart=224 NEnd=209 TPS=Acute A vs 0	E: Rehabilitation Nursing Training C: Standard Therapist-led Rehabilitation (not nursing) Duration: 30min,2x/d,7d	E vs C: MAS (+exp) FMA (+exp) ARAT (+exp) mBI (-) NIHSS (-) mRS (-)
Chin et al. (2021) Pilot RCT (8) NStart=24 NEnd=23 TPS=Acute A vs 0	E: Self-directed home-based physical training + conventional rehabilitation C: Education booklet + conventional rehabilitation Duration: 20 min, 3x/d, 6d/wk, 4wks self-directed exercise, 45min, 2x/d conventional rehab	E vs C: FMA-UE (-) ARAT (-) Modified ashworth scale (-) Numeric Rating Scale-UE (-) Fatigue- Visual numeric scale (-)
Chiu et al. (2021) Pilot RCT (7) NStart=26 NEnd=24 TPS=Chronic A vs 0	E: home-based ADL rehabilitation program C: Conventional rehab (physical therapy + OT training) Duration: 50min, 1d/wk, 6wks home-base therapy, 1hr/d, 2d/wk conventinonal rehab	E vs C: FMA-UE (-) SIS3.0 (-)
Eroglu et al. (2020) RCT (7) NStart=35 NEnd=32 TPS=Chronic A vs 0	E: Occupational Therapy with Standard Therapy C: Standard Therapy Duration: 45min, 5x/wk, 8wks	E vs C: Pinch Strength (-) Hand Grip Strength (-) Purdue Pegboard Test (+exp) Functional Independence Measure (+exp) Motor (+exp) Cognitive (-) Short-Form 36 - All subscales (-) Hospital Anxiety and Depression Scale (-) Nottingham Extended Activities of Daily Living Scale (+exp) Mobility (-) Kitchen (-) Domestic (+exp) Leisure Activities (-) PASS Instrumental ADL (+exp)
Khorvash et al. (2020) RCT (5) NStart=57 NEnd=40 TPS=Acute A vs 0	E: Home-based rehabilitation exercise program C: Conventional therapy Duration: 1hr, 2x/d for 12 wks home based exercise, 1x/d conventional therapy, variable time in hospital	E vs C: Barthel Index (+exp) Fugl Meyer upper extremity sensorimotor score (+exp) Fugl Meyer lower extremity sensorimotor score (+exp)
Swank et al. (2020) RCT (7) NStart=73	E: Patient-Directed Activity Program + usual care C: Usual care only	E vs C: Functional Independence Measure (-) motor (-)

NEnd=73 TPS=Subacute A vs 0	Duration: E: 1hr; C: 3hr	cognition (-) Stroke Rehabilitation Assessment of Movement Measure (-) UE (-) LE (-) Basic mobility (-) Balance master (-) Physical activity metabolic equivalent of task Sedentary (-) Light activity (-) moderate to vigorous physical activity (-) Steps per day (+exp) Stroke Impact Scale Physical problems Memory and thinking (+exp) Mood and emotions Communication (+exp) Daily activities Mobility at home/ community +exp Use of hand Participation in meaningful activities Recovery rating (+exp) SIS physical (+exp) mood (-) communication (-) Balance Physical activity
Epple et al. (2020) Pilot RCT (7) NStart=40 NEnd=39 TPS=Acute A vs 0	E: Votja therapy (reflex locomotion therapy) C: Conventional Physiotherapy Duration: 40min/d, 7d/wk, for 1wk	E vs C: Trunk Control Test (+exp) Catherine Bergego Scale (-) Motor Evaluation Scale for Upper Extremity (+exp) National Institutes of Health Stroke Scale (+exp) Barthel Index (-)
Bordoloi et al. (2019) RCT (4) NStart=236 NEnd=198 TPS=Not Reported A vs 0	E: Rood's approach home exercise + Routine physiotherapy C: Home exercise approach standard Duration: 1x/d, 3mo	E vs C: Manual muscle strength test shoulder flexors (+exp) shoulder extensors (+exp) shoulder abductors (+exp) shoulder adductors (+exp) elbow flexors (+exp) wrist flexors (+exp) finger flexors (+exp) hip flexors (+exp) hip extensors (+exp) hip adductors (+exp) knee flexors (+exp) ankle plantar flexors (+exp) dorsi flexors (+exp) elbow extensors (-) wrist extensors (-)

		finger extensors (-) hip abductors (-) Knee extensors (-)
MandehgaryNajafabadi et al. (2019) RCT (7) NStart=48 NEnd=38 TPS=Chronic A1 vs A2 vs 0	E1: Competitive volleyball E2: Non-competitive volleyball C: Conventional therapy Duration: 90min/d, 3d/wk for 7wk	E1/E2 vs C: WMFT (+exp1, +exp2) MAL (+exp1, +exp2) BBT (+exp1, +exp2) WPST (+exp1, +exp2)
Park et al. (2017a) RCT (5) NStart=30 NEnd=26 TPS=Subacute A vs 0	E: Sitting boxing training + conventional physical therapy C: Conventional physical therapy Duration: 30min/d, 3d/wk for 6wks boxing training; 30min/d, 3d/wk for 6 wks conventional therapy	E vs C: Manual function test (+exp) Berg balance scale (+exp) 10m Walk test (+exp) SSQOL (+exp) Hand grip strength AS (-) NAS (+exp)
Dell'Uomo et al. (2017) Pilot RCT (5) NStart=28 NEnd=28 TPS=Subacute A vs 0	E: Scapulohumeral rehabilitation + Standard physiotherapy C: Standard physiotherapy Duration: 20min/d, 5d/wk for 6wk	E vs C: Trunk impairment scale (+exp) Barthel index (+exp) Trunk control test (+exp) sitting balance test (+ex) FMA (-) Modified Ashworth Scale (-)
Pandian et al. (2015) Pilot RCT (8) NStart=35 NEnd=32 TPS=Chronic A vs 0	E: Motor training less affected side C: conventional therapy Duration: 60min/session; 24 sessions; 2mo	E vs C: Brunnstrom recovery stage (+exp) FMA UE (+exp) LE (+exp) Minnesota manual dexterity test (+exp) purdue pegboard test manual muscle testing (+exp)
Repsaite et al. (2015) Pilot RCT (3) NStart=27 NEnd=27 TPS=Acute A vs 0	E: Differential training-based occupational therapy + conventional occupational therapy C: Conventional occupational therapy Duration: 30min, 5x/wk, 32d total	E vs C: WMFT lift basket (+exp) fold towel (+exp) turn key in lock (+exp) flip cards (-) lift paper clip (-) lift pencil (-) lift can (+exp) reach and retrieve (+exp) hand to box (+exp) hand to table (-) extend elbow weight (+exp) extend elbow side (+exp) forearm to box (-) Forearm to table (+exp)
Bai et al. (2014) RCT (7) NStart=165 NEnd=154 TPS=Acute	E: Rehabilitation Therapy + Routine Medication C: Routine Medication	E vs C: Modified Ashworth Scale (+exp) Modified Barthel Index (+exp)

A vs 0	Duration: Mo1: 45min/d, 5d/wk; Mo2-3:45min/d, 2x/d for 5d/wk; Mo4-6: daily exercises	
Liu et al. (2014b) Pilot RCT (6) NStart=46 NEnd=44 TPS=Acute A vs 0	E: Self regulation rehabilitation C: Conventional therapy Duration: 1hr of SR + 1hr physical therapy/session, 5x	E vs C: Abbreviated mental test (no stats) FIM (+exp) Colour trails test (-) FMA (-)
ShimodozoNo et al. (2013) RCT (7) NStart=52 NEnd=49 TPS=Subacute A vs 0	E: Repetitive functional exercise C: Conventional rehabilitation Duration: 40min/d, 5d/wk,4wk	E vs C: Action Research Arm Test (+exp) Grasp (+exp) Grip (+exp) pinch (+exp) Gross (-) Fugl Meyer Assessment (+exp)
Duncan et al. (2003) RCT (8) NStart=100 NEnd=92 TPS=Subacute A vs 0	E: Home exercise program C: Usual Care Duration: 36 sessions, 90mins/session over 12 wks	E vs C: Fugl-Meyer Assessment (-) Wolf Motor Function Test (-) grip strength (-) Berg Balance Scale (+exp) Functional Reach Test (+exp) peak aerobic capacity (+exp) duration (+exp) knee isometric peak torque (-) Timed 10-m walk test (+exp) 6-min walk distance (+exp) ankle isometric peak torque (-)
Rodgers et al. (2003) RCT (8) NStart=123 NEnd=105 TPS=Acute A vs 0	E: Enhanced upper limb rehabilitation + Usual care C: Usual care Duration: 30min, 5xd/wk, 6 wk	E vs C: Action research Arm Test (-) Motricity Index (-) Frenchay Arm test (-) Barthel Index (-) Nottingham EADL (-) upper limb pain (-) Oxford handicap scale (-)
Wolfe et al. (2000) Pilot RCT (7) NStart=43 NEnd=32 TPS=Not Reported A vs 0	E: Home treatment by a rehabilitation team C: usual community care after stroke Duration: Variable, max care; 60min/d	E vs C: Recurrence (-) Living alone (-) Speech disturbance (-) Dysphasia (-) Dysarthria (-) Swallowing disturbance (-) Incontinence (-) Paralysis/weakness (-) Nottingham Health Profile (-) Motricity index (-) Mini-Mental health exam (-) Hospital Anxiety and Depression Scale (-) Frenchay Aphasia Screening Test -FAST (-) modified Barthel Score (-) 5 Meter walk (-)

		Albert Test (-) Caregiver Strain (-)
Lincoln et al. (1999) RCT (6) NStart=282 NEnd=191 TPS=Acute A1 vs A2 vs 0	E1: Additional Physiotherapy by a Qualified Senior Physiotherapist E2: Additional Physiotherapy by a Supervised Physiotherapy Assistant C: Routine physiotherapy Duration: E: 2h/wk, 5wks; C: 30-45min/d, 5d/wk, 5wks	E1 vs E2 vs C: Rivermead Mobility Assessment (-) Action Research Arm Test (-) Barthel Index (-) Nottingham Extended ADL (-) Ten Hole Peg Test (-) grip strength (-)
Duncan et al. (1998) Pilot RCT (7) NStart=20 NEnd=20 TPS=Subacute A vs 0	E: Home-based exercise program C: Usual Care Duration: E: 1.5h/d, 3d/wk, 8wk	E vs C: FMA upper (-) lower (+exp) Gait velocity (+exp) 6-min walk (-) Berg balance score (-) Medical outcomes study-36 (-) Jebsen test of hand function (-) Barthel index (-) Lawton Instrumental ADL scale (-)
Sunderland et al. (1992) RCT (6) NStart=132 NEnd=121 TPS=Acute A vs 0	E: Enhanced therapy C: conventional therapy Duration: median of 10wk for control group and 18wk for ET	E vs C: Extended Motricity Index (+exp) Barthel ADL (-)
Different approaches to exercise and custom physiotherapy protocols compared against one another		
Wang et al. (2021b) RCT (7) NStart=120 NEnd=110 TPS=Acute A1 vs A2	E: Early Physical Rehabilitation (24-48hrs post-stroke) C: Standard Rehabilitation (72-96hrs post-stroke) Duration: 3mo	E vs C: Modified Rankin Scale (+exp) Fugl-Meyer Assessment - Upper (-) Lower (+exp)
Hogg et al. (2020) RCT (8) NStart=43 NEnd=42 TPS=Acute A1 vs A2	E: High intensity arm training therapy C: Low intensity arm training therapy Duration: 60min, 3x/wk, 3wk	E vs C: Grip Strength: (-) Motricity Index: (-) Fugle-Meyers Assessment Upper Extremity: (-) Box and Block Test: (-) Goal Attainment Scale (-) Modified Ashworth Scale (-)
Abraha et al. (2018) RCT Crossover (4) NStart=12 NEnd=10 TPS=Chronic A1 vs A2	E1: High intensity interval training (HIIT) E2: Moderate intensity constant-load exercise (MICE) Duration: 25min/session, 1 session	E1 vs E2: Box and Blocks Test (-) Pinch Strength (-) Grip Strength (-) VO2 MEP resting motor threshold
Emmerson et al. (2017) RCT (7) NStart=62 NEnd=58	E: Smart tech Home exercise program C: Paper-based home exercise program Duration: 1x/d, 4wks	E vs C: WMFT (-)

TPS=Subacute A1 vs A2		
Han et al. (2013) RCT (8) NStart=32 NEnd=30 TPS=Subacute A1 vs A2	E1: Arm treatment for 3hr/d E2: Arm treatment for 2hr/d E3: Arm treatment for 1hr/d Duration: E1: 1hr, 5d/wk, 6wk; E2: 2hr, 5d/wk for 6wk; E3: 3hr, 5d/wk, for 6wk	E1 vs E2 vs E3: E1/2 vs E3: FMA (+exp1/2) ARAT (+exp1/2) BI (-) E1 vs E2: FMA (-) ARAT (-) BI (-)
Hesse et al. (2011a) RCT (8) NStart=50 NEnd=50 TPS=Subacute A1 vs A2	E1: Intermittent high intensity arm training therapy E2: Continuous low intensity arm training therapy Duration: 30-45min/session, 4sessions/wk, over 12mo (3x2mo blocks, 6mo active) intermittent physiotherapy, 30-45min/session, 2sessions/wk, for 12mo continuous physiotherapy	E1 vs E2: Rivermead mobility index: (-) Rivermead motor assessment leg and trunk (-) arm (-) Walking velocity (-) Stair climbing velocity (-) Time up and go test (-) Modified Ashworth Score (+exp) Rivermead Activities of Daily Living self-care (-) household I (+exp) household II (-) serious falls (+exp)
Langhammer et al. (2007) RCT (8) NStart=75 NEnd=65 TPS=Acute A1 vs A2	E: Intensive Exercise C: Regular exercise (need-based dose) Duration: 45min/d, 2-5d/wk, 4wk/3 months, 1yr	E vs C: Motor Assessment Scale (+exp) Barthel Index (+exp) Grip Strength (-) Paretic Hand (-) Non-Paretic Hand (-)
Wellwood et al. (2004) RCT (7) NStart=70 NEnd=69 TPS=Acute A1 vs A2	E: Augmented Physiotherapy C: Standard dose Physiotherapy Duration: E: 60-80min/d, 5d/wk, for 4 wks C: 30-40min/d, 5d/wk for 4wk	E vs C: Motricity Index (-) Barthel Index (-) Rivermead Mobility Index (-) Nottingham Extended Activities of Daily Living (-) Visual Analogue Scale from EuroQol (-) 10MWT (-)
Logigian et al. (1983) RCT (3) NStart=42 NEnd=42 TPS=Subacute A vs 0	E: facilitation exercise therapy C: traditional exercise therapy Duration: Not reported	E vs C: Barthel Index (-) manual muscle test (-)
Strength training compared to lower extremity exercise interventions		
Mares et al. (2014) RCT (6) NStart=52 NEnd=50 TPS=Chronic A1 vs A2	E1: Functional strength training UL E2: Functional strength training LL Duration: 60min/d, 4d/wk, for 6wks	E1 vs E2: ARAT (+exp1) Functional ambulation categories (-) MRMI (-) TUG time (+exp1) TUG ability to compete (-)

		9HPT ability to complete (-)
Graded repetitive arm supplementary program compared to conventional therapy		
Dodzo et al. (2020) RCT (5) NStart=11 NEnd=10 TPS=Subacute A vs 0	E: Graded Arm Supplementary Program C: Conventional Therapy Duration: 60min/d, 5d/wk, 4 wks	E vs C: Wolf Motor Function Test Function (+exp) Time (-) Motor Activity Log (-) Grip Strength (-)
Different approaches to strength training compared against one another		
Kerimov et al. (2021) RCT (5) NStart=28 NEnd=24 TPS=Chronic A1 vs A2	E: Hand Strengthening (SMI HumacNorm Cybex) C: Home Based Strengthening Exercises Duration: 3x/wk for 4wks (12 sessions) isokinetic strengthening exercises or home based strengthening exercises (3 X 10-15 Reps)	E vs C: Fugl-Meyer Assessment (-) Stroke Impact Scale (-) Strength (-) Memory and Thinking (-) Emotion (-) Communication (-) ADL (-) Mobility (-) Hand Function (-) Social Participation (-) Recovery (-) Disabilities of the Arm, Hand and Shoulder (-) Peak Isometric Muscle Strength -flexor (-) Peak Isometric Muscle Strength - extensor (+exp) Hand Grip Strength (-)
Agni & Kulkarni (2017) RCT (4) NStart=45 NEnd=37 TPS=Subacute A + B vs A vs B	E1: Strength Training + Conventional Therapy; E2: Functional Task-Related Training + Conventional Therapy E3: Functional Task-Related Training with Strength Training + Conventional Therapy Duration: 70min/d, 3d/wk for 6wk	E1 vs E2/E3: Chedoke Arm and Hand Inventory (+exp2/3) Manual Muscle Strength (+exp3) Fugl-Meyer Assessment (-) dynamometer (+exp3)
Kim et al. (2017a) RCT (5) NStart=24 NEnd=17 TPS=Chronic A1 vs A2	E: Scapular stabilization exercise + physical therapy C: Simple scapular exercise Duration: 30min/d, 3d/wk for 8wk	E vs C: Timed Up and Go (-) Manual Function Test: (+exp) functional gait assessment (+exp)
Graef et al. (2016) RCT (8) NStart=27 NEnd=21 TPS=Chronic A1 vs A2	E: Strength training with a functional goal C: Strength training with non-functional movements Duration: 30min/d, 3d/wk for 5wk	E vs C: UEFT (+exp) Shoulder Strength (-) Grip Strength (-) Shoulder AROM (-) FMA (-) modified Ashworth (-)
Awad et al. (2015) RCT (3) NStart=30 NEnd=23 TPS=Chronic	E: Shoulder strengthening program + additional scapular strengthening exercises C: Standard shoulder strengthening program Duration: 3d/wk for 6wk	E vs C: Shoulder Abduction Peak Torque (+exp) Shoulder External Rotator Peak Torque (+exp) Supraspinatus Peak Force (+exp) Upper Trapezius Peak Force (+exp)

A1 vs A2		Serratus Anterior Peak Force (+exp) Scapular Upward Rotation Angle (+exp) Spinal Lateral Deviation Angle (+exp)
Aerobic exercise compared to conventional therapy		
Topcuoglu et al. (2015) RCT (6) NStart=40 NEnd=40 TPS=Subacute A vs 0	E: Upper extremity aerobic exercise + conventional physiotherapy C: Conventional physiotherapy Duration: 30min/d, 5d/wk, 4wk	E vs C: Brunnstrom recovery stage hand (-) upper extremity (-) Modified ashworth scale (-) Shoulder subluxation (-) Functional independence measure AUO (+exp) QOM (+exp) Nottingham Health Profiles fatigue (+exp) pain (+exp) function (-) sleep (-) Social isolation (-) emotion (-) Beck Depression Scale scores (+exp) complex regional pain symptoms hyperalgesia (+exp) hyperesthesia (-) hyperpathia (-) allodynia (-) metacarpophalangeal tenderness (+exp) wrist dorsiflexion tenderness (+exp) hand edema (-) ' Temperature changes (-) increased sweating (+exp) Temperature aymetry (-) dystrophic changes (-) motor changes (-) Visual pain scale shoulder daytime (+exp) shoulder nightime (-) shoulder pain upon movement (+exp) hand daytime (+exp) hand night-time (+exp) hand upon movement (+exp)
Graded repetitive arm supplementary program combined with other interventions compared to exercise and custom physiotherapy protocols		
Harris et al. (2009) RCT (8) NStart=103 NEnd=94 TPS=Acute A vs B	E: GRASP protocol C: Education book- self-administered homework exercise program Duration: E: met with coordinator 1d/wk for 4wks + 60min/d 6d/wk for 4wks exercises C= met with coordinator 1d/wk for 4wks	E vs C: CAHAI (+exp) ARAT (+exp) grip strength (+exp) MAL amount of use (+exp) quality of movement (+exp) SF-12 (-)

Strength training combined with other interventions compared to stretching and positioning programs		
Coroian et al. (2018) RCT (7) NStart=20 NEnd=16 TPS=Chronic A vs B *Also in Table 8 (Stretching Programs)*	E: Isokinetic strengthening C: Passive joint mobilization Duration: 45min/d, 3d/wk for 6wk	E vs C: Fugl-Meyer Assessment Upper Extremity (+con) Box and Block Test (-) Modified Ashworth Scale (-) Barthel Index (-) Isokinetic Peak Torque (-)
Khallaf et al. (2018) RCT (5) NStart=26 NEnd=24 TPS=Chronic A vs B *Also in Table 8 (Stretching Programs)*	E: Muscle strength trainining and task specific exercise C: Traditional passive stretch and Range of Motion exercises Duration: 16 wks, 5x/wk, 60 min	E vs C: Nine Hole Peg Test: (-) Fugl-Meyers Assessment Upper Extremity: (-) Hand: (-) Wrist Extension: (-) Metacarpophalangeal Extension: (-) Thumb Carpometacarpal Extension: (-) elbow extension
Exercise and custom physiotherapy protocols compared to no treatment		
Natta et al. (2021) RCT (6) NStart=59 NEnd=49 TPS=Chronic A vs 0	E: Self-Rehabilitation C: No Self-Rehabilitation Duration: 2h/d, 6d/wk, 8wks (self-rehabilitation)	E vs C: ABILHAND Score (+exp) Muscle Strength (+exp) Box and Block Test (-) Fugl-Meyer Assessment (-) Wolf Motor Function Test (-) Quality of life
Lin et al. (2004) RCT Crossover (6) NStart=20 NEnd=19 TPS=Chronic A vs 0	E: Home-Based Physical Therapy Program C: No Rehabilitation (Delayed Group) Duration: 50-60min, 1x/wk, 10wks	E vs C: Barthel Index (No stats) Stroke Rehabilitation Assessment of Movement (No stats)
Hanlon et al. (1996) RCT (3) NStart=24 NEnd=24 TPS=Chronic A1 vs A2 vs 0	E1: Random Practice Schedule (contextual interference) E2: Block Practice Schedule (repetitive drilling) C: No Practice Duration: NR	E1/E2 vs C: Motor Task Performance (+exp1>exp2,exp3) CVA laterality
Werner & Kessler (1996) RCT (4) NStart=49 NEnd=40 TPS=Chronic A vs 0	E: intensive Outpatient Therapy program C: No Therapy Duration: 2hrs/d, 4x/wk, 12wks	E vs C: Functional Independence Measure - Motor (+exp) Dressing (No stats) Bathing (No stats) - Stairs (No stats) Grooming (No stats) Transfers (No stats) Walking (No stats) Tranfers (No stats) Baldder (No stats) - Bowel (No stats) Sickness Index Profile (+exp) Beck Depression Scale (-) Jebsen Hand Function Test (No stats) Brunnstom's Rating (No stats) Stair Climb (No stats)

		Walking Speed (No stats)
Lower extremity exercise interventions compared to conventional therapy		
Ploughman et al. (2008) RCT Crossover (6) NStart=21 NEnd=21 TPS=Chronic A vs 0	E: Body-weight supported treadmill training C: Education (reviewing home exercises) Duration: 20min of BWSTT or education; 7-10 d washout period	E vs C: Grip Strength (-) Action Research Arm Test (+exp) Grip (-) Grasp (-) Pinch (-) Trail Making Tests Parts A and B (-) Symbol digit substitution test (-) Paced Auditory Serial Addition Test (-)
Aerobic exercise compared to no treatment		
Hill et al. (2023) RCT (8) NStart=33 NEnd=33 TPS=Chronic A vs 0	E: Moderate intensity exercise C: Remained sedentary (watched documentary) Duration: 20min - single session	E vs C: MEPs (+exp)
Nepveu et al. (2017) RCT (5) NStart=22 NEnd=21 TPS=Chronic A vs 0	E: High-Intensity Interval Training C: Rest control Duration: 1x, 15min	E vs C: Motor skill retention (+exp) corticospinal excitability intracortical facilitation short interval intracortical inhibition cortical silent period
Strength training combined with other interventions compared to conventional therapy		
Kim et al. (2017b) RCT (5) NStart=30 NEnd=29 TPS=Chronic A + B vs 0	E: Handgrip strength training + treadmill-based walking training C: Conventional therapy Duration: 30min/d, 3d/wk, 6wks exercise program & 60min/d Conventional therapy	E vs C: handgrip strength affected side (+exp) K-MoCA (+exp) Trail making A (-) Trail making B (+exp) Stroop test interference (+exp) 10mwalking test (+exp) Timed up and go (+exp)
Lee et al. (2015c) RCT (7) NStart=30 NEnd=26 TPS=Chronic A + B vs 0	E: Aerobic and resistance exercise C: No treatment Duration: 60min/d, 3d/wk, 16wks aerobic and resistance exercise	E vs C: Six Minute Walk Test (+exp) Ten Meter Walk Test (+exp) Timed up Up and Go (-) Grip Strength (+exp) 30-sec chair stand test (-) Chair sit and reach (+exp) Functional reach test (-)
Lin et al. (2015) RCT (7) NStart=33 NEnd=33 TPS=Chronic A + B vs 0 *Also in Table 20 (Feedback-Based Training)*	E: Bilateral Isometric Handgrip Training with Visual Feedback C: Routine Therapy Duration: 30min/d, 3d/wk for 4wk	E vs C: Fugl-Meyer Assessment (+exp) Wolf Motor Function Test (+exp) Motor Assessment Scale (+exp) Barthel Index (+exp)

Exercise and custom physiotherapy protocols combined with other interventions compared to conventional therapy		
Simpson L.A. et al. (2024) RCT (6) NStart=73 NEnd=66 TPS=Chronic A + B vs 0 *Also in Table 17 (Virtual Reality)*	E: Vitrual Arm Boot Camp (home exercise program + feedback from TENZR +conventional therpay) C: Waitlist (conventional care) Duration: E: 2hr/d, 5d/wk (6 sessions), 3wks; C: 1d/wk, 3wks	E vs C: Reach-to-grasp counts (+exp) Rating of everyday arm-use in the community and home (REACH) Scale (+exp) Arm capacity and movement test (ArmCAM) (+exp) SIS Hand subscale (-) UE strength subscale (-)
Cirstea et al. (2006) RCT (6) NStart=37 NEnd=37 TPS=Chronic A + B1 vs A + B2 vs 0 *Also in Table 20 (Feedback-Based Training)*	E1: Pointing exercise with feedback at end E2: Pointing exercise with feedback throughout C: Conventional care Duration: 1hr/session, 10sessions over 2wk	E1 vs C: FMA (no stats) TEMPA (no stats) CSI (-) Movement time (+exp1) Velocity (+exp1) Precision Variability (+exp1) E2 vs C: FMA (no stats) TEMPA (no stats) CSI (+exp2) movement time (+exp2) velocity (+exp2) precision variability (+exp2)
Upper limb cycling compared to neurodevelopmental techniques (bobath approach) or thermal stimulation or stretching and positioning programs		
Patil et al. (2014) RCT (5) NStart=40 NEnd=40 TPS=Chronic A vs 0	E: Arm Ergometer + conventional treatment C: Cryotherapy + Proprioceptive Neuromuscular Facilitation and Neurodevelopmental Techniques Duration: E: 30min/d, 5x/wk, 3wks, C: 60min/d (20min each condition), 5x/wk, 3wks	E vs C: Modified Ashworth Scale Shoulder Abduction (-) Shoulder Flexion (-) Shoulder internal Rotation (+exp) Elbow Flexion (-) Pronation (-) Wrist and Finger Flexion (+exp) Range of Motion Shoulder Extension (+exp) Shoulder Abduction (-) Shoulder External Rotation (-) Elbow Extension (-) Supination (-) Wrist Extension (+exp) Radial Deviation (-) Wolf Motor Function Test Extension Elbow With Weight (+exp) Lift Can (+exp) Pick up Paper Clip (+exp) Other 12 Items (-)
Exercise and custom physiotherapy protocols combined with other interventions compared to exercise and custom physiotherapy protocols		
Mayrhuber et al. (2024) RCT (5) NStart=42	E: Home-based custom exercise program + Visual feedback + Vibrotactile Reminders	E vs C: MAL AOU (-)

NEnd=23 TPS=Not Reported A + B vs A/B *Also in Table 21 (Wearable Cueing and Reminder Devices)*	C: Home-based custom exercise program Duration: 6 Weeks	QOM (-) FMA-UE (-) ARAT (-) MRS (-) EQ-5D-5L index value (-) VAS (-) global rating of Perceived Changes (-) Affected arm use (+exp) Arm use ratio (-) Percentage of Time active (-)
Yamada et al. (2022) RCT Crossover (7) NStart=37 NEnd=37 TPS=Chronic A + B vs A/B *Also in Table 29 (Repetitive Transcranial Magnetic Stimulation (rTMS))*	E: Custom occupational therapy + rTMS-LF C: Custom Occupational Therapy Duration: 280min/d(40min rTMS, 240min OT), 6d/wk, 2wks, 1d washout	E vs C: WMFT (+exp) FMA-UE (+exp)
Taub et al. (2013) RCT (5) NStart=45 NEnd=40 TPS=Chronic A + B vs A + C vs A *Also in Table 1 (Neurodevelopmental Techniques); Table 6 (Constraint-Induced Movement Therapy (CIMT))*	E1: Shaping training + CIMT transfer package (TP) E2: Repetitive task practice + TP E3: Repetitive task practice C: Shaping training Duration: 3.5hr/d, 10d	E1/E2/E3 vs C: E1/E2 vs E3/C: Motor Activity Log (-) Wolf Motor Function Test (-)
Lower extremity exercise interventions combined with other interventions compared to no treatment		
Kwakkel et al. (1999) RCT (7) NStart=101 NEnd=89 TPS=Acute A vs B vs 0 *Also in Table 4 (Task-Specific Training)*	E1: Leg rehab training E2: Arm rehab training C: Immobilization therapy with inflatable pressure splint (arm and leg with splints) Duration: 30min/d, 5d/wk, 20wk	E1/E2 vs C: BI (+exp1) Functional ambulation categories (+exp1) ARAT (+exp1, +exp2) gait speed (+exp1) used walking aids (-) sickness impact profile (+exp1) Nottingham health profile (-) Frenchy activity index (-)
Upper limb cycling compared to conventional therapy		
da Rosa Pinheiro et al. (2021) RCT (6) NStart=20 NEnd=20 TPS=Acute A vs 0	E: Arm cycling + conventional physiotherapy C: conventional physiotherapy(2 sessions) Duration: 20min, 2x/d, 5d/wk, 1wk	E vs C: Grip Strength paretic limb (+exp) non-paretic limb (+exp) Muscle Strength shoulder abduction (+exp) elbow flexor (+exp) wrist extensor (+exp) Trunk Impairment scale (+exp) Modified Rankin Scale (+exp)
Graded repetitive arm supplementary program combined with other interventions compared to video game training		
Dhanusia et al. (2023) RCT (4)	E: Graded repetitive arm supplementary program (GRASP)	E vs C: FMA-UE (+exp)

NStart=14 NEnd=14 TPS=Subacute A vs B *Also in Table 17 (Virtual Reality)*	C: Virtual reality Duration: 60min/d, 6d/wk for 8wks	ARAT (+exp) Hand help dynamometer (+exp) EMG extensor digitorum (+exp) triceps (+exp) biceps (+exp)
Boxing training combined with other interventions compared to no treatment		
Ersoy & Iyigun (2024) RCT (5) NStart=70 NEnd=60 TPS=Chronic A vs B vs 0 *Also in Table 8 (Stretching Programs)*	E1: Boxing training E2: Scapular stabilization training C: No intervention or therapy Duration: 50min/d, 3d/wk for 8wks	E1/E2 vs C: Scapular mobility frontal plane (+exp1) sagittal plane (+exp1) transverse plane (+exp1) Scapular Balance Angle (+exp1) Manual Function Test (+exp1/2) E1 vs E2: Scapular mobility frontal plane (-) sagittal plane (-) transverse plane (-) Scapular Balance Angle (-) Manual Function Test (+exp1) VAS-treatment satisfaction (+exp1)
Aerobic exercise combined with other interventions compared to task-specific training		
Linder et al. (2024) RCT (8) NStart=60 NEnd=56 TPS=Chronic A + B vs A/B *Also in Table 4 (Task-Specific Training)*	E: Forced-rate exercise + Repetitive task practice C: Repetitive task practice Duration: 90min/d 3d/wk for 8wks	E vs C: FMA (-) ARAT (-) grasp (-) grip (-) pinch (-) gross (-) Wolf Motor Function Test log performance time (-) functional ability score (-) number of incomplete tasks in 120s (no stat) grip strength (-) weight to box (-) 6minWT (+exp) peak O2 consumption (+exp)
Upper limb cycling combined with other interventions compared to conventional therapy		
Simic-Panic et al. (2024) RCT (7) NStart=127 NEnd=119 TPS=Subacute A + B vs 0 *Also in Table 20 (Feedback-Based Training)*	E: Cycling exercise + feedback + Conventional therapy C: Conventional therapy Duration: E: 150 mins/d (120 mins of conventional rehabilitation + 30 mins of cycling), 6ds/wk, 3 wks; C: 120 mins/d, 6ds/wk, 3wks	E vs C: NIHSS (+exp) Modified Ashworth Scale (+exp) Brunnstrom motor evaluation scale arm (-) hand (-) leg (+exp) FMA-UE (-) FMA-LE (+exp) BI (-) Berg balance scale (+exp) 6-MWT (+exp)

		TUG (-)
Aerobic exercise combined with other interventions compared to aerobic exercise		
Carr & Jones (2003) RCT (3) NStart=40 NEnd=40 TPS=Chronic A + B vs A/B	E1: Aerobic training E2: Aerobic + strength training Duration: 20min, 3x/wk for 16wk	E1 vs E2: VOmax(no stats) Peak shoulder extension(no stats) Peak shoulder flexion(no stats) lipid profile panel
Upper limb cycling combined with other interventions compared to task-specific training or exoskeleton robotics		
Maguire et al. (2023) Pilot RCT (5) NStart=17 NEnd=13 TPS=Chronic A + B vs A + C *Also in Table 16 (Robotics); Table 4 (Task-Specific Training)*	E: Moderate intensity ergometer training + ARMEO robotic training C: Low intensity task oriented balance training + ARMEO robotic training Duration: 80min/d(40min exercise, 40min robotics), 3d/wk, 12wks	E vs C: Serum BDNF (no stat) ARAT (no stat) FMA-UE (no stat) BESTest (no stat) FSS (no stat) EQ-5D (no stat)
Exercise and custom physiotherapy protocols compared to lower extremity exercise interventions		
Meyer et al. (2021) Pilot RCT (7) NStart=18 NEnd=18 TPS=Subacute A vs B	E: 'BOOST' Intensive Arm-Hand Training Protocol C: Lower-Limb Strengthening And Reconditioning Duration: 60min, 5x/wk, 4wks	E vs C: Fugl-Meyer Assessment (+exp) Action Research Arm Test (-) Stroke Upper Limb Capacity Scale (-) Box and Block Test (-) Jebsen Taylor Hand Function Test (+exp) Rivermead Motor Assessment - Arm (+exp)
Sanchez-Sanchez et al. (2017) Pilot RCT (8) NStart=15 NEnd=12 TPS=Chronic A vs B	E: UE function training C: lower extremity function training Duration: 33x over 12wk	E vs C: Wolf Motor Function test- UE (+exp) Fugl-Meyer Assessment-UE (+exp) grip strength (-) Modified Ashworth scale Biceps braqui (-) Wrist flexors (-)
Pang et al. (2006) Pilot RCT (7) NStart=63 NEnd=60 TPS=Chronic A vs B	E: Community-based upper extremity exercise program C: Lower extremity exercise program Duration: 60min/session, 3xwk, 19wk	E vs C: Wolf Motor Function Test (+exp) Fugl-Meyer Assessment (+exp) grip strength (-) Motor activity log: AOU (-), QoM (-)
Strength training combined with other interventions compared to strength training or sham		
Beaulieu et al. (2019) Pilot RCT (8) NStart=14 NEnd=14 TPS=Chronic A + B vs A/B *Also in Table 31 (Transcranial Direct Current Stimulation (tDCS))*	E: real bilateral tDCS + resistance training exercise C: sham tDCS+ resistance training exercise Duration: 20min of real or sham tDCS stimulation + resistance training exercise (60min,3x/wk,4wks)	E vs C: FMA Upper extremity (-) WMFT (-) BBT (-) Grip strength (-) MAL (-) Modified Ashworth scale (-)
Strength training combined with other interventions compared to mirror therapy		
Ehrensberger et al. (2019) Pilot RCT (7)	E: Mirror and strength training therapy C: Strength training	E vs C:

NStart=35 NEnd=32 TPS=Chronic A + B vs A/B *Also in Table 10 (Mirror Therapy)*	Duration: 3x/wk, 4wk	Modified ashworth Scale (-), Biodex dynamometer (authour stated problem), chedoke arm and hand activity inventory (-) ABILHAND (-) london handicap scale
Different approaches to tilt table compared against one another		
Kim & Kim (2018) Pilot RCT (6) NStart=45 NEnd=34 TPS=Chronic A1 vs A2	E1: Tilt table affected knee belt + Conventional Therapy E2: Tilt table with task oriented training + Conventional Therapy C: Tilt table alone (both knee belts) + Conventional Therapy Duration: 50min/d, 3d/wk, 6wk	E1/E2 vs C: Fugl-Meyer Assessment (+exp1, +exp2) Wolf Motor Function Test (+exp2) Grip Strength (+exp2)
Aerobic exercise compared to stretching and positioning programs		
Quaney et al. (2009) Pilot RCT (6) NStart=40 NEnd=38 TPS=Chronic A vs B *Also in Table 8 (Stretching Programs)*	E: Aerobic exercise C: Stretching exercise Duration: 45min/session, 3x/wk, 8wk	E vs C: VO2 max: (+exp) Wisconsin Card Sorting Task: (-) Stroop task: (-) Trail-making B-A: (-) Serial reaction time task: Repeat: (+exp) Random: (-) Predictive grip force modulation: (+exp) Fugl Meyer total: (-) + BBS + get up and go test (fast speed)
Cross-Referenced RCTs: Combined or Comparative Interventions Involving Exercise and Strength Training (results included in this table's levels of evidence)		
Chang et al. (2024a) RCT (6) NStart=30 NEnd=30 TPS=Chronic A vs B *Primary listing: Table 16 (Robotics)*	E: Robotic training with Rebless C: UE training with Motomed ergometer Duration: 30min/d, 10 sessions over 4wks	E vs C: FMA-UE (+exp) modified Barthel Index (-) modified Ashworth Scale elbow flexor (+exp) elbow extensor (-) wrist flexor (-) wrist extensor (-) ROM elbow flexor (-) elbow extensor (-) wrist flexor (-) wrist extensor (-) Motricity Index-UE (-) fNIRS (no stat)
Saygili et al. (2024) RCT (6) NStart=18 NEnd=18 TPS=Chronic A + B vs A/B *Primary listing: Table 15 (Telerehabilitation and Education)*	E: Modified Constraint-Induced Movement Therapy + Exercise/custom physiotherapy (Telerehabilitation) C: Home exercise program Duration: 90 mins/d, 5ds/wk, 3wks (Modified CIMT and Home exercise program); CIMT group also has 5hs/d of wearing a mitt on less affected hand	E vs C: STREAM Upper extremity (+exp) Lower extremity (+exp) Basic mobility (-) total score (+exp) FMA-UE (+exp) WMFT Functional ability (+exp) performance time (+exp) 9HPT (+exp)

		Grip strength (+exp) Pinch strength bipod pinch (+exp) tripod pinch (+exp) lateral pinch (+exp) MAL-28 Amount of use (+exp) Quality of use (+exp) FIM (+exp)
Segura et al. (2024) RCT (6) NStart=58 NEnd=40 TPS=Chronic A vs B *Primary listing: Table 14 (Music Therapy and Rhythmic Auditory Stimulation)*	E: Enriched Music-Supported Therapy (eMST) C: Graded Repetitive Arm Supplementary Program (GRASP) Duration: 60 mins, session, 4 sessions/wk, 10 weeks	E vs C: ARAT (-) FMA-UE (+exp) CAHAI (-) BBT (-) 9HPT (-) grip strength (-) Behaviour Rating Inventory of Executive Function (-) Sustained Attention to Response Task (-) Figural Memory (-) Rey Auditory Verbal Learning Test (-) verbal fluency (-) BDI-II (-) Apathy Evaluation Scale informant (+exp) self (-) POMS anger (+exp) vigor (-) fatigue (-) confusion (-) tension (-) depression (-) SIS strength (-) memory (-) emotion (+exp) communication (-) activity (-) mobility (-) hand function (-) participation (+exp) recovery (-) Treatment Self-regulation Questionnaire (-) Intrinsic Motivation Inventory interest (+exp) perceived competence (-) effort (-) pressure (-) perceived choice (-) value (-)
Yang & Choi (2024) RCT (5)	E: Kinesio taping + GRASP (home program)	E vs C:

NStart=60 NEnd=53 TPS=Subacute A + B vs A/B *Primary listing: Table 9 (Orthotics and Taping)*	C: GRASP (Home program) Duration: 60 mins/d, 5ds/wk, 12 wks	sEMG % of voluntary reference contraction (-) CAHAI-9 (+exp) DLSES (+exp) MAL amount of use (-) quality of movement (+exp)
Chintamani R. (2024) RCT (5) NStart=66 NEnd=40 TPS=Chronic A vs B *Primary listing: Table 4 (Task-Specific Training)*	E: Task-oriented training + conventional therapy C: Progressive resistance exercise + conventional therapy Duration: 60-90min/d, 3d/wk, 4wks	E vs C: CAHAI (+exp) SIS (+exp) Wolf motor function test (-) ARAT (+exp) 9HPT (-)
Toh F.M. et al. (2024) RCT Crossover (6) NStart=12 NEnd=9 TPS=Chronic A vs 0 *Primary listing: Table 15 (Telerehabilitation and Education)*	E: Smart reminder wristwatch telerehabilitation + Conventional therapy C: Conventional therapy Duration: E: 3hr/d, 5d/wk, 4wks; C: 15min/session, 3sessions/d, 5d/wk, 4wks; 3wk washout	E vs C: FMA - UE (-) ARAT (-) Active ROM shoulder flexion (-) shoulder abduction (+exp) elbow (-) pronation (-) supination (-) Motor activity log (-)
Mahmoud et al. (2024) RCT (7) NStart=30 NEnd=30 TPS=Chronic A + B vs A/B *Primary listing: Table 13 (Cognitive and Dual-Task Training)*	E: Cognitive motor rehabilitation + specific UE exercises C: Specific UE exercises Duration: 3d/wk, 8wks	E vs C: FMA - UE Motor function (+exp) Sensation (+exp) Passive joint motion (+exp) Joint pain (+exp) ARAT (+exp) Manual Function Test (+exp) Motor evaluation scale for UE in stroke patients Hand (+exp) Arm (+exp) Total (+exp)
Babazadeh-Zavieh et al. (2024) RCT (7) NStart=24 NEnd=24 TPS=Chronic A + B vs A/B *Primary listing: Table 44 (Acupuncture)*	E: Dry Needling + exercise therapy C: Exercise therapy Duration: Needling: 1min/muscle, 1d/wk, 4wks; Exercise: 30min/d, 5dwk, 4wks	E vs C: Modified Modified Ashworth Scale (-) Hmax/Mmax (-) H-reflex latency (-) ARAT (-) FMA (-) AROM (+exp) PROM (-)
Chiu et al. (2024) Pilot RCT (6) NStart=24 NEnd=24 TPS=Acute A vs B	E: Alternating hot-cold water immersion (AHCWI) + Standard rehabilitation C: Upper limb cycling exercises + Standard rehabilitation Duration: 30min/d, 5d/wk for 6wks AHCWI or cycling + 50min/d 5d/wk standard rehabilitation	E vs C: FMA-UE (+exp) Motricity Index-UE (+exp) modified Motor Assessment Scale (-) upper limb (+exp) BBS (-) Barthel Index (-)

Primary listing: Table 24 (Thermal Stimulation)		modified Ashworth scale (-)
Hejazi-Shirmard M. et al. (2024) Pilot RCT (6) NStart=39 NEnd=39 TPS=Chronic A vs B vs 0 *Primary listing: Table 13 (Cognitive and Dual-Task Training)*	E1: Cognitive Orientation to Daily Occupaitonal Performance E2: Progressive exercise program (strenght, functional, balance, and endurance training) C: Conventional occupational therapy Duration: 1hr/d, 2d/wk, 6wks	E1/E2 vs C: E1 v E2/ C: [COPM; - Performance (+exp1), - Satisfaction (+exp1) FMA (-) BBT (-) Motor Acitivyt Log (-) Trail Making Test A (-) Trail Making Test B (-) kinematic outcome: normalized movement time (-), - Percentage of the movement time in which peak velocity occurs (-) Maximum grasp aperture (-), - Percentage of the movement time in which MGa occurs (-)
Youssef et al. (2023) RCT (8) NStart=35 NEnd=35 TPS=Subacute A + B1 vs A + B2 vs A *Primary listing: Table 31 (Transcranial Direct Current Stimulation (tDCS))*	E1: Bihemispheric tDCS + Custum physiotherapy protocol E2: Unihemispheric tDCS + Custum physiotherapy protocol C: Sham tDCS + Custom physiotherapy protocol Duration: 65min/d (20 minutes tDCS/Sham tDCS; 45 minutes of custom physiotherapy protocol); 3 d/wk, 4wks	E1 vs C: FMA-UE (+exp1) FMA-LE (+exp1) Modified Ashworth Scale elbow flexors (+exp1) wrist flexors (+exp1) knee flexors (-) plantar flexors (-) Berg Balance Scale (+exp1) Serum bdnf levels (+exp2) E2 vs C: FMA-UE (+exp2) FMA-LE (+exp2) Modified Ashworth Scale elbow flexors (+exp2) wrist flexors (+exp2) knee flexors (-) plantar flexors (-) Berg Balance Scale (+exp2) Serum bdnf levels (+exp2) E1 vs E2: FMA-UE (-) FMA-LE (-) Modified Ashworth Scale elbow flexors (-) wrist flexors (-) knee flexors (-) plantar flexors (-) Berg Balance Scale (-) Serum bdnf levels (-)
Rezaei et al. (2023) RCT (6) NStart=40 NEnd=40 TPS=Subacute A + B vs A vs B vs 0	E1: HF-rTMS + Conventional Therapy E2: Contralateral limb Cross education (strength training)+ Conventional therapy E3: HF-rTMS + cross education + conventional therapy C: Conventional therapy Duration: 3d/wk for 10 sessions	E1/E2/E3 vs C: FMA (+exp2/3) BBT (+exp1/2/3) grip strength (+exp1/2) pinch strength (-) E1 vs E2: FMA (+exp2)

Primary listing: Table 29 (Repetitive Transcranial Magnetic Stimulation (rTMS))		BBT (-) grip strength (-) pinch strength (-) E2 vs E3: FMA (-) BBT (-) grip strength (-) pinch strength (-) E1 vs E3: FMA (-) BBT (-) grip strength (-) pinch strength (-)
Zhu et al. (2023) RCT (6) NStart=347 NEnd=321 TPS=Not Reported A + B vs C *Primary listing: Table 47 (Traditional Herbal Medicine)*	E: Traditional Chinese medicine + Tuina treatment + Acupuncture + standard therapy C: Kinesiotherapy exercises + standard therapy Duration: E: 6hr/d, 5d/wk for 4wks; C: 30min/d 5d/wk for 4wks	E vs C: Modified Ashworth Scale elbow extension (+exp) knee flexion (+exp) Modified Barthel Index (+exp) Stroke Specific Quality of Life Scale (+exp)
Nguyen et al. (2023) RCT (5) NStart=120 NEnd=120 TPS=Not Reported A + B vs A/B *Primary listing: Table 45 (Electroacupuncture and Transcutaneous Electrical Acupoint Stimulation)*	E: Electroacupuncture + cycling C: Electroacupuncture Duration: E: 30min/d, 5d/wk cycling + 30min/d, 5d/wk for 6wks electroacupuncture C: 30min/d, 5d/wk for 6wks electroacupuncture	E vs C: Muscle strength grading quadriceps (+exp) tibialis anterior (+exp) deltoid (+exp) biceps (+exp) Modified Rankin Scale (+exp) Barthel Index (+exp) Orgogozo scale (+exp) EMG quadriceps (+exp) tibialis anterior (+exp) deltoid (+exp) biceps (+exp)
Khalifa et al. (2023) RCT (8) NStart=30 NEnd=30 TPS=Subacute A + B vs A/B *Primary listing: Table 26 (Extracorporeal Shockwave Therapy)*	E: Radial extracorporeal shock wave therapy (rESWT) + Designed physical therapy program for shoulder C: Sham rESWT + Designed physical therapy program for shoulder Duration: 15min rESWT + 60min physical therapy, 2d/wk, 4wks	E vs C: shoulder structure abnormality (Ultrasound) (+exp) Pressure-pain threshold (+exp) Shoulder Pain and Disability Index (+exp) pain score (+exp) disability score (+exp)
Pouplin S. et al. (2023) Pilot RCT (8) NStart=28 NEnd=24 TPS=Chronic A vs B *Primary listing: Table 17 (Virtual Reality)*	E: Ergotact system (Videogames) C: Home-based self-rehabilitation program Duration: 30mins/d, 5d/wk, 2wks	E vs C: FMA-UE (-) Modified Ashworth Scale elbow flexor (-) wrist flexor (-) metacarpal phalangeal flexors (-) flexor digitorum superficialis (-) flexor digitorum profundus (-) Pain-VAS (-) Fatigue severity scale (-)

		WMFT (-) proximal section (-) distal section (-) BBT (-) FAI (-) domestic chores (-) leisure/work (-) outdoor activities (-) SF12 (-) patient satisfaction/motivation-VAS (-)
Frisoli et al. (2022) RCT (4) NStart=26 NEnd=22 TPS=Chronic A vs B *Primary listing: Table 16 (Robotics)*	E: Three-Dimensional Upper Limb Robotic Exoskeleton Training C: Manual Rehabilitation Duration: 45min/d, 3d/wk, 6wks	E vs C: FMA proximal (+exp) distal (-) MAS (-) BAT timing (+exp) quality (-)
Lin et al. (2022) RCT (8) NStart=172 NEnd=165 TPS=Subacute A vs B *Primary listing: Table 16 (Robotics)*	E: Robot-assisted training (RAT) + conventional rehab C: Enhanced upper extremity therapy (EUET) + conventional rehab Duration: int: 30min/d, 5d/wk, 3wks; conventional rehab: 60min/d, 5d/wk, 3wks	E vs C: FMA UE (-) UE-proximal (-) LE (+exp) MBI (-)
Schwerz de Lucena et al. (2022) RCT (7) NStart=22 NEnd=20 TPS=Chronic A + B vs A/B *Primary listing: Table 21 (Wearable Cueing and Reminder Devices)*	E: Cueing/remind to move + exercise/custom physiotherapy protocols C: Sham + exercise/custom physiotherapy protocols Duration: 135min/wk, 7 days/wk, 3wks	E vs C: BBT (-) FMA-UE (-) ARAT (-) NIHSS (-) grip strength/force (-) pinch strength/force (-) MAL (-)
Palimeris et al. (2022) RCT (6) NStart=98 NEnd=90 TPS=Chronic A + B vs A/B *Primary listing: Table 31 (Transcranial Direct Current Stimulation (tDCS))*	E: anodal tDCS + Upper extremity strength training C: Sham tDCS + Upper extremity strength training Duration: 80min/d(60m training, 20m tDCS), 3d/wk, 4wks	E vs C: FMA (-) Grip strength (-) Box and block (-) MAL (-) AROM shoulder (+exp) Wrist and elbow (-) PROM (-)
Hernandez et al. (2022) RCT (8) NStart=53 NEnd=51 TPS=Chronic A vs B *Primary listing: Table 17 (Virtual Reality)*	E: Jintronix Virtual reality C: GRASP rehab Duration: 20min/d, 5d/wk, 4wks	E vs C: FMA-UE (-) SIS (-) MAL (-)
Alberti et al. (2022) RCT (3) NStart=14	E1: Lucid table personalized computer physio E2: Kinesiotherapy(TST)	E1 vs E2 vs E3: HAQ-DI (no stat) PROM (no stat)

NEnd=14 TPS=Not Reported A + B vs A vs B *Primary listing: Table 20 (Feedback-Based Training)*	E3: Lucid table + kinesiotherapy Duration: 30min/d, 2d/wk, 7wks	AROM (no stat) GMFM (no stat)
Prathum et al. (2022) RCT (8) NStart=26 NEnd=24 TPS=Chronic A + B vs A/B *Primary listing: Table 31 (Transcranial Direct Current Stimulation (tDCS))*	E: Dual tDCS + home exercise program C: Sham tDCS + home exercise program Duration: 80min/d(20min tDCS, 60min home exercise), 3d/wk, 4wks	E vs C: FMA FMA-UE (+exp) FMA-LE (+exp) FMA-Total (+exp) WMFT FAS (+exp) Time (-) FTSST (-) 6MWT (-) TUG (-) Grip strength (-) MST (-)
Allegue et al. (2022) Pilot RCT (2) NStart=11 NEnd=9 TPS=Chronic A vs B *Primary listing: Table 17 (Virtual Reality)*	E: Telerehabilitation videogames VirTele C: GRASP program Duration: 30min/d, 5d/wk, 8wks	E vs C: FMA-UE (no stat) MAL (no stat) SIS (no stat) TSRQ (no stat)
Carlsson et al. (2022) Pilot RCT (7) NStart=27 NEnd=27 TPS=Chronic A + B vs A + C *Primary listing: Table 5 (Sensorimotor Training)*	E: Sensory Relearning + Task-Specific Training + home exercise C: Task-Specific Training + strength training Duration: 2.5hr/d, 2d/wk, 5wks	E vs C: SWM (+exp) STI (-) FMA-UE (-): light touch (-) proprioception (-) mSHFT (-) BBT (-) MAL (-) COPM (-) SIS (-)
Choi et al. (2022b) Pilot RCT (4) NStart=24 NEnd=20 TPS=Subacute A vs B *Primary listing: Table 4 (Task-Specific Training)*	E: Task-Oriented Training C: Table-Top Activity Training Duration: 30min/d, 5d/wk, 6wks	E vs C: MFT (+exp) MVPT-Vertical (-) mBI (-)
Hankinson et al. (2022) Pilot RCT (3) NStart=22 NEnd=4 TPS=Subacute A + B vs 0 *Primary listing: Table 14 (Music Therapy and Rhythmic Auditory Stimulation)*	E: Music motor therapy + custom program + conventional therapy C: Conventional Rehab Duration: 20min/d, 3d/wk, 6wks	E vs C: Adherence to intervention (no stat)
Saywell et al. (2021) RCT (7)	E: Augmented Community Telerehabilitation	E vs C: Stroke Impact Scale (-)

NStart=95 NEnd=83 TPS=Chronic A vs 0 *Primary listing: Table 15 (Telerehabilitation and Education)*	C: Conventional Therapy Duration: 6mo	Physical (-) Strength (-) Memory (-) Emotion (-) Communication (-) Activities of Daily Living (-) Mobility (-) Use of Hand (-) Participation (+exp) Grip Strength (-) Step Number (-) Stroke Self-Efficacy Questionnaire (-) Health Related Quality of Life (EQ-5D) Visual Analogue Scale (+exp)
Ersoy & Iyigun (2021) RCT (6) NStart=40 NEnd=40 TPS=Chronic A vs B *Primary listing: Table 17 (Virtual Reality)*	E1: Virtual Reality Boxing (Xbox Kinect) E2: Boxing Practice with Therapist Duration: 30min/d, 3d/wk, 8wks conventional therapy, 30min/d, 3d/wk, 8wks Virtual or in-person boxing	E1 vs E2: Wolf Motor Function Test (-) Minnesota Manual Dexterity Test (-) Fullerton Advanced Balance Scale (-) Addenbrooke's Cognitive Assessment (-) virtual boxing analysis
Krakauer et al. (2021) RCT (7) NStart=24 NEnd=21 TPS=Acute A vs B *Primary listing: Table 17 (Virtual Reality)*	E: Neuroanimation therapy using ARMEO exoskeleton C: Modified Occupational therapy (stretching, task specific training) Duration: 2hr/d, 5d/wk, 3wks	E vs C: FMA-UE (-) ARAT (-) Grip strength (-) SIS (-) Reaching AMD (-) Finger maximum voluntary force (-) Finger individuation (-)
Lencioni et al. (2021) RCT (6) NStart=40 NEnd=32 TPS=Chronic A vs B *Primary listing: Table 16 (Robotics)*	E: Robotic-assisted training + conventional therapy C: Conventional therapy + arm specific physiotherapy Duration: 45min/d, 5d/wk, 4wks	E vs C: Ev C: FMA (no stat), Kinematics elbow extension (+exp) trunk angles (+exp) shoulder angles (-) movement smooth (-) forearm pronation (+exp)
Maulet et al. (2021) RCT (8) NStart=33 NEnd=33 TPS=Chronic A + B vs A/B *Primary listing: Table 33 (Botulinum Toxin)*	E: Botulinum toxin injection + self-rehabilitation C: BTI Duration: 30min/d, 5ds/wk, 4wks	E vs C: WMFT (-) ARAT (-) EuroQol-visual analogue scale (-) Fatigue Severity Scale (-) Motor Activity Log (-)
Wilson et al. (2021) RCT (7) NStart=19 NEnd=17 TPS=Subacute A vs B *Primary listing: Table 17 (Virtual Reality)*	E: Home-Based (Virtual) Rehabilitation + Treatment As Usual C: Graded Repetitive Arm Supplementary Program + Treatment As Usual Duration: 30min/d,3-4d/wk, 8wks	E vs C: BBT MAH (+exp) LAH (-), 9HPT MAH (-) LAH (-) MoCA (+exp) SIS (-)

Hee-Su An & Deok-Ju Kim (2021) RCT (5) NStart=30 NEnd=30 TPS=Subacute A vs B *Primary listing: Table 13 (Cognitive and Dual-Task Training)*	E: Dual-Task Training + Conventional OT C: Single Task Training (combining sensory stimulation, UE muscle strength, cognitive and perceptual training, and fine hand movement) + Conventional OT Duration: 30min/d, 5d/wk, 5wks	E vs C: MFT (+exp) K-TMT (+exp) DST (+exp) EFPT-K (+exp) WHOQOL-BREF (+exp)
El-Kafy E.M.A. et al. (2021) RCT (6) NStart=40 NEnd=37 TPS=Chronic A + B vs 0 *Primary listing: Table 17 (Virtual Reality)*	E: Virtual reality therapy with ARMEO + combination of different exercises C: Conventional physiotherapy Duration: 2hr/d, 3d/wk, 12wks	E vs C: ARAT (+exp) WMFT (+exp) Grip Strength (-)
Yang Y. et al. (2021) RCT (5) NStart=44 NEnd=39 TPS=Subacute A + B vs A vs B *Primary listing: Table 29 (Repetitive Transcranial Magnetic Stimulation (rTMS))*	E: High frequency rTMS + grip training + conventional rehab C1: rTMS + conventional rehab C2: Grip training + conventional rehab Duration: E: 7min(2m rTMS, 5m grip training)/d, 5d/wk, 2wks; C1: 2m/d, 5d/wk, 2wks; C2: 5m/d, 5d/wk, 2wks; Conventional rehab: 120m/d, 5d/wk, 2wks	E vs C1: JTHFT total (-) without writing task (-) motor coordination (-) speed of movement (-) grip force scaling (-) FMA-UE (+exp) Grip strength (-) mBI (-) iMEP latency (-) E vs C2: JTHFT total (+exp) without writing task (+exp) motor coordination (+exp) speed of movement (+exp) grip force scaling (+exp) FMA-UE (+exp) Grip strength (-) mBI (-) iMEP latency (-) C1 vs C2: JTHFT total (-) without writing task (-) motor coordination (-) speed of movement (-) grip force scaling (-) FMA-UE (-) Grip strength (-) mBI (-) iMEP latency (-)
Ji et al. (2021) RCT (5) NStart=42 NEnd=37 TPS=Chronic	E: Graded Motor Imagery (included implicit and explicit motor imagery plus mirror therapy) + conventional rehabilitation C: Upper limb exercise + conventional rehabilitation Duration: 30min/d, 8 wks	E vs C: FMA-UE (-) MFT (-) Arm motion (+exp) MBI (-)

A vs B *Primary listing: Table 11 (Mental Practice)*		
Cho et al. (2021) Pilot RCT (7) NStart=24 NEnd=24 TPS=Acute A vs B *Primary listing: Table 17 (Virtual Reality)*	E: Virtual Reality Training (Nintendo Wii) + general physical therapy C: OT + general physical therapy Duration: 30min, 5x/wk, 4wks	E vs C: Jebsen-Taylor Hand Function Test (-) Fugl-Meyer Assessment (-) Grip Strength (+exp) Modified Bathel Index (-)
Kang et al. (2020) RCT (7) NStart=23 NEnd=23 TPS=Acute A vs B *Primary listing: Table 17 (Virtual Reality)*	E: Smart Glove Upper Extremity Training (RAPAEL)+ standard rehab C: Upper Extremity Self-Training at home + standard rehab Duration: 30min/d, 5d/wk, 2wks upper extremity training & 30min/d, 5d/wk, 2wks conventional therapy	E vs C: Fugl-Meyer Assessment- Upper Extremity (+exp) Proximal (-) Distal (+exp) Coordination/Speed (+exp) Jebsen Hand Function Test (-) Box and Block Test (-) Grip Strength (-) Modified Barthel Index- Upper Extremity (-) Carer Burden Scale (-)
Lannin et al. (2020) RCT (8) NStart=140 NEnd=139 TPS=Chronic A + B1 vs A + B2 *Primary listing: Table 33 (Botulinum Toxin)*	E: Botox+movement training C: Botox plus excercise handout Duration: 60min/d, 7d/wk, 10wk. Botox 1/x10 wk.	E vs C: goal attainment scale (-) BBT (-) passive range of motion wrist (-) grip strength (+exp) pain VAS (-) EuroQol-5D (+exp) Tardieu scale (-)
Ahn et al. (2019) RCT (4) NStart=60 NEnd=60 TPS=Subacute A + B vs A + C *Primary listing: Table 25 (Muscle Vibration)*	E1: Whole-body vibration + Task Oriented Training + Conventional PT E2: Upper- and lower-Cycle group+ Task Specific Training + Conventional PT Duration: 30min/d, 5d/wk for 4wk	E1 vs E2: Manual Function Test (+exp1) Grip Strength (+exp1)
Cramer et al. (2019) RCT (6) NStart=124 NEnd=114 TPS=Subacute A1 vs A2 *Primary listing: Table 15 (Telerehabilitation and Education)*	E: Telerehabilitation (motor therapy, gaming, videoconference supervised) C: In clinic Rehabilitation (Motor therapy, gaming, therapist supervised) Duration: 70min/d, 36 sessions total over 6-8wks	E vs C: Fugl-Meyer Assessment (-) BBT (no stat) SIS-hand motor domain (no stat)
Khan et al. (2019) RCT (8) NStart=60 NEnd=60 TPS=Chronic A + B vs A + C vs A *Primary listing: Table 30 (Theta Burst Stimulation (TBS))*	E1: iTBS + Physical therapy E2: FES + Physical therapy C: Physical Therapy Duration: 4wks, 3x stimulation plus 5x physical therapy for 30min	E1 vs C: Fugl-Meyer Assessment: (+exp1) Modified Rankin Scale: (+exp1) Barthel Index: (+exp1) National Institute of Health Stroke Scale: (+exp1) E2 vs C: Fugl-Meyer Assessment: (+exp2)

		Modified Rankin Scale: (+exp2) Barthel Index: (+exp2) National Institute of Health Stroke Scale: (+exp2) E1 vs E2: Fugl-Meyer Assessment: (-) Modified Rankin Scale: (-) Barthel Index: (-) National Institute of Health Stroke Scale: (-) RMT resting motor threshold
Rodgers et al. (2019) RCT (8) NStart=770 NEnd=676 TPS=Chronic A vs B vs 0 *Primary listing: Table 16 (Robotics)*	E1: Robot-assisted training E2: Enhanced upper limb therapy C: Usual care Duration: 45 min, 3x/wk, 12wk	E1 vs C: ARAT (-) FMA (-) Barthel Index (-) SIS: hand function (-); mobility; ADL (-); social participation (-) E2 vs C: ARAT (+exp) FMA (+exp) Barthel Index (+exp) SIS: hand function (+exp); mobility; ADL (+exp); social participation (+exp) E1 vs E2: ARAT (-) FMA (-) Barthel Index (-) SIS: hand function (-) mobility ADL (-) social participation (-)
Arnao et al. (2019) Pilot RCT (8) NStart=18 NEnd=18 TPS=Acute A + B vs A/B *Primary listing: Table 32 (Other Non-Invasive Brain Stimulation Methods)*	E: tNRS+GRASP C: Sham tRNS+GRASP Duration: 20min/d, for 5d	E vs C: FMA-UE (+exp) NIHSS (-) mRS (-) BI (-) BDI (no stats)
Milot et al. (2019) Pilot RCT (7) NStart=12 NEnd=12 TPS=Chronic A vs B *Primary listing: Table 4 (Task-Specific Training)*	E: Functional Training C: Strength Training Duration: 60min, 3x/wk, 4wks	E vs C: Fugl-Meyer Assessment (-) Wolf Motor Function Test (-) Motor Activity Log (-) Modified Ashworth Scale (-) Grip Strength (-)
Valkenborghs et al. (2019) Pilot RCT (8) NStart=20 NEnd=19 TPS=Chronic A + B vs A/B	E: Task-specific training preceded by aerobic exercise C: Task-specific training alone Duration: 6hr/wk, 10wk TST & 30 min, 3x/wk, 10wk aerobic exercise	E vs C: Action Research Arm Test (no stat) Wolf Motor Function (no stat) time (no stat) Motor Activity Log AOU (no stat) QOM (no stat)

Primary listing: Table 4 (Task-Specific Training)		Stroke Impact Scale strength memory mood communication ADL mobility hand use activities (no stat) Fatigue Assessment Scale 6-minute walk test International Physical Activity Questionnaire Peak VO2 (no stat) Peak Heart Rate (no stat) Brain derived neurotrophic factor (no stat)
Ellis et al. (2018) RCT (9) NStart=32 NEnd=31 TPS=Chronic A + B vs A/B *Primary listing: Table 16 (Robotics)*	E: Progressive abduction loading therapy +horizontal-plance viscous resistance device C: Progressive abduction loading therapy Duration: 1x/d; 3x/wk; 8wks	E vs C: Kinematic reaching distance (-) Reaching velocity FMA (-) SIS (-) Motor activity log Rancho los amigos functional test for hemiparetic UE isometric joint strength (-)
Lannin et al. (2018) Pilot RCT (8) NStart=37 NEnd=36 TPS=Chronic A + B vs A vs B *Primary listing: Table 33 (Botulinum Toxin)*	E: Botox+ intensive rehabilitation program C1: Botox C2: Intensive therapy Duration: 60min/session, for 6wks (12 sessions total) clinic rehabilitation, 3x60min/d, 5d/wk, for 6wks (90h total) self-directed practice, Single dose (max 500U) Botox	E vs C1 vs C2: goal attainment scale (-) BBT (-) 6min walk test (-) Tardieu scale (-)
Folkerts et al. (2017) RCT Crossover (4) NStart=11 NEnd=10 TPS=Chronic A vs B *Primary listing: Table 4 (Task-Specific Training)*	E1: Eccentric strength training E2: Task-oriented strength training Duration: 60min/d; 4wk+4wk	E1 vs E2: ARAT (+exp) muscle strength by hand held dynamometre (-)
Devier et al. (2017) RCT (5) NStart=31 NEnd=29 TPS=Chronic A + B vs A/B *Primary listing: Table 33 (Botulinum Toxin)*	E: OnabotulinumtoxinA with upper limb rehabilitation C: OnabotulinumtoxinA Duration: 2 injections, 24wk follow-up	E vs C: FMA (+exp) DAS (-) mAS (-)
Adie et al. (2017) RCT (7) NStart=235 NEnd=209 TPS=Subacute	E: Wii arm exercises C: Home-based arm exercises Duration: 45min/d for 6wk	E vs C: Action Research Arm Test (-) Stroke Impact Questionnaire (-) Canadian Occupational Performance Measure (-)

A vs B *Primary listing: Table 17 (Virtual Reality)*		Motor Activity Log (-) EQ 5D 3L Visual Analogue Scale (-)
Celletti et al. (2017) Pilot RCT (6) NStart=18 NEnd=18 TPS=Chronic A + B vs A/B vs 0 *Primary listing: Table 25 (Muscle Vibration)*	E1: Focal muscle vibration + progressive modular rebalancing E2: Focal muscle vibration + conventional physiotherapy C: Conventional physiotherapy Duration: 60min, 2d/wk for 6wks progressive modular rebalancing or conventional physiotherapy + 30 min/d for 3d muscle vibration	E1/E2 vs C: Wolf Motor Function Test (WMFT) (-) the Modified Ashworth Scale (MAS) (-) Motricity Index (-) VAS-Pain
Linder et al. (2017) Pilot RCT (6) NStart=20 NEnd=17 TPS=Chronic A + B1 vs A + B2 vs A *Primary listing: Table 4 (Task-Specific Training)*	E1: Forced aerobic exercise + Repetitive task practice(RTP) E2: Voluntary exercise + RTP C: RTP Duration: 90min/session, 3x/wk for 8wk	E1 vs E2: FMA (+exp1) WMFT (-) peak VO2 (+exp2) E1 vs C: FMA (+exp1) WMFT (-) Peak VO2 (-) E2 vs C: FMA (-) WMFT (-) Peak VO2 (+exp2)
Ni et al. (2017) RCT (6) NStart=180 NEnd=176 TPS=Chronic A + B vs 0 *Primary listing: Table 44 (Acupuncture)*	E: Superficial needling acupuncture plus club swing exercise + conventional therapy C: Conventional therapy Duration: 1-2x/d for 60d	E vs C: Visual Analogue Scale - Pain (+exp) Functional Comprehensive Assessment (+exp) Active Range of Motion: Shoulder flexion, extension, abduction, and internal rotation (+exp) Active Range of Motion: External shoulder rotation (-)
Rand et al. (2017) Pilot RCT (7) NStart=24 NEnd=23 TPS=Chronic A vs B *Primary listing: Table 17 (Virtual Reality)*	E: Video game self training C: Graded repetitive arm supplementary program Duration: 60min/d, 6d/wk, 5wk	E vs C: ARAT (-) Motor activity log (-) BBT (-)
Skubik-Peplaski et al. (2017) Pilot RCT (7) NStart=16 NEnd=16 TPS=Chronic A vs B *Primary listing: Table 4 (Task-Specific Training)*	E: Repetitive Task Practice C: Occupation-Based Intervention Duration: 55min/d, 2d/wk, 4wk	E vs C: Fugl-Meyer Assessment (-) Stroke Impact Scale (-) Canadian Occupational Performance Measure satisfaction (-) performance (-) Goal Attainment Scale (-) Center of gravity affected hemispher (-) unaffected hemisphere (-) MEP amplitude

Stockley et al. (2017) Pilot RCT (7) NStart=12 NEnd=12 TPS=Chronic A vs B *Primary listing: Table 17 (Virtual Reality)*	E: VR (YOUgrabber) C: Gym training Duration: 30 min, 18x over 12wk VR	E vs C: Motor Activity Log Amount of Use (-) Quality of Use (-) Box and Block Test (-) Fatigue severity scale (-)
Takahashi et al. (2016) RCT (5) NStart=60 NEnd=56 TPS=Subacute A vs B *Primary listing: Table 16 (Robotics)*	E: Robot arm end effectors (ReoGO) + standard therapy C: self-guided therapy + standard therapy Duration: 40min, 7d/wk, 6wk	E vs C: Fugl Meyer Assessment total UE (-) Proximal UE (+exp) flexor synergy (+exp) Wolf Motor Function Test Total (-) proximal UE (-) Motor Activity Log Amount of use: (-) Quality of use: (-) Simple Test for Evaluating Hand Function Range of Motion VAS scale Motricity Index Modified Ashworth Scale FIM Brunnstrom Scale
Allman et al. (2016) RCT (8) NStart=26 NEnd=24 TPS=Chronic A + B vs A/B *Primary listing: Table 31 (Transcranial Direct Current Stimulation (tDCS))*	E: Anodal tDCS + GRASP C: Sham tDCS + GRASP Duration: tDCS: 1mA, 20min/d, 9d; GRASP: 1hr/d, 9d	E vs C: Action Research Arm Test (no stats) Wolf Motor Function Test (no stats) Fugl-Meyer Upper Extremity Score (no stats)
Lee et al. (2016d) Pilot RCT (8) NStart=26 NEnd=26 TPS=Chronic A vs B *Primary listing: Table 17 (Virtual Reality)*	E: VR based rehab C: Group based rehab Duration: 30min/d, 3d/wk 8wk	E vs C: FMA (+exp) BBT (-) mBI (-) Manual function test (+exp) SF-12 (-)
English et al. (2015) RCT (7) NStart=283 NEnd=261 TPS=Acute A vs B vs 0 *Primary listing: Table 4 (Task-Specific Training)*	E: Group Circuit C1: high intensity physio (7d/wk) C2: usual physiotherapy (5d/wk) Duration: 90min/d, 2x/d, 5d/wk, 4wk Circuit	E vs C1 vs C2: 6min walk test (-) Functional independence Measure (-) Wolf Motor Function Test (-) Stroke Impact Scale (-) Austrailian Quality of life (-) Functional Ambulation Classification (-) Length of stay (-)
Tyson et al. (2015) RCT (8) NStart=94 NEnd=85 TPS=Acute A vs B	E: Mirror therapy + usual care C: Lower-limb exercise + usual care Duration: 1x/d, 4wk	E vs C: Motricity Index (-) Grip Strength (-) Rivermead Assessment of Sensory Perception (-) Modified Ashworth Scale -biceps (-)

Primary listing: Table 10 (Mirror Therapy)		Box and Block Test (-) Action Research Arm Test (-) Star Cancellation
Linder et al. (2015) RCT (6) NStart=99 NEnd=91 TPS=Subacute A + B vs A/B *Primary listing: Table 15 (Telerehabilitation and Education)*	E: Robot-assisted therapy (Hand mentor pro robotic device) + home exercise program (Hand Mentor) C: Home exercise program Duration: 180min/d, 5d/wk for 8wk	E vs C: Stroke Impact Scale (-) Center for Epidemiologic Studies Depression Scale (-)
Wolf et al. (2015) RCT (7) NStart=99 NEnd=92 TPS=Subacute A + B vs A/B *Primary listing: Table 16 (Robotics)*	E: Telemonitored hand robotic-assisted therapy (Hand mentor pro) + home exercise program C: Home exercise program only Duration: 3h/d, 5d/wk for 8 wks	E vs C: Fugl Meyer Assessment (-) Action Research Arm Test (-) Wolf Motor Function Test (+exp)
BaziledaSilva et al. (2015) RCT (8) NStart=20 NEnd=20 TPS=Chronic A + B vs A/B *Primary listing: Table 4 (Task-Specific Training)*	E: Task specific training with strength training/resistance C: Task oriented training without resistance Duration: 30min/d, 2d/wk for 6wk	E vs C: Active shoulder Range of Motion (+exp) FMA (+exp) Grip strength (+exp) TEMPA (+exp) Modified Ashworth Scale (-) shoulder flexors strength
Sale et al. (2014a) RCT (6) NStart=20 NEnd=20 TPS=Acute A vs B *Primary listing: Table 16 (Robotics)*	E: inpatient rehabilitation + robot-assisted hand therapy C: inpatient rehabilitation + personalized OT training Duration: 3hr/day inpatient rehabilitation + 40min/d, 5d/wk, 4wk, 20x total robot assisted or OT therapy	E vs C: Fugl-Meyer Assessment Medical Research Council Scale Motricity Index Modified Ashworth scale - no stat
You et al. (2014) RCT (5) NStart=45 NEnd=41 TPS=Chronic A + B vs A/B vs 0 *Primary listing: Table 8 (Stretching Programs)*	E1: Stretching + Joint-stabilizing exercises E2: Stretching C: Standard exercise Duration: 30min/d, 5d/wk, for 8wk	E1 vs C: Motor Assessment Scale (+exp1) Thickness of tendon E1 vs E2: Motor Assessment Scale (+exp2) Thickness of tendon E2 vs C: Motor Assessment Scale (-) Thickness of tendon
Ackerley et al. (2014) RCT Crossover (7) NStart=13 NEnd=13 TPS=Chronic A + B1 vs A + B2 vs A *Primary listing: Table 30 (Theta Burst Stimulation (TBS))*	E1: Intermittent theta burst stimulation (TBS) + dexterity training E2: Continuous TBS + dexterity training C: Sham TBS + dexterity training Duration: 600 stimuli, 1 session, unspecified length	E1 vs C: Motor-Evoked Potentials (+exp1) Grating Orientation Task (-) Precision Grip (-) Action Research Arm Test (-) E2 vs C: Motor-Evoked Potentials (-) Grating Orientation Task (-) Precision Grip (-) Action Research Arm Test (-) E1 vs E2:

		Motor-Evoked Potentials (no stats) Grating Orientation Task (-) Precision Grip (-) Action Research Arm Test (-) sensory with Semmes-Weinstein monofilaments
Friedman et al. (2014) Pilot RCT (4) NStart=12 NEnd=12 TPS=Chronic A vs B vs 0 *Primary listing: Table 17 (Virtual Reality)*	E1: Music glove E2: Isometric hand therapy C: Conventional care Duration: 1hr, 3x/wk, 2wk	E1 vs C: Box and Block Test (+exp1) Fugl-Meyer Asessment (-) Wolf Motor Function Test (-) Action Research Arm Test (-) Nine Hole Peg Test (+exp1) Pinch Strength (-) E2 vs C: Box and Block Test (-) Fugl-Meyer Asessment (-) Wolf Motor Function Test (-) Action Research Arm Test (-) Nine Hole Peg Test (-) Pinch Strength (-) E1 vs E2: Box and Block Test (-) Fugl-Meyer Asessment (-) Wolf Motor Function Test (-) Action Research Arm Test (-) Nine Hole Peg Test (-) Pinch Strength (-) User satisfaction questionnaire
Patten et al. (2013) RCT Crossover (7) NStart=19 NEnd=18 TPS=Chronic A + B vs A/B *Primary listing: Table 4 (Task-Specific Training)*	E: Functional task practice (FTP) + Power training C: Functional task practice (FTP) Duration: 75min/d, 3d/wk for 4wks; 4wk washout	E vs C: WMFT (+exp) Ashworth scale (-) FIM (+exp) FMA UE (-) Maximal isometric joint torque (+exp) agonist electromyographic activation (+exp) peak power (+exp) EMG position threshold during stretch reflex testing (+exp) EMG burst duration during stretch reflex testing (+exp) passive joint torque during stretch (+exp)
Bai et al. (2013) RCT (5) NStart=120 NEnd=120 TPS=Subacute A + B vs A vs B *Primary listing: Table 44 (Acupuncture)*	E1: Physiotherapy E2: Acupuncture E3: Physiotherapy+Acupuncture Duration: Acupuncture: 30min/d, 6d/wk for 4wk; Physiotherapy: 45min/d, 6d/wk for 4wk	E1 vs E2: Simplified Fugl-Meyer Assessment (-) Modified Barthel Index (-) E1 vs E3: Simplified Fugl-Meyer Assessment (-) Modified Barthel Index (-) E2 vs E3: Simplified Fugl-Meyer Assessment (-) Modified Barthel Index (-)
DosSantos-Fontes et al. (2013) Pilot RCT (8)	E: Repetitive peripheral nerve sensory stim (RPSS) + Motor Training	E vs C: Feasibility: Compliance (+exp)

NStart=20 NEnd=20 TPS=Chronic A + B vs A/B *Primary listing: Table 27 (Additional Afferent and Peripheral Stimulation Methods)*	C: Sham + Motor Training Duration: 2h/d RPSS prior to motor training for 4wk	Jebsen taylor hand function test (+exp)
Ni et al. (2013) RCT (7) NStart=165 NEnd=165 TPS=Chronic A + B1 vs A + B2 *Primary listing: Table 44 (Acupuncture)*	E: Standard Acupuncture with Shixuan & Xiaohai acupoints + Functional training C: Standard Acupuncture only + Functional training Duration: 3 sessions	E vs C: Finger grip strength (+exp) Fugl-Meyer Assessment (+exp)
Zarnigar et al. (2012) RCT (4) NStart=101 NEnd=60 TPS=Not Reported A vs B vs C *Primary listing: Table 46 (Meridian Acupressure and Massage Therapy)*	E1: Massage E2: Tailored exercise (physical therapy regimen) C: Traditional medicine (Conventional unani drug therapy (Munzij, Mushil, Muaqwwi Aasab)) Duration: E: 45min/d, 1x/alternate day, 8wks; C: 2x/d, 15d munzij, alternate days for 1 wk mushil. 2x/d, 5wks muqawwi aasab	E1/E2 vs C: Fugl-Meyer Assessment (+exp1/2) Functional Independence Measure (+exp1/2) Independent walking ability (+exp2)
Basaran et al. (2012) RCT (7) NStart=39 NEnd=38 TPS=Chronic A + B1 vs A + B2 vs A *Primary listing: Table 9 (Orthotics and Taping)*	E1: Dorsal hand splint + home-based exercise program E2: Volar hand splint + home-based exercise program C: Home-based exercise program Duration: 10 reps, 3x/d home-based exercise & 10hr/d, 5wk splint	E1 vs E2 vs C: Modified Ashworth Scale (-) Passive ROM of wrist extension (-) Hmax/Max ratio (-) H latency (-)
Conforto et al. (2012) Pilot RCT (8) NStart=30 NEnd=29 TPS=Acute A + B vs A/B *Primary listing: Table 29 (Repetitive Transcranial Magnetic Stimulation (rTMS))*	E: Low frequency rTMS +outpatient customary rehabilitation C: Sham rTMS+ outpatient customary rehabilitation Duration: 25min/d, 5d/wk for 4wk	E vs C: JTHFT (no between stat) Pinch force (no stat) FMA (no stat) AS (no stat) Modified Rankin Scale (no stat)
Wang et al. (2011) RCT (5) NStart=30 NEnd=30 TPS=Subacute A vs B vs 0 *Primary listing: Table 6 (Constraint-Induced Movement Therapy (CIMT))*	E1: mCIMT E2: Intensive conventional therapy C: Conventional rehabilitation Duration: C: 45 mins/d, 5ds/wk, 4wks; E2/E2: 180 mins/d, 5ds/wk, 4wk	E1/E2 vs C: Wolf Motor Function Test (+exp)
Khan et al. (2011) Pilot RCT (8) NStart=44 NEnd=42 TPS=Chronic A vs B vs 0	E1: CIMT E2: Therapeutic Climbing C: Conventional neurological therapy Duration: 15-20h/wk for 4wk	E1 vs E2: Wolf Motor Function Test : time (+E1); functional ability scale (-) Motor Activity Log (-) Isometric Strength (-) Active Range of Motion (-)

Primary listing: Table 6 (Constraint-Induced Movement Therapy (CIMT))		Chedoke McMaster Impairment Inventory subscale Shoulder pain (+E1) E1 vs C: Wolf Motor Function Test: time (-) functional ability scale (-) Motor Activity Log (-) Isometric Strength (-) Active Range of Motion (-) Chedoke McMaster Impairment Inventory subscale Shoulder pain (-) E2 vs C: Wolf Motor Function Test: time (-); functional ability scale (-) Motor Activity Log (-) Isometric Strength (-) Active Range of Motion (-) Chedoke McMaster Impairment Inventory subscale Shoulder pain (-)
Lo et al. (2010) RCT (7) NStart=127 NEnd=120 TPS=Chronic A vs B vs 0 *Primary listing: Table 16 (Robotics)*	E1: Robot-Assisted Therapy E2: Dose-matched Intensive Comparison Therapy C: Usual care Duration: 60min/session, 36 session, 12wk	E1 vs C: FMA (-) WMFT (-) SIS (+exp1) pain scale (-) mAS (-) E1 vs E2: FMA (-) WMFT (-) SIS (-) pain scale (-) mAS (-)
Wu et al. (2010b) RCT (6) NStart=23 NEnd=23 TPS=Chronic A vs B *Primary listing: Table 24 (Thermal Stimulation)*	E: upper extremity thermal stimulation C: lower extremity thermal stimulation Duration: 3d/wk, 8wk	E vs C: Stroke Rehabilitation Assessment of Movement (+exp) Action Research Arm Test (+exp) Modified Ashworth Scale (-) Barthel Index (-)
Wolny et al. (2010) RCT (5) NStart=96 NEnd=96 TPS=Chronic A + B vs A/B vs 0 *Primary listing: Table 8 (Stretching Programs)*	E1: Individual proprioceptive neuromuscular facilitation exercises + Conventional care E2: Individual proprioceptive neuromuscular facilitation exercises + neuromobilization of the affected upper extremity + Conventional care C: Conventional care Duration: 45min, 1x/d, 18d	E1 vs E2 vs C: E1/ E2: two-point discriminatory sense (+exp2) stereognosia (-) thermaesthesia (+exp) E2/C: two-point discriminatory sense (+exp2) stereogNosia (+exp2) thermaesthesia (+exp2)
Celnik et al. (2008) RCT Crossover (5) NStart=9 NEnd=8 TPS=Chronic A + B1 vs A + B2 vs A	E1: Physical Therapy + Action Observation Congruent E2: Physical Therapy + Action Observation Incongruent C: Physical Therapy Duration: 30min, 1x/condition, 7d washout period	E1/E2 vs C: E1 vs E2/C: motor memory formation (based on EMG, TMS-evoked thumb movements) (+exp1)

Primary listing: Table 12 (Action Observation)		
Stinear et al. (2008) RCT (5) NStart=32 NEnd=30 TPS=Chronic A + B vs A/B *Primary listing: Table 2 (Bilateral Arm Training)*	E: Active-passive bilateral therapy (APBT) + Self-directed motor practice C: Self-directed motor practice on affected upper limb Duration: 10-15min, 3x/d, 7d/wk, 4wk	E vs C: grip strength (-) Fugl-Meyer Assessment (-) National Institutes of Health Stroke Scale (-)
Thielman et al. (2008) RCT (4) NStart=12 NEnd=11 TPS=Chronic A + B vs A + C *Primary listing: Table 4 (Task-Specific Training)*	E1: Task-related Training + Trunk Restraint E2: Resistive Exercises + Trunk Restraint Duration: 45min/d, 3x/wk, for 4wks	E1 vs E2: Movement time (-) First velocity peak (-) Trunk motion (-) Arm motion (-) Wolf Motor Function Test (-) Fugl-Meyer Assessment (-) Active Range of Motion (-)
Liu et al. (2008) Pilot RCT (4) NStart=10 NEnd=10 TPS=Chronic A + B vs A/B *Primary listing: Table 45 (Electroacupuncture and Transcutaneous Electrical Acupoint Stimulation)*	E: Electroacupuncture + strength training C: Strength training Duration: 30min strength + 40min electroacupuncture, 2x/wk for 6wk	E vs C: Wrist extension AROM (no stats) Wrist strength (no stats) FMA (no stats) speed-dependent reflex torque
Rabadi et al. (2008) Pilot RCT (6) NStart=30 NEnd=30 TPS=Acute A vs B vs 0 *Primary listing: Table 16 (Robotics)*	E1: Robotic therapy (MIT-Manus) + conventional therapy E2: Arm ergometer (Monark) + conventional therapy C: Occupational therapy Duration: 3hr/d conventional therapy & 40min/d, 5d/wk robot or arm ergometer therapy	E1/E2 vs C: FMA (-) FIM Motor (-), - cognition (-) Motor status scale (-) MAS + ARAT + PAIN-VAS
Kowalczewski et al. (2007) RCT (6) NStart=20 NEnd=18 TPS=Subacute A + B1 vs A + B2 *Primary listing: Table 22 (Neuromuscular Electrical Stimulation (NMES))*	E1: High intensity FES assisted exercise therapy E2: Low FES assisted exercise therapy Duration: 15/60 min, 5d/wk for 3 wk	E1 vs E2: Wolf Motor Fuction Test (+exp1) Fugl-Meyer Assessment (-) Motor activity log (-) Combined kinematic Score (+exp1)
Page et al. (2007) RCT (5) NStart=32 NEnd=32 TPS=Chronic A + B vs 0 *Primary listing: Table 11 (Mental Practice)*	E: Mental Practice+ ADL training session C: Sham Relaxation Exercise+ ADL training session Duration: 60min (30min ADL training + 30min MP)/d, 2d/wk, 6wks	E vs C: Fugl-Meyer Assessment (+exp) Action Research Arm Test (+exp)
Mukherjee et al. (2007) RCT Crossover (3) NStart=7 NEnd=7	E: Electroacupuncture + strength training C: Strength training Duration: 2Hz, 40min/d, 2d/wk for 6wk	E vs C: mAS (+exp) velocity ARST (no stats) segmented ARST (no stats)

TPS=Chronic A + B vs A/B *Primary listing: Table 45 (Electroacupuncture and Transcutaneous Electrical Acupoint Stimulation)*		EMG of wrist flexors
Cirstea et al. (2007) RCT (6) NStart=28 NEnd=28 TPS=Chronic A + B vs A/B *Primary listing: Table 20 (Feedback-Based Training)*	E: Pointing movement practice with feedback C: Pointing movement practice without feedback Duration: 1hr/session, 10sessions over 2wk	E vs C: FMA (-) CSI (-) TEMPA (+exp) Shoulder horizontal adduction (+exp) shoulder flexion (+exp) TCI segment II amplitude (+exp) Trunk anterior displacement (-) Trunk rotation (-) Elbow extension (-) TCI Segment III duration (-)
Pomeroy et al. (2007) Pilot RCT (6) NStart=27 NEnd=24 TPS=Acute A + B vs A vs B vs 0 *Primary listing: Table 29 (Repetitive Transcranial Magnetic Stimulation (rTMS))*	E1: Real rTMS+ Real VMC E2: Real rTMS+Placebo VMC E3: Placebo rTMA+ real VMC C: Placebo rTMS + Placebo VMC Duration: VMC 5min	E1/E2/E3 vs C: ARAT Flexion/extension torque MEP in bicep/tricep Peak torque for elbow Peak flex for elbow
Gladstone et al. (2006) RCT (7) NStart=71 NEnd=67 TPS=Acute A + B vs A/B *Primary listing: Table 41 (Central Nervous System Stimulants)*	E: Dextroamphetamine + physiotherapy C: Placebo + Physiotherapy Duration: single dose 10 mg, 1x/d + 60min/d physiotherapy, 2d/wk, 5wks	E vs C: FMA total (-) UE (-) LE (-) Chedoke Arm and Hand Activity Inventory score (-) Independent Ambulation with environmental barriers (-) FIM (-) Chedoke McMaster Disability Inventory (-) Clinical Outcome Variable Scale (-) ambulatory (-) independent ambulation (-)
Higgins et al. (2006) RCT (8) NStart=91 NEnd=84 TPS=Chronic A vs B *Primary listing: Table 4 (Task-Specific Training)*	E: Unilateral and bilateral task oriented exercises. C: Walking tasks Duration: 90min/d, 3d/wk; 6wks	E vs C: BBT (-) 9HPT (-) Maximal grip strength (-) TEMPA (-) Stroke Rehab assessment of movement (-) Barthel index (-) OARS-IADL (-) SF36 (-)
Kim & Koh (2005) RCT Crossover (4) NStart=10 NEnd=10 TPS=Chronic	E1: UE Exercise + Music Therapy (Song) E2: UE Exercise + Music Therapy (Karaoke) C: UE Exercise Duration: 20min/d, for 8wks	E1/E2 vs C: Numerical Pain Rating Scale (-)

A + B1 vs A + B2 vs A *Primary listing: Table 14 (Music Therapy and Rhythmic Auditory Stimulation)*		
Gabr et al. (2005) RCT Crossover (2) NStart=12 NEnd=12 TPS=Chronic A vs B *Primary listing: Table 22 (Neuromuscular Electrical Stimulation (NMES))*	E: Home-based electromyography-triggered neuromascular stimulation (ETMS) C: Home exercise program Duration: 70min/d, 5d/wk, for 8wks ETMS/Home-exercise (17wks total)	E vs C: FMA (no stat) ARAT (no stat) Goniometry-PROM (no stat)
Thielman et al. (2004) RCT (4) NStart=12 NEnd=12 TPS=Chronic A vs B *Primary listing: Table 4 (Task-Specific Training)*	E: Task-related Training (Grasping/Retrieving Objects) C: Progressive Resistive Exercises Duration: 35min/d, 12 sessions, for 4wk	E vs C: Kinematic measures (-) Modified Ashworth Scale (-) Rivermead Motor Assessment (-)
Winstein et al. (2004) Pilot RCT (6) NStart=64 NEnd=60 TPS=Acute A vs B vs 0 *Primary listing: Table 4 (Task-Specific Training)*	E1: Strength training E2: Functional task practice C: Standard care Duration: 1h/d, 5d/wk, 4wk	E1 vs E2 vs C: Fugl Meyer Assessment: (+exp, +exp2) Functional test of the hemiparetic upper extremity (+exp, +exp2) Isometric torque (+exp , +exp2)
Page et al. (2001a) Pilot RCT (5) NStart=13 NEnd=13 TPS=Chronic A + B vs A/B *Primary listing: Table 11 (Mental Practice)*	E: Guided Motor Imagery (tape) + OT exercises C: Stroke-information tape + OT exercises Duration: 60 min of OT 3x/wk for 6 wks, 10-minute tape (imagery or stroke information) after each session and at home 2x/wk.	E vs C: Fugl-Meyer Assessment (No stats) Action Research Arm Test (No stats)
Dean et al. (2000b) Pilot RCT (5) NStart=12 NEnd=8 TPS=Chronic A vs B *Primary listing: Table 4 (Task-Specific Training)*	E: Lower-Limb Task-Specific Circuit Training C: Upper-Limb Task-Specific Training Duration: 60min, 3x/wk, 4wks	E vs C: 6-Minute Walk Test -No device (+exp) 10-Meter Walk Test -With (-) and Without (+exp) Assistive Device Step Test (+exp) Timed Up and Go Test (-) Grip Strength (-) Purdue Pegboard Test (-) sit to stand
Francisco et al. (1998) Pilot RCT (3) NStart=9 NEnd=9 TPS=Acute A + B vs A/B *Primary listing: Table 22 (Neuromuscular Electrical Stimulation (NMES))*	E: EMG triggered NMS (EMG-Stim) + Wrist Strengthening Exercises C: Wrist Exercises Duration: 30min/d, 5x/wk, during rehabilitation stay	E vs C: Fugl-Meyer Assessment Upper Extremity (+exp) Functional Independence Measure (+exp)

Abbreviations and table notes: C=control group; D=days; E=experimental group; H=hours; Min=minutes; RCT=randomized controlled trial; TPS=time post stroke category (Acute: less than 30 days, Subacute: more than 1 month but less than 6 months, Chronic: over 6 months); Wk=weeks.

+exp indicates a statistically significant between groups difference at α=0.05 in favour of the experimental group

+exp1/+exp2/+exp3 indicates a statistically significant between groups difference at α=0.05 in favour of the first, second or third experimental group

+con indicates a statistically significant between groups difference at α=0.05 in favour of the control group

- indicates no statistically significant between groups differences at α=0.05

1. Body Functions and Structures

MOTOR FUNCTION			
LoE	**Conclusion Statement**	**RCTs**	**References**
1b	Functional strength training may not have a difference in efficacy when compared to Movement performance therapy for improving motor function.	1	Hunter et al. (2018)
1b	Dynamic resistance training (POWER) may not have a difference in efficacy when compared to Functional Task Practice (FTP) for improving motor function.	1	Corti et al. (2012)
1a	Strength training may produce greater improvements in motor function than conventional therapy.	5	Salehi DehNo et al. (2021); Dhoka et al. (2020); El-Nashar et al. (2019); Park et al. (2019a); Donaldson et al. (2009)
1b	Functional strength training with conventional physical therapy may not have a difference in efficacy when compared to Conventional physiotherapy X2 for improving motor function.	1	Donaldson et al. (2009)
1a	Exercise and custom physiotherapy protocols may produce greater improvements in motor function than conventional therapy.	24	Deng et al. (2024); García-Pérez et al. (2024); Ho et al. (2024); Mehraban et al. (2024); Swanson et al. (2023); Fathi et al. (2022); Jarbandhan et al. (2022); Munawar A. et al. (2022); Chin et al. (2021); Chiu et al. (2021); Wang et al. (2021a); Khorvash et al. (2020); Swank et al. (2020); MandehgaryNajafabadi et al. (2019); Dell'Uomo et al. (2017); Park et al. (2017a); Pandian et al. (2015); Repsaite et al. (2015); Liu et al. (2014b); ShimodozoNo et al. (2013); Duncan et al. (2003); Rodgers et al. (2003); Lincoln et al. (1999); Duncan et al. (1998)
1a	Different approaches to exercise and custom physiotherapy protocols may not have a difference in efficacy when compared with one another for improving motor function.	4	Wang et al. (2021b); Hogg et al. (2020); Emmerson et al. (2017); Hesse et al. (2011a)
1b	Arm treatment for 3hr/d may not have a difference in efficacy when compared to Arm treatment for 2hr/d or Arm treatment for 1hr/d for improving motor function.	1	Han et al. (2013)
1b	Arm treatment for 3hr/d may not have a difference in efficacy when compared to Arm treatment for 2hr/d for improving motor function.	1	Han et al. (2013)
1b	Functional strength training UL may produce greater improvements in motor function than the other study arms.	1	Mares et al. (2014)

2	There is conflicting evidence about the effect of Graded Arm Supplementary Program when compared to Conventional Therapy for improving motor function.	1	Dodzo et al. (2020)
1b	There is conflicting evidence about the comparative effects of different approaches to strength training for improving motor function.	4	Kerimov et al. (2021); Agni & Kulkarni (2017); Kim et al. (2017a); Graef et al. (2016)
1b	Graded repetitive arm supplementary program protocol may produce greater improvements in motor function than Education book- self-administered homework exercise program.	1	Harris et al. (2009)
1b	Strength training combined with other interventions may not have a difference in efficacy when compared to stretching and positioning programs for improving motor function.	2	Coroian et al. (2018); Khallaf et al. (2018)
1b	Exercise and custom physiotherapy protocols may not have a difference in efficacy when compared to no treatment for improving motor function.	2	Natta et al. (2021); Werner & Kessler (1996)
1b	Body-weight supported treadmill training may not have a difference in efficacy when compared to Education (reviewing home exercises) for improving motor function.	1	Ploughman et al. (2008)
1b	Strength training combined with other interventions may produce greater improvements in motor function than conventional therapy.	1	Lin et al. (2015)
1a	Exercise and custom physiotherapy protocols combined with other interventions may produce greater improvements in motor function than conventional therapy.	2	Simpson L.A. et al. (2024); Cirstea et al. (2006)
2	Arm Ergometer with conventional treatment may produce greater improvements in motor function than Cryotherapy with Proprioceptive Neuromusucal Facilitation and Neurodevelopmental Techniques.	1	Patil et al. (2014)
1b	Exercise and custom physiotherapy protocols combined with other interventions may not have a difference in efficacy when compared to exercise and custom physiotherapy protocols for improving motor function.	3	Mayrhuber et al. (2024); Yamada et al. (2022); Taub et al. (2013)
1b	Leg rehab training may produce greater improvements in motor function than Immobilization therapy with inflatable pressure splint (arm and leg with splints).	1	Kwakkel et al. (1999)
2	Graded repetitive arm supplementary program may produce greater improvements in motor function than Virtual reality.	1	Dhanusia et al. (2023)
2	Boxing training may produce greater improvements in motor function than No intervention or therapy.	1	Ersoy & Iyigun (2024)
2	Boxing training may produce greater improvements in motor function than Scapular stabilization training.	1	Ersoy & Iyigun (2024)
1b	Forced-rate exercise with Repetitive task practice may not have a difference in efficacy when compared to Repetitive task practice for improving motor function.	1	Linder et al. (2024)
1b	Cycling exercise with feedback and Conventional therapy may not have a difference in efficacy when compared to Conventional therapy for improving motor function.	1	Simic-Panic et al. (2024)
2	Task-related Training (Grasping or Retrieving Objects) may not have a difference in efficacy when compared to Progressive Resistive Exercises for improving motor function.	1	Thielman et al. (2004)
1b	Smart Glove Upper Extremity Training (RAPAEL) with rehab may produce greater improvements in motor function than Upper Extremity Self-Training at home with rehab.	1	Kang et al. (2020)

2	Active-passive bilateral therapy (APBT) with Self-directed motor practice may not have a difference in efficacy when compared to Self-directed motor practice on affected upper limb for improving motor function.	1	Stinear et al. (2008)
2	Mental Practice with activities of daily living training session may produce greater improvements in motor function than Sham Relaxation Exercise with activities of daily living training session.	1	Page et al. (2007)
2	Whole-body vibration with Task Oriented Training and Conventional physical therapy may produce greater improvements in motor function than Upper- and lower-Cycle group with Task Specific Training and Conventional physical therapy.	1	Ahn et al. (2019)
2	Massage may produce greater improvements in motor function than Traditional medicine (Conventional unani drug therapy (Munzij, Mushil, Muaqwwi Aasab)).	1	Zarnigar et al. (2012)
1b	Group Circuit may not have a difference in efficacy when compared to high intensity physio or usual physiotherapy for improving motor function.	1	English et al. (2015)
2	Task-related Training with Trunk Restraint may not have a difference in efficacy when compared to Resistive Exercises with Trunk Restraint for improving motor function.	1	Thielman et al. (2008)
1b	Dextroamphetamine with physiotherapy may not have a difference in efficacy when compared to Placebo with Physiotherapy for improving motor function.	1	Gladstone et al. (2006)
1b	Mirror therapy with usual care may not have a difference in efficacy when compared to Lower-limb exercise with usual care for improving motor function.	1	Tyson et al. (2015)
1b	Telemonitored hand robotic-assisted therapy (Hand mentor pro) with home exercise program may not have a difference in efficacy when compared to Home exercise program only for improving motor function.	1	Wolf et al. (2015)
2	Modified constraint-induced movement therapy may produce greater improvements in motor function than Conventional rehabilitation.	1	Wang et al. (2011)
2	Robot arm end effectors (ReoGO) with therapy may not have a difference in efficacy when compared to self-guided therapy with therapy for improving motor function.	1	Takahashi et al. (2016)
1b	Telerehabilitation may not have a difference in efficacy when compared to In clinic Rehabilitation for improving motor function.	1	Cramer et al. (2019)
1b	Robot-Assisted Therapy may not have a difference in efficacy when compared to Usual care for improving motor function.	1	Lo et al. (2010)
1b	Robot-Assisted Therapy may not have a difference in efficacy when compared to Dose-matched Intensive Comparison Therapy for improving motor function.	1	Lo et al. (2010)
2	Eccentric strength training may produce greater improvements in motor function than Task-oriented strength training.	1	Folkerts et al. (2017)
1b	Intermittent theta burst stimulation with dexterity training may not have a difference in efficacy when compared to Sham theta burst stimulation with dexterity training for improving motor function.	1	Ackerley et al. (2014)
1b	Intermittent theta burst stimulation with dexterity training may not have a difference in efficacy when compared to Continuous theta burst stimulation with dexterity training for improving motor function.	1	Ackerley et al. (2014)
1b	There is conflicting evidence about the effect of Functional task practice (FTP) with Power training when compared to Functional task practice (FTP) for improving motor function.	1	Patten et al. (2013)

1b	Task specific training with strength training or resistance may produce greater improvements in motor function than Task oriented training without resistance.	1	BaziledaSilva et al. (2015)
1b	Upper extremity thermal stimulation may produce greater improvements in motor function than lower extremity thermal stimulation.	1	Wu et al. (2010b)
1b	Pointing movement practice with feedback may produce greater improvements in motor function than Pointing movement practice without feedback.	1	Cirstea et al. (2007)
2	OnabotulinumtoxinA with upper limb rehabilitation may produce greater improvements in motor function than OnabotulinumtoxinA.	1	Devier et al. (2017)
1b	Progressive abduction loading therapy with horizontal-plance viscous resistance device may not have a difference in efficacy when compared to Progressive abduction loading therapy for improving motor function.	1	Ellis et al. (2018)
1b	Virtual Reality Boxing (Xbox Kinect) may not have a difference in efficacy when compared to Boxing Practice with Therapist for improving motor function.	1	Ersoy & Iyigun (2021)
1b	Intermittent theta burst stimulation with Physical therapy may produce greater improvements in motor function than Physical Therapy.	1	Khan et al. (2019)
1b	Intermittent theta burst stimulation with Physical therapy may not have a difference in efficacy when compared to functional electrical stimulation with Physical therapy for improving motor function.	1	Khan et al. (2019)
1b	Unilateral and bilateral task oriented exercises may not have a difference in efficacy when compared to Walking tasks for improving motor function.	1	Higgins et al. (2006)
2	Physiotherapy may not have a difference in efficacy when compared to Acupuncture for improving motor function.	1	Bai et al. (2013)
2	Physiotherapy may not have a difference in efficacy when compared to Physiotherapy with Acupuncture for improving motor function.	1	Bai et al. (2013)
2	Acupuncture may not have a difference in efficacy when compared to Physiotherapy with Acupuncture for improving motor function.	1	Bai et al. (2013)
1b	Wii arm exercises may not have a difference in efficacy when compared to Home-based arm exercises for improving motor function.	1	Adie et al. (2017)
1b	Neuroanimation therapy using ARMEO exoskeleton may not have a difference in efficacy when compared to Modified Occupational therapy (stretching, task specific training) for improving motor function.	1	Krakauer et al. (2021)
1b	Robotic-assisted training with conventional therapy may produce greater improvements in motor function than Conventional therapy with arm specific physiotherapy.	1	Lencioni et al. (2021)
1b	Botulinum toxin injection with self-rehabilitation may not have a difference in efficacy when compared to BTI for improving motor function.	1	Maulet et al. (2021)
2	Dual-Task Training with Conventional occupational therapy may produce greater improvements in motor function than Single Task Training (combining sensory stimulation, UE muscle strength, cognitive and perceptual training, and fine hand movement) with Conventional occupational therapy.	1	Hee-Su An & Deok-Ju Kim (2021)
1b	Virtual reality therapy with ARMEO with combination of different exercises may produce greater improvements in motor function than Conventional physiotherapy.	1	El-Kafy E.M.A. et al. (2021)

2	High frequency repetitive transcranial magnetic stimulation with grip training and conventional rehab may not have a difference in efficacy when compared to repetitive transcranial magnetic stimulation with conventional rehab or Grip training and conventional rehab for improving motor function.	1	Yang Y. et al. (2021)
2	There is conflicting evidence about the effect of Three-Dimensional Upper Limb Robotic Exoskeleton Training when compared to Manual Rehabilitation for improving motor function.	1	Frisoli et al. (2022)
1b	Robot-assisted training (RAT) with conventional rehab may not have a difference in efficacy when compared to Enhanced upper extremity therapy (EUET) with conventional rehab for improving motor function.	1	Lin et al. (2022)
1b	Cueing or remind to move with exercise or custom physiotherapy protocols may not have a difference in efficacy when compared to Sham with exercise or custom physiotherapy protocols for improving motor function.	1	Schwerz de Lucena et al. (2022)
1b	Anodal transcranial direct current stimulation with Upper extremity strength training may not have a difference in efficacy when compared to Sham transcranial direct current stimulation with Upper extremity strength training for improving motor function.	1	Palimeris et al. (2022)
1b	Jintronix Virtual reality may not have a difference in efficacy when compared to graded repetitive arm supplementary program rehab for improving motor function.	1	Hernandez et al. (2022)
1b	Dual transcranial direct current stimulation with home exercise program may produce greater improvements in motor function than Sham transcranial direct current stimulation with home exercise program.	1	Prathum et al. (2022)
1b	Bihemispheric transcranial direct current stimulation with Custum physiotherapy protocol may produce greater improvements in motor function than Sham transcranial direct current stimulation with Custom physiotherapy protocol.	1	Youssef et al. (2023)
1b	Bihemispheric transcranial direct current stimulation with Custum physiotherapy protocol may not have a difference in efficacy when compared to Unihemispheric transcranial direct current stimulation with Custum physiotherapy protocol for improving motor function.	1	Youssef et al. (2023)
1b	High-frequency repetitive transcranial magnetic stimulation with Conventional Therapy may produce greater improvements in motor function than Conventional therapy.	1	Rezaei et al. (2023)
1b	High-frequency repetitive transcranial magnetic stimulation with Conventional Therapy may result in lesser improvements in motor function when compared to Contralateral limb Cross education (strength training) with Conventional therapy.	1	Rezaei et al. (2023)
1b	Contralateral limb Cross education (strength training) with Conventional therapy may not have a difference in efficacy when compared to high-frequency repetitive transcranial magnetic stimulation with cross education and conventional therapy for improving motor function.	1	Rezaei et al. (2023)
1b	High-frequency repetitive transcranial magnetic stimulation with Conventional Therapy may not have a difference in efficacy when compared to high-frequency repetitive transcranial magnetic stimulation with cross education and conventional therapy for improving motor function.	1	Rezaei et al. (2023)
1b	Robotic training with Rebless may produce greater improvements in motor function than UE training with Motomed ergometer.	1	Chang et al. (2024a)

1b	Modified Constraint-Induced Movement Therapy with Exercise or custom physiotherapy (Telerehabilitation) may produce greater improvements in motor function than Home exercise program.	1	Saygili et al. (2024)
1b	There is conflicting evidence about the effect of Enriched Music-Supported Therapy (eMST) when compared to Graded Repetitive Arm Supplementary Program for improving motor function.	1	Segura et al. (2024)
2	There is conflicting evidence about the effect of Task-oriented training with conventional therapy when compared to Progressive resistance exercise with conventional therapy for improving motor function.	1	Chintamani R. (2024)
1b	Smart reminder wristwatch telerehabilitation with Conventional therapy may not have a difference in efficacy when compared to Conventional therapy for improving motor function.	1	Toh F.M. et al. (2024)
1b	Cognitive motor rehabilitation with specific UE exercises may produce greater improvements in motor function than Specific UE exercises.	1	Mahmoud et al. (2024)
1b	Dry Needling with exercise therapy may not have a difference in efficacy when compared to Exercise therapy for improving motor function.	1	Babazadeh-Zavieh et al. (2024)
2	Graded Motor Imagery (included implicit and explicit motor imagery plus mirror therapy) with conventional rehabilitation may not have a difference in efficacy when compared to Upper limb exercise with conventional rehabilitation for improving motor function.	1	Ji et al. (2021)
1b	'BOOST' Intensive Arm-Hand Training Protocol may produce greater improvements in motor function than Lower-Limb Strengthening And Reconditioning.	1	Meyer et al. (2021)
1b	Real bilateral tDCS with resistance training exercise may not have a difference in efficacy when compared to sham tDCS with resistance training exercise for improving motor function.	1	Beaulieu et al. (2019)
1b	UE function training may produce greater improvements in motor function than lower extremity function training.	1	Sanchez-Sanchez et al. (2017)
1b	Aerobic exercise may not have a difference in efficacy when compared to Stretching exercise for improving motor function.	1	Quaney et al. (2009)
1b	Community-based upper extremity exercise program may produce greater improvements in motor function than Lower extremity exercise program.	1	Pang et al. (2006)
1b	Alternating hot-cold water immersion (AHCWI) with Standard rehabilitation may produce greater improvements in motor function than Upper limb cycling exercises with Standard rehabilitation.	1	Chiu et al. (2024)
1b	Cognitive Orientation to Daily Occupaitonal Performance may not have a difference in efficacy when compared to Conventional occupational therapy for improving motor function.	1	Hejazi-Shirmard M. et al. (2024)
1b	Ergotact system (Videogames) may not have a difference in efficacy when compared to Home-based self-rehabilitation program for improving motor function.	1	Pouplin S. et al. (2023)
1b	Sensory Relearning with Task-Specific Training and home exercise may not have a difference in efficacy when compared to Task-Specific Training with strength training for improving motor function.	1	Carlsson et al. (2022)
2	Task-Oriented Training may produce greater improvements in motor function than Table-Top Activity Training.	1	Choi et al. (2022b)
1b	Virtual Reality Training (Nintendo Wii) with general physical therapy may not have a difference in efficacy when compared to OT with general physical therapy for improving motor function.	1	Cho et al. (2021)

1b	TNRS with GRASP may produce greater improvements in motor function than Sham tRNS with GRASP.	1	Arnao et al. (2019)
1b	Functional Training may not have a difference in efficacy when compared to Strength Training for improving motor function.	1	Milot et al. (2019)
1b	Focal muscle vibration with progressive modular rebalancing may not have a difference in efficacy when compared to Conventional physiotherapy for improving motor function.	1	Celletti et al. (2017)
1b	There is conflicting evidence about the effect of Forced aerobic exercise with Repetitive task practice(RTP) when compared to Voluntary exercise with RTP for improving motor function.	1	Linder et al. (2017)
1b	There is conflicting evidence about the effect of Forced aerobic exercise with Repetitive task practice(RTP) when compared to RTP for improving motor function.	1	Linder et al. (2017)
1b	Voluntary exercise with RTP may not have a difference in efficacy when compared to RTP for improving motor function.	1	Linder et al. (2017)
1b	Video game self training may not have a difference in efficacy when compared to Graded repetitive arm supplementary program for improving motor function.	1	Rand et al. (2017)
1b	Repetitive Task Practice may not have a difference in efficacy when compared to Occupation-Based Intervention for improving motor function.	1	Skubik-Peplaski et al. (2017)
1b	VR based rehab may produce greater improvements in motor function than Group based rehab.	1	Lee et al. (2016d)
2	Music glove may not have a difference in efficacy when compared to Conventional care for improving motor function.	1	Friedman et al. (2014)
2	Isometric hand therapy may not have a difference in efficacy when compared to Conventional care for improving motor function.	1	Friedman et al. (2014)
2	Music glove may not have a difference in efficacy when compared to Isometric hand therapy for improving motor function.	1	Friedman et al. (2014)
1b	Repetitive peripheral nerve sensory stim (RPSS) with Motor Training may produce greater improvements in motor function than Sham with Motor Training.	1	DosSantos-Fontes et al. (2013)
1b	Standard Acupuncture with Shixuan & Xiaohai acupoints with Functional training may produce greater improvements in motor function than Standard Acupuncture only with Functional training.	1	Ni et al. (2013)
1b	CIMT may not have a difference in efficacy when compared to Therapeutic Climbing for improving motor function.	1	Khan et al. (2011)
1b	CIMT may not have a difference in efficacy when compared to Conventional neurological therapy for improving motor function.	1	Khan et al. (2011)
1b	Therapeutic Climbing may not have a difference in efficacy when compared to Conventional neurological therapy for improving motor function.	1	Khan et al. (2011)
1b	Robotic therapy (MIT-Manus) with conventional therapy may not have a difference in efficacy when compared to Occupational therapy for improving motor function.	1	Rabadi et al. (2008)
1b	Strength training may produce greater improvements in motor function than Standard care.	1	Winstein et al. (2004)
2	EMG triggered NMS (EMG-Stim) with Wrist Strengthening Exercises may produce greater improvements in motor function than Wrist Exercises.	1	Francisco et al. (1998)

1b	There is conflicting evidence about the effect of High intensity FES assisted exercise therapy when compared to Low FES assisted exercise therapy for improving motor function.	1	Kowalczewski et al. (2007)
1b	There is conflicting evidence about the effect of Tilt table affected knee belt with Conventional Therapy when compared to Tilt table alone (both knee belts) with Conventional Therapy for improving motor function.	1	Kim & Kim (2018)
1b	Tilt table with task oriented training with Conventional Therapy may produce greater improvements in motor function than Tilt table alone (both knee belts) with Conventional Therapy.	1	Kim & Kim (2018)
1b	Cognitive Orientation to Daily Occupaitonal Performance may not have a difference in efficacy when compared to Progressive exercise program (strenght, functional, balance, and endurance training) for improving motor function.	1	Hejazi-Shirmard M. et al. (2024)
1b	Robot-assisted training may not have a difference in efficacy when compared to Usual care for improving motor function.	1	Rodgers et al. (2019)
1b	Enhanced upper limb therapy may produce greater improvements in motor function than Usual care.	1	Rodgers et al. (2019)
1b	Robot-assisted training may not have a difference in efficacy when compared to Enhanced upper limb therapy for improving motor function.	1	Rodgers et al. (2019)

STROKE SEVERITY			
LoE	**Conclusion Statement**	**RCTs**	**References**
1b	Dynamic resistance training (POWER) may not have a difference in efficacy when compared to Functional Task Practice (FTP) for improving stroke severity.	1	Corti et al. (2012)
1a	Exercise and custom physiotherapy protocols may not have a difference in efficacy when compared to conventional therapy for improving stroke severity.	6	García-Pérez et al. (2024); Ho et al. (2024); Wang et al. (2021a); Epple et al. (2020); Pandian et al. (2015); Rodgers et al. (2003)
1b	Exercise and custom physiotherapy protocols: some approaches may produce greater improvements in stroke severity than others.	1	Wang et al. (2021b)
1b	Upper extremity aerobic exercise with conventional physiotherapy may not have a difference in efficacy when compared to Conventional physiotherapy for improving stroke severity.	1	Topcuoglu et al. (2015)
2	Exercise and custom physiotherapy protocols combined with other interventions may not have a difference in efficacy when compared to exercise and custom physiotherapy protocols for improving stroke severity.	1	Mayrhuber et al. (2024)
1b	Arm cycling with conventional physiotherapy may produce greater improvements in stroke severity than conventional physiotherapy.	1	da Rosa Pinheiro et al. (2021)
1b	There is conflicting evidence about the effect of Cycling exercise with feedback and Conventional therapy when compared to Conventional therapy for improving stroke severity.	1	Simic-Panic et al. (2024)
2	Active-passive bilateral therapy (APBT) with Self-directed motor practice may not have a difference in efficacy when compared to Self-directed motor practice on affected upper limb for improving stroke severity.	1	Stinear et al. (2008)
1b	Intermittent theta burst stimulation with Physical therapy may produce greater improvements in stroke severity than Physical Therapy.	1	Khan et al. (2019)

1b	Intermittent theta burst stimulation with Physical therapy may not have a difference in efficacy when compared to functional electrical stimulation with Physical therapy for improving stroke severity.	1	Khan et al. (2019)
1b	Cueing or remind to move with exercise or custom physiotherapy protocols may not have a difference in efficacy when compared to Sham with exercise or custom physiotherapy protocols for improving stroke severity.	1	Schwerz de Lucena et al. (2022)
2	Electroacupuncture with cycling may produce greater improvements in stroke severity than Electroacupuncture.	1	Nguyen et al. (2023)
1b	TNRS with GRASP may not have a difference in efficacy when compared to Sham tRNS with GRASP for improving stroke severity.	1	Arnao et al. (2019)
1b	CIMT may not have a difference in efficacy when compared to Conventional neurological therapy for improving stroke severity.	1	Khan et al. (2011)
1b	Therapeutic Climbing may not have a difference in efficacy when compared to Conventional neurological therapy for improving stroke severity.	1	Khan et al. (2011)
2	Exercise and custom physiotherapy protocols may produce greater improvements in stroke severity than no treatment.	1	Werner & Kessler (1996)

MUSCLE STRENGTH			
LoE	**Conclusion Statement**	**RCTs**	**References**
1b	Functional strength training may not have a difference in efficacy when compared to Movement performance therapy for improving muscle strength.	1	Hunter et al. (2018)
1a	Strength training may produce greater improvements in muscle strength than conventional therapy.	6	Shao et al. (2023); Salehi DehNo et al. (2021); Shang et al. (2021); Gambassi et al. (2019); Park et al. (2019a); Donaldson et al. (2009)
1a	Exercise and custom physiotherapy protocols may produce greater improvements in muscle strength than conventional therapy.	11	Fathi et al. (2022); Jarbandhan et al. (2022); Eroglu et al. (2020); Bordoloi et al. (2019); Park et al. (2017a); ShimodozoNo et al. (2013); Duncan et al. (2003); Rodgers et al. (2003); Wolfe et al. (2000); Lincoln et al. (1999); Sunderland et al. (1992)
1a	Different approaches to exercise and custom physiotherapy protocols may not have a difference in efficacy when compared with one another for improving muscle strength.	4	Hogg et al. (2020); Langhammer et al. (2007); Wellwood et al. (2004); Logigian et al. (1983)
2	High intensity interval training (HIIT) may not have a difference in efficacy when compared to Moderate intensity constant-load exercise (MICE) for improving muscle strength.	1	Abraha et al. (2018)
2	Graded Arm Supplementary Program may not have a difference in efficacy when compared to Conventional Therapy for improving muscle strength.	1	Dodzo et al. (2020)
1b	Different approaches to strength training may not have a difference in efficacy when compared with one another for improving muscle strength.	4	Kerimov et al. (2021); Agni & Kulkarni (2017); Graef et al. (2016); Awad et al. (2015)
1b	Graded repetitive arm supplementary program protocol may produce greater improvements in muscle strength than Education book- self-administered homework exercise program.	1	Harris et al. (2009)

1b	Strength training combined with other interventions may not have a difference in efficacy when compared to stretching and positioning programs for improving muscle strength.	1	Coroian et al. (2018)
1b	Exercise and custom physiotherapy protocols may produce greater improvements in muscle strength than no treatment.	1	Natta et al. (2021)
1b	Body-weight supported treadmill training may not have a difference in efficacy when compared to Education (reviewing home exercises) for improving muscle strength.	1	Ploughman et al. (2008)
1b	Strength training combined with other interventions may produce greater improvements in muscle strength than conventional therapy.	2	Kim et al. (2017b); Lee et al. (2015c)
1b	Arm cycling with conventional physiotherapy may produce greater improvements in muscle strength than conventional physiotherapy.	1	da Rosa Pinheiro et al. (2021)
2	Graded repetitive arm supplementary program may produce greater improvements in muscle strength than Virtual reality.	1	Dhanusia et al. (2023)
1b	Smart Glove Upper Extremity Training (RAPAEL) with rehab may not have a difference in efficacy when compared to Upper Extremity Self-Training at home with rehab for improving muscle strength.	1	Kang et al. (2020)
2	Active-passive bilateral therapy (APBT) with Self-directed motor practice may not have a difference in efficacy when compared to Self-directed motor practice on affected upper limb for improving muscle strength.	1	Stinear et al. (2008)
2	Whole-body vibration with Task Oriented Training and Conventional physical therapy may produce greater improvements in muscle strength than Upper- and lower-Cycle group with Task Specific Training and Conventional physical therapy.	1	Ahn et al. (2019)
1b	Augmented Community Telerehabilitation may not have a difference in efficacy when compared to Conventional Therapy for improving muscle strength.	1	Saywell et al. (2021)
1b	Mirror therapy with usual care may not have a difference in efficacy when compared to Lower-limb exercise with usual care for improving muscle strength.	1	Tyson et al. (2015)
2	Eccentric strength training may not have a difference in efficacy when compared to Task-oriented strength training for improving muscle strength.	1	Folkerts et al. (2017)
1b	Task specific training with strength training or resistance may produce greater improvements in muscle strength than Task oriented training without resistance.	1	BaziledaSilva et al. (2015)
1b	Unilateral and bilateral task oriented exercises may not have a difference in efficacy when compared to Walking tasks for improving muscle strength.	1	Higgins et al. (2006)
1b	Botox with movement training may produce greater improvements in muscle strength than Botox plus excercise handout.	1	Lannin et al. (2020)
1b	Neuroanimation therapy using ARMEO exoskeleton may not have a difference in efficacy when compared to Modified Occupational therapy (stretching, task specific training) for improving muscle strength.	1	Krakauer et al. (2021)
1b	Virtual reality therapy with ARMEO with combination of different exercises may not have a difference in efficacy when compared to Conventional physiotherapy for improving muscle strength.	1	El-Kafy E.M.A. et al. (2021)
2	High frequency repetitive transcranial magnetic stimulation with grip training and conventional rehab may not have a difference in efficacy when compared to repetitive transcranial magnetic stimulation with conventional rehab or Grip training and conventional rehab for improving muscle strength.	1	Yang Y. et al. (2021)

1b	Cueing or remind to move with exercise or custom physiotherapy protocols may not have a difference in efficacy when compared to Sham with exercise or custom physiotherapy protocols for improving muscle strength.	1	Schwerz de Lucena et al. (2022)
1b	Anodal transcranial direct current stimulation with Upper extremity strength training may not have a difference in efficacy when compared to Sham transcranial direct current stimulation with Upper extremity strength training for improving muscle strength.	1	Palimeris et al. (2022)
1b	Dual transcranial direct current stimulation with home exercise program may not have a difference in efficacy when compared to Sham transcranial direct current stimulation with home exercise program for improving muscle strength.	1	Prathum et al. (2022)
1b	There is conflicting evidence about the effect of High-frequency repetitive transcranial magnetic stimulation with Conventional Therapy when compared to Conventional therapy for improving muscle strength.	1	Rezaei et al. (2023)
1b	High-frequency repetitive transcranial magnetic stimulation with Conventional Therapy may not have a difference in efficacy when compared to Contralateral limb Cross education (strength training) with Conventional therapy for improving muscle strength.	1	Rezaei et al. (2023)
1b	Contralateral limb Cross education (strength training) with Conventional therapy may not have a difference in efficacy when compared to high-frequency repetitive transcranial magnetic stimulation with cross education and conventional therapy for improving muscle strength.	1	Rezaei et al. (2023)
1b	High-frequency repetitive transcranial magnetic stimulation with Conventional Therapy may not have a difference in efficacy when compared to high-frequency repetitive transcranial magnetic stimulation with cross education and conventional therapy for improving muscle strength.	1	Rezaei et al. (2023)
2	Electroacupuncture with cycling may produce greater improvements in muscle strength than Electroacupuncture.	1	Nguyen et al. (2023)
1b	Robotic training with Rebless may not have a difference in efficacy when compared to UE training with Motomed ergometer for improving muscle strength.	1	Chang et al. (2024a)
1b	Modified Constraint-Induced Movement Therapy with Exercise or custom physiotherapy (Telerehabilitation) may produce greater improvements in muscle strength than Home exercise program.	1	Saygili et al. (2024)
1b	Enriched Music-Supported Therapy (eMST) may not have a difference in efficacy when compared to Graded Repetitive Arm Supplementary Program for improving muscle strength.	1	Segura et al. (2024)
1b	Functional task practice (FTP) with Power training may produce greater improvements in muscle strength than Functional task practice (FTP).	1	Patten et al. (2013)
1b	Progressive abduction loading therapy with horizontal-plance viscous resistance device may not have a difference in efficacy when compared to Progressive abduction loading therapy for improving muscle strength.	1	Ellis et al. (2018)
1b	Real bilateral tDCS with resistance training exercise may not have a difference in efficacy when compared to sham tDCS with resistance training exercise for improving muscle strength.	1	Beaulieu et al. (2019)
1b	UE function training may not have a difference in efficacy when compared to lower extremity function training for improving muscle strength.	1	Sanchez-Sanchez et al. (2017)

1b	Aerobic exercise may produce greater improvements in muscle strength than Stretching exercise.	1	Quaney et al. (2009)
1b	Community-based upper extremity exercise program may not have a difference in efficacy when compared to Lower extremity exercise program for improving muscle strength.	1	Pang et al. (2006)
1b	Alternating hot-cold water immersion (AHCWI) with Standard rehabilitation may produce greater improvements in muscle strength than Upper limb cycling exercises with Standard rehabilitation.	1	Chiu et al. (2024)
1b	Virtual Reality Training (Nintendo Wii) with general physical therapy may produce greater improvements in muscle strength than OT with general physical therapy.	1	Cho et al. (2021)
1b	Functional Training may not have a difference in efficacy when compared to Strength Training for improving muscle strength.	1	Milot et al. (2019)
1b	Focal muscle vibration with progressive modular rebalancing may not have a difference in efficacy when compared to Conventional physiotherapy for improving muscle strength.	1	Celletti et al. (2017)
2	Music glove may not have a difference in efficacy when compared to Conventional care for improving muscle strength.	1	Friedman et al. (2014)
2	Isometric hand therapy may not have a difference in efficacy when compared to Conventional care for improving muscle strength.	1	Friedman et al. (2014)
2	Music glove may not have a difference in efficacy when compared to Isometric hand therapy for improving muscle strength.	1	Friedman et al. (2014)
1b	Standard Acupuncture with Shixuan & Xiaohai acupoints with Functional training may produce greater improvements in muscle strength than Standard Acupuncture only with Functional training.	1	Ni et al. (2013)
1b	CIMT may not have a difference in efficacy when compared to Therapeutic Climbing for improving muscle strength.	1	Khan et al. (2011)
1b	CIMT may not have a difference in efficacy when compared to Conventional neurological therapy for improving muscle strength.	1	Khan et al. (2011)
1b	Therapeutic Climbing may not have a difference in efficacy when compared to Conventional neurological therapy for improving muscle strength.	1	Khan et al. (2011)
1b	Strength training may produce greater improvements in muscle strength than Standard care.	1	Winstein et al. (2004)
2	Lower-Limb Task-Specific Circuit Training may not have a difference in efficacy when compared to Upper-Limb Task-Specific Training for improving muscle strength.	1	Dean et al. (2000b)
1b	Tilt table affected knee belt with Conventional Therapy may not have a difference in efficacy when compared to Tilt table alone (both knee belts) with Conventional Therapy for improving muscle strength.	1	Kim & Kim (2018)
1b	Tilt table with task oriented training with Conventional Therapy may produce greater improvements in muscle strength than Tilt table alone (both knee belts) with Conventional Therapy.	1	Kim & Kim (2018)

SPASTICITY			
LoE	**Conclusion Statement**	**RCTs**	**References**
1b	Dynamic resistance training (POWER) may not have a difference in efficacy when compared to Functional Task Practice (FTP) for improving spasticity.	1	Corti et al. (2012)
1b	Strength training may not have a difference in efficacy when compared to conventional therapy for improving spasticity.	1	Salehi DehNo et al. (2021)

1a	Exercise and custom physiotherapy protocols may not have a difference in efficacy when compared to conventional therapy for improving spasticity.	5	Swanson et al. (2023); Chin et al. (2021); Wang et al. (2021a); Dell'Uomo et al. (2017); Bai et al. (2014)
1a	There is conflicting evidence about the comparative effects of different approaches to exercise and custom physiotherapy protocols for improving spasticity.	2	Hogg et al. (2020); Hesse et al. (2011a)
1b	Different approaches to strength training may not have a difference in efficacy when compared with one another for improving spasticity.	1	Graef et al. (2016)
1b	Upper extremity aerobic exercise with conventional physiotherapy may not have a difference in efficacy when compared to Conventional physiotherapy for improving spasticity.	1	Topcuoglu et al. (2015)
1b	Strength training combined with other interventions may not have a difference in efficacy when compared to stretching and positioning programs for improving spasticity.	1	Coroian et al. (2018)
1b	There is conflicting evidence about the effect of Exercise and custom physiotherapy protocols combined with other interventions when compared to conventional therapy for improving spasticity.	1	Cirstea et al. (2006)
2	Arm Ergometer with conventional treatment may not have a difference in efficacy when compared to Cryotherapy with Proprioceptive Neuromusucal Facilitation and Neurodevelopmental Techniques for improving spasticity.	1	Patil et al. (2014)
1b	Cycling exercise with feedback and Conventional therapy may produce greater improvements in spasticity than Conventional therapy.	1	Simic-Panic et al. (2024)
2	Task-related Training (Grasping or Retrieving Objects) may not have a difference in efficacy when compared to Progressive Resistive Exercises for improving spasticity.	1	Thielman et al. (2004)
1b	Mirror therapy with usual care may not have a difference in efficacy when compared to Lower-limb exercise with usual care for improving spasticity.	1	Tyson et al. (2015)
1b	Dorsal hand splint with home-based exercise program may not have a difference in efficacy when compared to Home-based exercise program for improving spasticity.	1	Basaran et al. (2012)
1b	Robot-Assisted Therapy may not have a difference in efficacy when compared to Usual care for improving spasticity.	1	Lo et al. (2010)
1b	Robot-Assisted Therapy may not have a difference in efficacy when compared to Dose-matched Intensive Comparison Therapy for improving spasticity.	1	Lo et al. (2010)
2	Electroacupuncture with strength training may produce greater improvements in spasticity than Strength training.	1	Mukherjee et al. (2007)
1b	Functional task practice (FTP) with Power training may not have a difference in efficacy when compared to Functional task practice (FTP) for improving spasticity.	1	Patten et al. (2013)
1b	Task specific training with strength training or resistance may not have a difference in efficacy when compared to Task oriented training without resistance for improving spasticity.	1	BaziledaSilva et al. (2015)
1b	Upper extremity thermal stimulation may not have a difference in efficacy when compared to lower extremity thermal stimulation for improving spasticity.	1	Wu et al. (2010b)
1b	Pointing movement practice with feedback may not have a difference in efficacy when compared to Pointing movement practice without feedback for improving spasticity.	1	Cirstea et al. (2007)

2	OnabotulinumtoxinA with upper limb rehabilitation may not have a difference in efficacy when compared to OnabotulinumtoxinA for improving spasticity.	1	Devier et al. (2017)
1b	Botox with movement training may not have a difference in efficacy when compared to Botox plus excercise handout for improving spasticity.	1	Lannin et al. (2020)
2	Three-Dimensional Upper Limb Robotic Exoskeleton Training may not have a difference in efficacy when compared to Manual Rehabilitation for improving spasticity.	1	Frisoli et al. (2022)
1b	There is conflicting evidence about the effect of Bihemispheric transcranial direct current stimulation with Custum physiotherapy protocol when compared to Sham transcranial direct current stimulation with Custom physiotherapy protocol for improving spasticity.	1	Youssef et al. (2023)
1b	Bihemispheric transcranial direct current stimulation with Custum physiotherapy protocol may not have a difference in efficacy when compared to Unihemispheric transcranial direct current stimulation with Custum physiotherapy protocol for improving spasticity.	1	Youssef et al. (2023)
1b	Traditional Chinese medicine with Tuina treatment (massage techniques), Acupuncture kinesiotherapy and Basic stroke treatment may produce greater improvements in spasticity than Basic stroke treatment with modern rehabilitation techniques.	1	Zhu et al. (2023)
1b	Robotic training with Rebless may not have a difference in efficacy when compared to UE training with Motomed ergometer for improving spasticity.	1	Chang et al. (2024a)
1b	Dry Needling with exercise therapy may not have a difference in efficacy when compared to Exercise therapy for improving spasticity.	1	Babazadeh-Zavieh et al. (2024)
1b	Real bilateral tDCS with resistance training exercise may not have a difference in efficacy when compared to sham tDCS with resistance training exercise for improving spasticity.	1	Beaulieu et al. (2019)
1b	UE function training may not have a difference in efficacy when compared to lower extremity function training for improving spasticity.	1	Sanchez-Sanchez et al. (2017)
1b	Alternating hot-cold water immersion (AHCWI) with Standard rehabilitation may not have a difference in efficacy when compared to Upper limb cycling exercises with Standard rehabilitation for improving spasticity.	1	Chiu et al. (2024)
1b	Ergotact system (Videogames) may not have a difference in efficacy when compared to Home-based self-rehabilitation program for improving spasticity.	1	Pouplin S. et al. (2023)
1b	Functional Training may not have a difference in efficacy when compared to Strength Training for improving spasticity.	1	Milot et al. (2019)
1b	Botox with intensive rehabilitation program may not have a difference in efficacy when compared to Botox for improving spasticity.	1	Lannin et al. (2018)
1b	Focal muscle vibration with progressive modular rebalancing may not have a difference in efficacy when compared to Conventional physiotherapy for improving spasticity.	1	Celletti et al. (2017)

RANGE OF MOTION			
LoE	**Conclusion Statement**	**RCTs**	**References**
1b	Dynamic resistance training (POWER) may not have a difference in efficacy when compared to Functional Task Practice (FTP) for improving range of motion.	1	Corti et al. (2012)

2	There is conflicting evidence about the effect of Strength training when compared to conventional therapy for improving range of motion.	2	El-Nashar et al. (2019); Jeon et al. (2016)
1b	Exercise and custom physiotherapy protocols may not have a difference in efficacy when compared to conventional therapy for improving range of motion.	1	Mehraban et al. (2024)
2	Arm Ergometer with conventional treatment may not have a difference in efficacy when compared to Cryotherapy with Proprioceptive Neuromusucal Facilitation and Neurodevelopmental Techniques for improving range of motion.	1	Patil et al. (2014)
2	Task-related Training with Trunk Restraint may not have a difference in efficacy when compared to Resistive Exercises with Trunk Restraint for improving range of motion.	1	Thielman et al. (2008)
1b	Dorsal hand splint with home-based exercise program may not have a difference in efficacy when compared to Home-based exercise program for improving range of motion.	1	Basaran et al. (2012)
1b	Task specific training with strength training or resistance may produce greater improvements in range of motion than Task oriented training without resistance.	1	BaziledaSilva et al. (2015)
1b	Botox with movement training may not have a difference in efficacy when compared to Botox plus excercise handout for improving range of motion.	1	Lannin et al. (2020)
1b	Anodal transcranial direct current stimulation with Upper extremity strength training may not have a difference in efficacy when compared to Sham transcranial direct current stimulation with Upper extremity strength training for improving range of motion.	1	Palimeris et al. (2022)
1b	Robotic training with Rebless may not have a difference in efficacy when compared to UE training with Motomed ergometer for improving range of motion.	1	Chang et al. (2024a)
1b	Smart reminder wristwatch telerehabilitation with Conventional therapy may not have a difference in efficacy when compared to Conventional therapy for improving range of motion.	1	Toh F.M. et al. (2024)
1b	There is conflicting evidence about the effect of Dry Needling with exercise therapy when compared to Exercise therapy for improving range of motion.	1	Babazadeh-Zavieh et al. (2024)
1b	Different approaches to strength training may not have a difference in efficacy when compared with one another for improving range of motion.	1	Graef et al. (2016)
1b	There is conflicting evidence about the effect of Superficial needling acupuncture plus club swing exercise with conventional therapy when compared to Conventional therapy for improving range of motion.	1	Ni et al. (2017)
1b	CIMT may not have a difference in efficacy when compared to Therapeutic Climbing for improving range of motion.	1	Khan et al. (2011)
1b	CIMT may not have a difference in efficacy when compared to Conventional neurological therapy for improving range of motion.	1	Khan et al. (2011)
1b	Therapeutic Climbing may not have a difference in efficacy when compared to Conventional neurological therapy for improving range of motion.	1	Khan et al. (2011)

PROPRIOCEPTION			
LoE	**Conclusion Statement**	**RCTs**	**References**
1b	Exercise and custom physiotherapy protocols may produce greater improvements in proprioception than conventional therapy.	1	MandehgaryNajafabadi et al. (2019)
1b	Mirror therapy with usual care may not have a difference in efficacy when compared to Lower-limb exercise with usual care for improving proprioception.	1	Tyson et al. (2015)
2	Proprioceptive neuromuscular facilitation exercises with neuromobilization of the affected upper extremity may produce greater improvements in proprioception than proprioceptive neuromuscular facilitation exercises without neuromobilization or conventional care.	1	Wolny et al. (2010)
1b	There is conflicting evidence about the effect of Sensory Relearning with Task-Specific Training and home exercise when compared to Task-Specific Training with strength training for improving proprioception.	1	Carlsson et al. (2022)

2. Activities

ACTIVITIES OF DAILY LIVING			
LoE	**Conclusion Statement**	**RCTs**	**References**
1a	Strength training may produce greater improvements in performance of activities of daily living than conventional therapy.	3	Shao et al. (2023); Salehi DehNo et al. (2021); Jeon et al. (2016)
1a	Exercise and custom physiotherapy protocols may not have a difference in efficacy when compared to conventional therapy for improving performance of activities of daily living.	20	Deng et al. (2024); García-Pérez et al. (2024); Ho et al. (2024); Mehraban et al. (2024); Swanson et al. (2023); Fathi et al. (2022); Wang et al. (2021a); Epple et al. (2020); Eroglu et al. (2020); Khorvash et al. (2020); Swank et al. (2020); MandehgaryNajafabadi et al. (2019); Dell'Uomo et al. (2017); Bai et al. (2014); Liu et al. (2014b); Rodgers et al. (2003); Wolfe et al. (2000); Lincoln et al. (1999); Duncan et al. (1998); Sunderland et al. (1992)
1a	Different approaches to exercise and custom physiotherapy protocols may not have a difference in efficacy when compared with one another for improving performance of activities of daily living.	4	Hogg et al. (2020); Langhammer et al. (2007); Wellwood et al. (2004); Logigian et al. (1983)
1b	Arm treatment for 3hr/d may not have a difference in efficacy when compared to Arm treatment for 2hr/d or Arm treatment for 1hr/d for improving performance of activities of daily living.	1	Han et al. (2013)
1b	Arm treatment for 3hr/d may not have a difference in efficacy when compared to Arm treatment for 2hr/d for improving performance of activities of daily living.	1	Han et al. (2013)
2	Graded Arm Supplementary Program may not have a difference in efficacy when compared to Conventional Therapy for improving performance of activities of daily living.	1	Dodzo et al. (2020)
1b	Upper extremity aerobic exercise with conventional physiotherapy may produce greater improvements in performance of activities of daily living than Conventional physiotherapy.	1	Topcuoglu et al. (2015)

1b	Graded repetitive arm supplementary program protocol may produce greater improvements in performance of activities of daily living than Education book- self-administered homework exercise program.	1	Harris et al. (2009)
1b	Strength training combined with other interventions may not have a difference in efficacy when compared to stretching and positioning programs for improving performance of activities of daily living.	1	Coroian et al. (2018)
1b	Exercise and custom physiotherapy protocols may produce greater improvements in performance of activities of daily living than no treatment.	2	Natta et al. (2021); Werner & Kessler (1996)
1a	Strength training combined with other interventions may produce greater improvements in performance of activities of daily living than conventional therapy.	2	Lee et al. (2015c); Lin et al. (2015)
1b	Exercise and custom physiotherapy protocols combined with other interventions may produce greater improvements in performance of activities of daily living than conventional therapy.	1	Simpson L.A. et al. (2024)
2	Exercise and custom physiotherapy protocols combined with other interventions may not have a difference in efficacy when compared to exercise and custom physiotherapy protocols for improving performance of activities of daily living.	2	Mayrhuber et al. (2024); Taub et al. (2013)
1b	Leg rehab training may produce greater improvements in performance of activities of daily living than Immobilization therapy with inflatable pressure splint (arm and leg with splints).	1	Kwakkel et al. (1999)
1b	Cycling exercise with feedback and Conventional therapy may not have a difference in efficacy when compared to Conventional therapy for improving performance of activities of daily living.	1	Simic-Panic et al. (2024)
1b	Smart Glove Upper Extremity Training (RAPAEL) with rehab may not have a difference in efficacy when compared to Upper Extremity Self-Training at home with rehab for improving performance of activities of daily living.	1	Kang et al. (2020)
1b	Augmented Community Telerehabilitation may not have a difference in efficacy when compared to Conventional Therapy for improving performance of activities of daily living.	1	Saywell et al. (2021)
2	Massage may produce greater improvements in performance of activities of daily living than Traditional medicine (Conventional unani drug therapy (Munzij, Mushil, Muaqwwi Aasab)).	1	Zarnigar et al. (2012)
1b	Group Circuit may not have a difference in efficacy when compared to high intensity physio or usual physiotherapy for improving performance of activities of daily living.	1	English et al. (2015)
2	There is conflicting evidence about the effect of Stretching with Joint-stabilizing exercises when compared to exercise for improving performance of activities of daily living.	1	You et al. (2014)
2	Stretching with Joint-stabilizing exercises may result in lesser improvements in performance of activities of daily living when compared to Stretching.	1	You et al. (2014)
1b	Dextroamphetamine with physiotherapy may not have a difference in efficacy when compared to Placebo with Physiotherapy for improving performance of activities of daily living.	1	Gladstone et al. (2006)
2	Robot arm end effectors (ReoGO) with therapy may not have a difference in efficacy when compared to self-guided therapy with therapy for improving performance of activities of daily living.	1	Takahashi et al. (2016)
1b	Functional task practice (FTP) with Power training may produce greater improvements in performance of activities of daily living than Functional task practice (FTP).	1	Patten et al. (2013)

1b	Upper extremity thermal stimulation may not have a difference in efficacy when compared to lower extremity thermal stimulation for improving performance of activities of daily living.	1	Wu et al. (2010b)
2	OnabotulinumtoxinA with upper limb rehabilitation may not have a difference in efficacy when compared to OnabotulinumtoxinA for improving performance of activities of daily living.	1	Devier et al. (2017)
1b	Intermittent theta burst stimulation with Physical therapy may produce greater improvements in performance of activities of daily living than Physical Therapy.	1	Khan et al. (2019)
1b	Intermittent theta burst stimulation with Physical therapy may not have a difference in efficacy when compared to functional electrical stimulation with Physical therapy for improving performance of activities of daily living.	1	Khan et al. (2019)
1b	Unilateral and bilateral task oriented exercises may not have a difference in efficacy when compared to Walking tasks for improving performance of activities of daily living.	1	Higgins et al. (2006)
2	Physiotherapy may not have a difference in efficacy when compared to Acupuncture for improving performance of activities of daily living.	1	Bai et al. (2013)
2	Physiotherapy may not have a difference in efficacy when compared to Physiotherapy with Acupuncture for improving performance of activities of daily living.	1	Bai et al. (2013)
2	Acupuncture may not have a difference in efficacy when compared to Physiotherapy with Acupuncture for improving performance of activities of daily living.	1	Bai et al. (2013)
1b	Botox with movement training may not have a difference in efficacy when compared to Botox plus excercise handout for improving performance of activities of daily living.	1	Lannin et al. (2020)
1b	Wii arm exercises may not have a difference in efficacy when compared to Home-based arm exercises for improving performance of activities of daily living.	1	Adie et al. (2017)
1b	Botulinum toxin injection with self-rehabilitation may not have a difference in efficacy when compared to BTI for improving performance of activities of daily living.	1	Maulet et al. (2021)
2	High frequency repetitive transcranial magnetic stimulation with grip training and conventional rehab may not have a difference in efficacy when compared to repetitive transcranial magnetic stimulation with conventional rehab or Grip training and conventional rehab for improving performance of activities of daily living.	1	Yang Y. et al. (2021)
1b	Robot-assisted training (RAT) with conventional rehab may not have a difference in efficacy when compared to Enhanced upper extremity therapy (EUET) with conventional rehab for improving performance of activities of daily living.	1	Lin et al. (2022)
1b	Cueing or remind to move with exercise or custom physiotherapy protocols may not have a difference in efficacy when compared to Sham with exercise or custom physiotherapy protocols for improving performance of activities of daily living.	1	Schwerz de Lucena et al. (2022)
1b	Anodal transcranial direct current stimulation with Upper extremity strength training may not have a difference in efficacy when compared to Sham transcranial direct current stimulation with Upper extremity strength training for improving performance of activities of daily living.	1	Palimeris et al. (2022)
1b	Jintronix Virtual reality may not have a difference in efficacy when compared to graded repetitive arm supplementary program rehab for improving performance of activities of daily living.	1	Hernandez et al. (2022)

1b	Traditional Chinese medicine with Tuina treatment (massage techniques), Acupuncture kinesiotherapy and Basic stroke treatment may produce greater improvements in performance of activities of daily living than Basic stroke treatment with modern rehabilitation techniques.	1	Zhu et al. (2023)
2	Electroacupuncture with cycling may produce greater improvements in performance of activities of daily living than Electroacupuncture.	1	Nguyen et al. (2023)
1b	Radial extracorporeal shock wave therapy (radial extracorporeal shockwave therapy) with Designed physical therapy program for shoulder may produce greater improvements in performance of activities of daily living than Sham radial extracorporeal shockwave therapy with Designed physical therapy program for shoulder.	1	Khalifa et al. (2023)
1b	Robotic training with Rebless may not have a difference in efficacy when compared to UE training with Motomed ergometer for improving performance of activities of daily living.	1	Chang et al. (2024a)
1b	Modified Constraint-Induced Movement Therapy with Exercise or custom physiotherapy (Telerehabilitation) may produce greater improvements in performance of activities of daily living than Home exercise program.	1	Saygili et al. (2024)
1b	Enriched Music-Supported Therapy (eMST) may not have a difference in efficacy when compared to Graded Repetitive Arm Supplementary Program for improving performance of activities of daily living.	1	Segura et al. (2024)
2	Kinesio taping with graded repetitive arm supplementary program (home program) may produce greater improvements in performance of activities of daily living than graded repetitive arm supplementary program (Home program).	1	Yang & Choi (2024)
2	Task-oriented training with conventional therapy may produce greater improvements in performance of activities of daily living than Progressive resistance exercise with conventional therapy.	1	Chintamani R. (2024)
1b	Smart reminder wristwatch telerehabilitation with Conventional therapy may not have a difference in efficacy when compared to Conventional therapy for improving performance of activities of daily living.	1	Toh F.M. et al. (2024)
2	Graded Motor Imagery (included implicit and explicit motor imagery plus mirror therapy) with conventional rehabilitation may not have a difference in efficacy when compared to Upper limb exercise with conventional rehabilitation for improving performance of activities of daily living.	1	Ji et al. (2021)
1b	Dynamic resistance training (POWER) may not have a difference in efficacy when compared to Functional Task Practice (FTP) for improving performance of activities of daily living.	1	Corti et al. (2012)
2	Different approaches to strength training: some approaches may produce greater improvements in performance of activities of daily living than others.	1	Agni & Kulkarni (2017)
1b	Real bilateral tDCS with resistance training exercise may not have a difference in efficacy when compared to sham tDCS with resistance training exercise for improving performance of activities of daily living.	1	Beaulieu et al. (2019)
1b	Mirror and strength training therapy may not have a difference in efficacy when compared to Strength training for improving performance of activities of daily living.	1	Ehrensberger et al. (2019)
1b	Community-based upper extremity exercise program may not have a difference in efficacy when compared to Lower extremity exercise program for improving performance of activities of daily living.	1	Pang et al. (2006)

1b	Alternating hot-cold water immersion (AHCWI) with Standard rehabilitation may not have a difference in efficacy when compared to Upper limb cycling exercises with Standard rehabilitation for improving performance of activities of daily living.	1	Chiu et al. (2024)
1b	Cognitive Orientation to Daily Occupaitonal Performance may produce greater improvements in performance of activities of daily living than Conventional occupational therapy.	1	Hejazi-Shirmard M. et al. (2024)
1b	Ergotact system (Videogames) may not have a difference in efficacy when compared to Home-based self-rehabilitation program for improving performance of activities of daily living.	1	Pouplin S. et al. (2023)
1b	Sensory Relearning with Task-Specific Training and home exercise may not have a difference in efficacy when compared to Task-Specific Training with strength training for improving performance of activities of daily living.	1	Carlsson et al. (2022)
2	Task-Oriented Training may not have a difference in efficacy when compared to Table-Top Activity Training for improving performance of activities of daily living.	1	Choi et al. (2022b)
1b	Virtual Reality Training (Nintendo Wii) with general physical therapy may not have a difference in efficacy when compared to OT with general physical therapy for improving performance of activities of daily living.	1	Cho et al. (2021)
1b	TNRS with GRASP may not have a difference in efficacy when compared to Sham tRNS with GRASP for improving performance of activities of daily living.	1	Arnao et al. (2019)
1b	Functional Training may not have a difference in efficacy when compared to Strength Training for improving performance of activities of daily living.	1	Milot et al. (2019)
1b	Botox with intensive rehabilitation program may not have a difference in efficacy when compared to Botox for improving performance of activities of daily living.	1	Lannin et al. (2018)
1b	Superficial needling acupuncture plus club swing exercise with conventional therapy may produce greater improvements in performance of activities of daily living than Conventional therapy.	1	Ni et al. (2017)
1b	Video game self training may not have a difference in efficacy when compared to Graded repetitive arm supplementary program for improving performance of activities of daily living.	1	Rand et al. (2017)
1b	Repetitive Task Practice may not have a difference in efficacy when compared to Occupation-Based Intervention for improving performance of activities of daily living.	1	Skubik-Peplaski et al. (2017)
1b	VR (YOUgrabber) may not have a difference in efficacy when compared to Gym training for improving performance of activities of daily living.	1	Stockley et al. (2017)
1b	VR based rehab may not have a difference in efficacy when compared to Group based rehab for improving performance of activities of daily living.	1	Lee et al. (2016d)
1b	CIMT may not have a difference in efficacy when compared to Therapeutic Climbing for improving performance of activities of daily living.	1	Khan et al. (2011)
1b	CIMT may not have a difference in efficacy when compared to Conventional neurological therapy for improving performance of activities of daily living.	1	Khan et al. (2011)
1b	Therapeutic Climbing may not have a difference in efficacy when compared to Conventional neurological therapy for improving performance of activities of daily living.	1	Khan et al. (2011)

1b	Robotic therapy (MIT-Manus) with conventional therapy may not have a difference in efficacy when compared to Occupational therapy for improving performance of activities of daily living.	1	Rabadi et al. (2008)
2	EMG triggered NMS (EMG-Stim) with Wrist Strengthening Exercises may produce greater improvements in performance of activities of daily living than Wrist Exercises.	1	Francisco et al. (1998)
1b	High intensity FES assisted exercise therapy may not have a difference in efficacy when compared to Low FES assisted exercise therapy for improving performance of activities of daily living.	1	Kowalczewski et al. (2007)
1b	Cognitive Orientation to Daily Occupaitonal Performance may produce greater improvements in performance of activities of daily living than Progressive exercise program (strenght, functional, balance, and endurance training).	1	Hejazi-Shirmard M. et al. (2024)
2	High-Intensity Interval Training may produce greater improvements in performance of activities of daily living than Rest control.	1	Nepveu et al. (2017)
1b	Robot-assisted training may not have a difference in efficacy when compared to Usual care for improving performance of activities of daily living.	1	Rodgers et al. (2019)
1b	Enhanced upper limb therapy may produce greater improvements in performance of activities of daily living than Usual care.	1	Rodgers et al. (2019)
1b	Robot-assisted training may not have a difference in efficacy when compared to Enhanced upper limb therapy for improving performance of activities of daily living.	1	Rodgers et al. (2019)

DEXTERITY			
LoE	**Conclusion Statement**	**RCTs**	**References**
1a	There is conflicting evidence about the effect of Strength training when compared to conventional therapy for improving dexterity.	2	Park et al. (2019a); Donaldson et al. (2009)
1b	Functional strength training with conventional physical therapy may not have a difference in efficacy when compared to Conventional physiotherapy X2 for improving dexterity.	1	Donaldson et al. (2009)
1a	There is conflicting evidence about the effect of Exercise and custom physiotherapy protocols when compared to conventional therapy for improving dexterity.	6	Swanson et al. (2023); Fathi et al. (2022); Eroglu et al. (2020); MandehgaryNajafabadi et al. (2019); Pandian et al. (2015); Lincoln et al. (1999)
1b	Different approaches to exercise and custom physiotherapy protocols may not have a difference in efficacy when compared with one another for improving dexterity.	1	Hogg et al. (2020)
2	High intensity interval training (HIIT) may not have a difference in efficacy when compared to Moderate intensity constant-load exercise (MICE) for improving dexterity.	1	Abraha et al. (2018)
1b	Functional strength training UL may not have a difference in efficacy when compared to the other study arms for improving dexterity.	1	Mares et al. (2014)
1b	Strength training combined with other interventions may not have a difference in efficacy when compared to stretching and positioning programs for improving dexterity.	2	Coroian et al. (2018); Khallaf et al. (2018)
1b	Exercise and custom physiotherapy protocols may not have a difference in efficacy when compared to no treatment for improving dexterity.	1	Natta et al. (2021)
1b	Smart Glove Upper Extremity Training (RAPAEL) with rehab may not have a difference in efficacy when compared to Upper Extremity Self-Training at home with rehab for improving dexterity.	1	Kang et al. (2020)

1b	Mirror therapy with usual care may not have a difference in efficacy when compared to Lower-limb exercise with usual care for improving dexterity.	1	Tyson et al. (2015)
1b	Intermittent theta burst stimulation with dexterity training may not have a difference in efficacy when compared to Sham theta burst stimulation with dexterity training for improving dexterity.	1	Ackerley et al. (2014)
1b	Intermittent theta burst stimulation with dexterity training may not have a difference in efficacy when compared to Continuous theta burst stimulation with dexterity training for improving dexterity.	1	Ackerley et al. (2014)
1b	Unilateral and bilateral task oriented exercises may not have a difference in efficacy when compared to Walking tasks for improving dexterity.	1	Higgins et al. (2006)
1b	Botox with movement training may not have a difference in efficacy when compared to Botox plus excercise handout for improving dexterity.	1	Lannin et al. (2020)
1b	Home-Based (Virtual) Rehabilitation with Treatment As Usual may not have a difference in efficacy when compared to Graded Repetitive Arm Supplementary Program with Treatment As Usual for improving dexterity.	1	Wilson et al. (2021)
1b	Cueing or remind to move with exercise or custom physiotherapy protocols may not have a difference in efficacy when compared to Sham with exercise or custom physiotherapy protocols for improving dexterity.	1	Schwerz de Lucena et al. (2022)
1b	Anodal transcranial direct current stimulation with Upper extremity strength training may not have a difference in efficacy when compared to Sham transcranial direct current stimulation with Upper extremity strength training for improving dexterity.	1	Palimeris et al. (2022)
1b	High-frequency repetitive transcranial magnetic stimulation with Conventional Therapy may produce greater improvements in dexterity than Conventional therapy.	1	Rezaei et al. (2023)
1b	High-frequency repetitive transcranial magnetic stimulation with Conventional Therapy may not have a difference in efficacy when compared to Contralateral limb Cross education (strength training) with Conventional therapy for improving dexterity.	1	Rezaei et al. (2023)
1b	Contralateral limb Cross education (strength training) with Conventional therapy may not have a difference in efficacy when compared to high-frequency repetitive transcranial magnetic stimulation with cross education and conventional therapy for improving dexterity.	1	Rezaei et al. (2023)
1b	High-frequency repetitive transcranial magnetic stimulation with Conventional Therapy may not have a difference in efficacy when compared to high-frequency repetitive transcranial magnetic stimulation with cross education and conventional therapy for improving dexterity.	1	Rezaei et al. (2023)
1b	Modified Constraint-Induced Movement Therapy with Exercise or custom physiotherapy (Telerehabilitation) may produce greater improvements in dexterity than Home exercise program.	1	Saygili et al. (2024)
1b	Enriched Music-Supported Therapy (eMST) may not have a difference in efficacy when compared to Graded Repetitive Arm Supplementary Program for improving dexterity.	1	Segura et al. (2024)
2	Task-oriented training with conventional therapy may not have a difference in efficacy when compared to Progressive resistance exercise with conventional therapy for improving dexterity.	1	Chintamani R. (2024)

1b	Virtual Reality Boxing (Xbox Kinect) may not have a difference in efficacy when compared to Boxing Practice with Therapist for improving dexterity.	1	Ersoy & Iyigun (2021)
1b	'BOOST' Intensive Arm-Hand Training Protocol may not have a difference in efficacy when compared to Lower-Limb Strengthening And Reconditioning for improving dexterity.	1	Meyer et al. (2021)
1b	Real bilateral tDCS with resistance training exercise may not have a difference in efficacy when compared to sham tDCS with resistance training exercise for improving dexterity.	1	Beaulieu et al. (2019)
1b	Cognitive Orientation to Daily Occupaitonal Performance may not have a difference in efficacy when compared to Conventional occupational therapy for improving dexterity.	1	Hejazi-Shirmard M. et al. (2024)
1b	Ergotact system (Videogames) may not have a difference in efficacy when compared to Home-based self-rehabilitation program for improving dexterity.	1	Pouplin S. et al. (2023)
1b	Sensory Relearning with Task-Specific Training and home exercise may not have a difference in efficacy when compared to Task-Specific Training with strength training for improving dexterity.	1	Carlsson et al. (2022)
1b	Botox with intensive rehabilitation program may not have a difference in efficacy when compared to Botox for improving dexterity.	1	Lannin et al. (2018)
1b	Video game self training may not have a difference in efficacy when compared to Graded repetitive arm supplementary program for improving dexterity.	1	Rand et al. (2017)
1b	VR (YOUgrabber) may not have a difference in efficacy when compared to Gym training for improving dexterity.	1	Stockley et al. (2017)
1b	VR based rehab may not have a difference in efficacy when compared to Group based rehab for improving dexterity.	1	Lee et al. (2016d)
2	Music glove may produce greater improvements in dexterity than Conventional care.	1	Friedman et al. (2014)
2	Isometric hand therapy may not have a difference in efficacy when compared to Conventional care for improving dexterity.	1	Friedman et al. (2014)
2	Music glove may not have a difference in efficacy when compared to Isometric hand therapy for improving dexterity.	1	Friedman et al. (2014)
2	Lower-Limb Task-Specific Circuit Training may not have a difference in efficacy when compared to Upper-Limb Task-Specific Training for improving dexterity.	1	Dean et al. (2000b)
1b	Cognitive Orientation to Daily Occupaitonal Performance may not have a difference in efficacy when compared to Progressive exercise program (strenght, functional, balance, and endurance training) for improving dexterity.	1	Hejazi-Shirmard M. et al. (2024)

Key Points

- Functional strength training may not be beneficial for improving motor function and muscle strength after stroke when compared to Movement performance therapy.
- Dynamic resistance training (POWER) may not be beneficial for improving motor function, performance of activities of daily living, spasticity, range of motion, and stroke severity after stroke when compared to Functional Task Practice (FTP).
- Strength training may be beneficial for improving motor function, muscle strength, and performance of activities of daily living, but not spasticity, after stroke when compared to conventional therapy; the literature is mixed regarding range of motion and dexterity.

- Functional strength training with conventional physical therapy may not be beneficial for improving motor function and dexterity after stroke when compared to Conventional physiotherapy X2.
- Exercise and custom physiotherapy protocols may be beneficial for improving motor function, muscle strength, and proprioception, but not stroke severity, spasticity, range of motion, and performance of activities of daily living, after stroke when compared to conventional therapy; the literature is mixed regarding dexterity.
- Arm treatment for 3hr/d may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Arm treatment for 2hr/d or Arm treatment for 1hr/d.
- Arm treatment for 3hr/d may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Arm treatment for 2hr/d.
- Functional strength training UL may be beneficial for improving motor function, but not dexterity, after stroke when compared to the other study arms.
- Graded Arm Supplementary Program may not be beneficial for improving performance of activities of daily living and muscle strength after stroke when compared to Conventional Therapy; the literature is mixed regarding motor function.
- Graded repetitive arm supplementary program protocol may be beneficial for improving motor function, performance of activities of daily living, and muscle strength after stroke when compared to Education book- self-administered homework exercise program.
- Strength training combined with other interventions may not be beneficial for improving motor function, dexterity, performance of activities of daily living, spasticity, and muscle strength after stroke when compared to stretching and positioning programs.
- Exercise and custom physiotherapy protocols may be beneficial for improving stroke severity, muscle strength, and performance of activities of daily living, but not motor function and dexterity, after stroke when compared to no treatment.
- Body-weight supported treadmill training may not be beneficial for improving motor function and muscle strength after stroke when compared to Education (reviewing home exercises).
- Strength training combined with other interventions may be beneficial for improving motor function, muscle strength, and performance of activities of daily living after stroke when compared to conventional therapy.
- Exercise and custom physiotherapy protocols combined with other interventions may be beneficial for improving motor function and performance of activities of daily living after stroke when compared to conventional therapy; the literature is mixed regarding spasticity.
- Arm Ergometer with conventional treatment may be beneficial for improving motor function, but not spasticity and range of motion, after stroke when compared to Cryotherapy with Proprioceptive Neuromusucal Facilitation and Neurodevelopmental Techniques.
- Exercise and custom physiotherapy protocols combined with other interventions may not be beneficial for improving motor function, performance of activities of daily living, and stroke severity after stroke when compared to exercise and custom physiotherapy protocols.
- Leg rehab training may be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Immobilization therapy with inflatable pressure splint (arm and leg with splints).
- Graded repetitive arm supplementary program may be beneficial for improving motor function and muscle strength after stroke when compared to Virtual reality.
- Boxing training may be beneficial for improving motor function after stroke when compared to No intervention or therapy.
- Boxing training may be beneficial for improving motor function after stroke when compared to Scapular stabilization training.
- Forced-rate exercise with Repetitive task practice may not be beneficial for improving motor function after stroke when compared to Repetitive task practice.
- Cycling exercise with feedback and Conventional therapy may be beneficial for improving spasticity, but not motor function and performance of activities of daily living, after stroke when compared to Conventional therapy; the literature is mixed regarding stroke severity.

- Task-related Training (Grasping or Retrieving Objects) may not be beneficial for improving motor function and spasticity after stroke when compared to Progressive Resistive Exercises.
- Smart Glove Upper Extremity Training (RAPAEL) with rehab may be beneficial for improving motor function, but not dexterity, performance of activities of daily living, and muscle strength, after stroke when compared to Upper Extremity Self-Training at home with rehab.
- Active-passive bilateral therapy (APBT) with Self-directed motor practice may not be beneficial for improving motor function, stroke severity, and muscle strength after stroke when compared to Self-directed motor practice on affected upper limb.
- Mental Practice with activities of daily living training session may be beneficial for improving motor function after stroke when compared to Sham Relaxation Exercise with activities of daily living training session.
- Whole-body vibration with Task Oriented Training and Conventional physical therapy may be beneficial for improving motor function and muscle strength after stroke when compared to Upper- and lower-Cycle group with Task Specific Training and Conventional physical therapy.
- Massage may be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Traditional medicine (Conventional unani drug therapy (Munzij, Mushil, Muaqwwi Aasab)).
- Group Circuit may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to high intensity physio or usual physiotherapy.
- Task-related Training with Trunk Restraint may not be beneficial for improving motor function and range of motion after stroke when compared to Resistive Exercises with Trunk Restraint.
- Dextroamphetamine with physiotherapy may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Placebo with Physiotherapy.
- Mirror therapy with usual care may not be beneficial for improving motor function, dexterity, spasticity, proprioception, and muscle strength after stroke when compared to Lower-limb exercise with usual care.
- Telemonitored hand robotic-assisted therapy (Hand mentor pro) with home exercise program may not be beneficial for improving motor function after stroke when compared to Home exercise program only.
- Modified constraint-induced movement therapy may be beneficial for improving motor function after stroke when compared to Conventional rehabilitation.
- Robot arm end effectors (ReoGO) with therapy may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to self-guided therapy with therapy.
- Telerehabilitation may not be beneficial for improving motor function after stroke when compared to In clinic Rehabilitation.
- Robot-Assisted Therapy may not be beneficial for improving motor function and spasticity after stroke when compared to Usual care.
- Robot-Assisted Therapy may not be beneficial for improving motor function and spasticity after stroke when compared to Dose-matched Intensive Comparison Therapy.
- Eccentric strength training may be beneficial for improving motor function, but not muscle strength, after stroke when compared to Task-oriented strength training.
- Intermittent theta burst stimulation with dexterity training may not be beneficial for improving motor function and dexterity after stroke when compared to Sham theta burst stimulation with dexterity training.
- Intermittent theta burst stimulation with dexterity training may not be beneficial for improving motor function and dexterity after stroke when compared to Continuous theta burst stimulation with dexterity training.
- Functional task practice (FTP) with Power training may be beneficial for improving performance of activities of daily living and muscle strength, but not spasticity, after stroke when compared to Functional task practice (FTP); the literature is mixed regarding motor function.
- Task specific training with strength training or resistance may be beneficial for improving motor function, range of motion, and muscle strength, but not spasticity, after stroke when compared to Task oriented training without resistance.

- Upper extremity thermal stimulation may be beneficial for improving motor function, but not performance of activities of daily living and spasticity, after stroke when compared to lower extremity thermal stimulation.
- Pointing movement practice with feedback may be beneficial for improving motor function, but not spasticity, after stroke when compared to Pointing movement practice without feedback.
- OnabotulinumtoxinA with upper limb rehabilitation may be beneficial for improving motor function, but not performance of activities of daily living and spasticity, after stroke when compared to OnabotulinumtoxinA.
- Progressive abduction loading therapy with horizontal-plance viscous resistance device may not be beneficial for improving motor function and muscle strength after stroke when compared to Progressive abduction loading therapy.
- Virtual Reality Boxing (Xbox Kinect) may not be beneficial for improving motor function and dexterity after stroke when compared to Boxing Practice with Therapist.
- Intermittent theta burst stimulation with Physical therapy may be beneficial for improving motor function, performance of activities of daily living, and stroke severity after stroke when compared to Physical Therapy.
- Intermittent theta burst stimulation with Physical therapy may not be beneficial for improving motor function, performance of activities of daily living, and stroke severity after stroke when compared to functional electrical stimulation with Physical therapy.
- Unilateral and bilateral task oriented exercises may not be beneficial for improving motor function, dexterity, performance of activities of daily living, and muscle strength after stroke when compared to Walking tasks.
- Physiotherapy may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Acupuncture.
- Physiotherapy may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Physiotherapy with Acupuncture.
- Acupuncture may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Physiotherapy with Acupuncture.
- Wii arm exercises may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Home-based arm exercises.
- Neuroanimation therapy using ARMEO exoskeleton may not be beneficial for improving motor function and muscle strength after stroke when compared to Modified Occupational therapy (stretching, task specific training).
- Robotic-assisted training with conventional therapy may be beneficial for improving motor function after stroke when compared to Conventional therapy with arm specific physiotherapy.
- Botulinum toxin injection with self-rehabilitation may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to BTI.
- Dual-Task Training with Conventional occupational therapy may be beneficial for improving motor function after stroke when compared to Single Task Training (combining sensory stimulation, UE muscle strength, cognitive and perceptual training, and fine hand movement) with Conventional occupational therapy.
- Virtual reality therapy with ARMEO with combination of different exercises may be beneficial for improving motor function, but not muscle strength, after stroke when compared to Conventional physiotherapy.
- High frequency repetitive transcranial magnetic stimulation with grip training and conventional rehab may not be beneficial for improving motor function, performance of activities of daily living, and muscle strength after stroke when compared to repetitive transcranial magnetic stimulation with conventional rehab or Grip training and conventional rehab.
- Three-Dimensional Upper Limb Robotic Exoskeleton Training may not be beneficial for improving spasticity after stroke when compared to Manual Rehabilitation; the literature is mixed regarding motor function.
- Robot-assisted training (RAT) with conventional rehab may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Enhanced upper extremity therapy (EUET) with conventional rehab.

- Cueing or remind to move with exercise or custom physiotherapy protocols may not be beneficial for improving motor function, dexterity, performance of activities of daily living, stroke severity, and muscle strength after stroke when compared to Sham with exercise or custom physiotherapy protocols.
- Anodal transcranial direct current stimulation with Upper extremity strength training may not be beneficial for improving motor function, dexterity, performance of activities of daily living, range of motion, and muscle strength after stroke when compared to Sham transcranial direct current stimulation with Upper extremity strength training.
- Jintronix Virtual reality may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to graded repetitive arm supplementary program rehab.
- Dual transcranial direct current stimulation with home exercise program may be beneficial for improving motor function, but not muscle strength, after stroke when compared to Sham transcranial direct current stimulation with home exercise program.
- Bihemispheric transcranial direct current stimulation with Custum physiotherapy protocol may be beneficial for improving motor function after stroke when compared to Sham transcranial direct current stimulation with Custom physiotherapy protocol; the literature is mixed regarding spasticity.
- Bihemispheric transcranial direct current stimulation with Custum physiotherapy protocol may not be beneficial for improving motor function and spasticity after stroke when compared to Unihemispheric transcranial direct current stimulation with Custum physiotherapy protocol.
- High-frequency repetitive transcranial magnetic stimulation with Conventional Therapy may be beneficial for improving motor function and dexterity after stroke when compared to Conventional therapy; the literature is mixed regarding muscle strength.
- High-frequency repetitive transcranial magnetic stimulation with Conventional Therapy may not be beneficial for improving dexterity and muscle strength after stroke when compared to Contralateral limb Cross education (strength training) with Conventional therapy.
- High-frequency repetitive transcranial magnetic stimulation with Conventional Therapy may be less beneficial than Contralateral limb Cross education (strength training) with Conventional therapy for improving motor function after stroke.
- Contralateral limb Cross education (strength training) with Conventional therapy may not be beneficial for improving motor function, dexterity, and muscle strength after stroke when compared to high-frequency repetitive transcranial magnetic stimulation with cross education and conventional therapy.
- High-frequency repetitive transcranial magnetic stimulation with Conventional Therapy may not be beneficial for improving motor function, dexterity, and muscle strength after stroke when compared to high-frequency repetitive transcranial magnetic stimulation with cross education and conventional therapy.
- Robotic training with Rebless may be beneficial for improving motor function, but not performance of activities of daily living, spasticity, range of motion, and muscle strength, after stroke when compared to UE training with Motomed ergometer.
- Modified Constraint-Induced Movement Therapy with Exercise or custom physiotherapy (Telerehabilitation) may be beneficial for improving motor function, dexterity, performance of activities of daily living, and muscle strength after stroke when compared to Home exercise program.
- Enriched Music-Supported Therapy (eMST) may not be beneficial for improving dexterity, performance of activities of daily living, and muscle strength after stroke when compared to Graded Repetitive Arm Supplementary Program; the literature is mixed regarding motor function.
- Task-oriented training with conventional therapy may be beneficial for improving performance of activities of daily living, but not dexterity, after stroke when compared to Progressive resistance exercise with conventional therapy; the literature is mixed regarding motor function.
- Smart reminder wristwatch telerehabilitation with Conventional therapy may not be beneficial for improving motor function, performance of activities of daily living, and range of motion after stroke when compared to Conventional therapy.
- Cognitive motor rehabilitation with specific UE exercises may be beneficial for improving motor function after stroke when compared to Specific UE exercises.
- Dry Needling with exercise therapy may not be beneficial for improving motor function and spasticity after stroke when compared to Exercise therapy; the literature is mixed regarding range of motion.

- Graded Motor Imagery (included implicit and explicit motor imagery plus mirror therapy) with conventional rehabilitation may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Upper limb exercise with conventional rehabilitation.
- High intensity interval training (HIIT) may not be beneficial for improving dexterity and muscle strength after stroke when compared to Moderate intensity constant-load exercise (MICE).
- Botox with movement training may be beneficial for improving muscle strength, but not dexterity, performance of activities of daily living, spasticity, and range of motion, after stroke when compared to Botox plus excercise handout.
- Home-Based (Virtual) Rehabilitation with Treatment As Usual may not be beneficial for improving dexterity after stroke when compared to Graded Repetitive Arm Supplementary Program with Treatment As Usual.
- Upper extremity aerobic exercise with conventional physiotherapy may be beneficial for improving performance of activities of daily living, but not spasticity and stroke severity, after stroke when compared to Conventional physiotherapy.
- Augmented Community Telerehabilitation may not be beneficial for improving performance of activities of daily living and muscle strength after stroke when compared to Conventional Therapy.
- The literature is mixed regarding the effect of Stretching with Joint-stabilizing exercises on improvement of performance of activities of daily living after stroke when compared to exercise.
- Stretching with Joint-stabilizing exercises may be less beneficial than Stretching for improving performance of activities of daily living after stroke.
- Traditional Chinese medicine with Tuina treatment (massage techniques), Acupuncture kinesiotherapy and Basic stroke treatment may be beneficial for improving performance of activities of daily living and spasticity after stroke when compared to Basic stroke treatment with modern rehabilitation techniques.
- Electroacupuncture with cycling may be beneficial for improving performance of activities of daily living, stroke severity, and muscle strength after stroke when compared to Electroacupuncture.
- Radial extracorporeal shock wave therapy (radial extracorporeal shockwave therapy) with Designed physical therapy program for shoulder may be beneficial for improving performance of activities of daily living after stroke when compared to Sham radial extracorporeal shockwave therapy with Designed physical therapy program for shoulder.
- Kinesio taping with graded repetitive arm supplementary program (home program) may be beneficial for improving performance of activities of daily living after stroke when compared to graded repetitive arm supplementary program (Home program).
- Dorsal hand splint with home-based exercise program may not be beneficial for improving spasticity and range of motion after stroke when compared to Home-based exercise program.
- Electroacupuncture with strength training may be beneficial for improving spasticity after stroke when compared to Strength training.
- Proprioceptive neuromuscular facilitation exercises with neuromobilization of the affected upper extremity may be beneficial for improving proprioception after stroke when compared to proprioceptive neuromuscular facilitation exercises without neuromobilization or conventional care.
- Arm cycling with conventional physiotherapy may be beneficial for improving stroke severity and muscle strength after stroke when compared to conventional physiotherapy.
- 'BOOST' Intensive Arm-Hand Training Protocol may be beneficial for improving motor function, but not dexterity, after stroke when compared to Lower-Limb Strengthening And Reconditioning.
- Real bilateral tDCS with resistance training exercise may not be beneficial for improving motor function, muscle strength, spasticity, performance of activities of daily living, and dexterity after stroke when compared to sham tDCS with resistance training exercise.
- Mirror and strength training therapy may not be beneficial for improving performance of activities of daily living after stroke when compared to Strength training.
- UE function training may be beneficial for improving motor function, but not muscle strength and spasticity, after stroke when compared to lower extremity function training.
- Aerobic exercise may be beneficial for improving muscle strength, but not motor function, after stroke when compared to Stretching exercise.

- Community-based upper extremity exercise program may be beneficial for improving motor function, but not muscle strength and performance of activities of daily living, after stroke when compared to Lower extremity exercise program.
- Alternating hot-cold water immersion (AHCWI) with Standard rehabilitation may be beneficial for improving motor function and muscle strength, but not spasticity and performance of activities of daily living, after stroke when compared to Upper limb cycling exercises with Standard rehabilitation.
- Cognitive Orientation to Daily Occupaitonal Performance may be beneficial for improving performance of activities of daily living, but not motor function and dexterity, after stroke when compared to Conventional occupational therapy.
- Ergotact system (Videogames) may not be beneficial for improving motor function, spasticity, performance of activities of daily living, and dexterity after stroke when compared to Home-based self-rehabilitation program.
- Sensory Relearning with Task-Specific Training and home exercise may not be beneficial for improving motor function, performance of activities of daily living, and dexterity after stroke when compared to Task-Specific Training with strength training; the literature is mixed regarding proprioception.
- Task-Oriented Training may be beneficial for improving motor function, but not performance of activities of daily living, after stroke when compared to Table-Top Activity Training.
- Virtual Reality Training (Nintendo Wii) with general physical therapy may be beneficial for improving muscle strength, but not motor function and performance of activities of daily living, after stroke when compared to OT with general physical therapy.
- TNRS with GRASP may be beneficial for improving motor function, but not stroke severity and performance of activities of daily living, after stroke when compared to Sham tRNS with GRASP.
- Functional Training may not be beneficial for improving motor function, muscle strength, spasticity, and performance of activities of daily living after stroke when compared to Strength Training.
- Botox with intensive rehabilitation program may not be beneficial for improving spasticity, performance of activities of daily living, and dexterity after stroke when compared to Botox.
- Focal muscle vibration with progressive modular rebalancing may not be beneficial for improving motor function, muscle strength, and spasticity after stroke when compared to Conventional physiotherapy.
- The literature is mixed regarding the effect of Forced aerobic exercise with Repetitive task practice(RTP) on motor function after stroke when compared to Voluntary exercise with RTP.
- The literature is mixed regarding the effect of Forced aerobic exercise with Repetitive task practice(RTP) on motor function after stroke when compared to RTP.
- Voluntary exercise with RTP may not be beneficial for improving motor function after stroke when compared to RTP.
- Superficial needling acupuncture plus club swing exercise with conventional therapy may be beneficial for improving performance of activities of daily living after stroke when compared to Conventional therapy; the literature is mixed regarding range of motion.
- Video game self training may not be beneficial for improving motor function, performance of activities of daily living, and dexterity after stroke when compared to Graded repetitive arm supplementary program.
- Repetitive Task Practice may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Occupation-Based Intervention.
- VR (YOUgrabber) may not be beneficial for improving performance of activities of daily living and dexterity after stroke when compared to Gym training.
- VR based rehab may be beneficial for improving motor function, but not performance of activities of daily living and dexterity, after stroke when compared to Group based rehab.
- Music glove may be beneficial for improving dexterity, but not motor function and muscle strength, after stroke when compared to Conventional care.
- Isometric hand therapy may not be beneficial for improving motor function, muscle strength, and dexterity after stroke when compared to Conventional care.
- Music glove may not be beneficial for improving motor function, muscle strength, and dexterity after stroke when compared to Isometric hand therapy.

- Repetitive peripheral nerve sensory stim (RPSS) with Motor Training may be beneficial for improving motor function after stroke when compared to Sham with Motor Training.
- Standard Acupuncture with Shixuan & Xiaohai acupoints with Functional training may be beneficial for improving motor function and muscle strength after stroke when compared to Standard Acupuncture only with Functional training.
- CIMT may not be beneficial for improving motor function, muscle strength, range of motion, and performance of activities of daily living after stroke when compared to Therapeutic Climbing.
- CIMT may not be beneficial for improving motor function, stroke severity, muscle strength, range of motion, and performance of activities of daily living after stroke when compared to Conventional neurological therapy.
- Therapeutic Climbing may not be beneficial for improving motor function, stroke severity, muscle strength, range of motion, and performance of activities of daily living after stroke when compared to Conventional neurological therapy.
- Robotic therapy (MIT-Manus) with conventional therapy may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Occupational therapy.
- Strength training may be beneficial for improving motor function and muscle strength after stroke when compared to Standard care.
- Lower-Limb Task-Specific Circuit Training may not be beneficial for improving muscle strength and dexterity after stroke when compared to Upper-Limb Task-Specific Training.
- EMG triggered NMS (EMG-Stim) with Wrist Strengthening Exercises may be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Wrist Exercises.
- High intensity FES assisted exercise therapy may not be beneficial for improving performance of activities of daily living after stroke when compared to Low FES assisted exercise therapy; the literature is mixed regarding motor function.
- Exercise and custom physiotherapy protocols: some approaches may be more beneficial than others for improving stroke severity; different approaches to exercise and custom physiotherapy protocols may not have a difference in efficacy when compared with one another for improving motor function, muscle strength, performance of activities of daily living, and dexterity; the literature is mixed regarding spasticity.
- Strength training: some approaches may be more beneficial than others for improving performance of activities of daily living; different approaches to strength training may not have a difference in efficacy when compared with one another for improving muscle strength, spasticity, and range of motion; the literature is mixed regarding motor function.
- Tilt table affected knee belt with Conventional Therapy may not be beneficial for improving muscle strength after stroke when compared to Tilt table alone (both knee belts) with Conventional Therapy; the literature is mixed regarding motor function.
- Tilt table with task oriented training with Conventional Therapy may be beneficial for improving motor function and muscle strength after stroke when compared to Tilt table alone (both knee belts) with Conventional Therapy.
- Cognitive Orientation to Daily Occupaitonal Performance may be beneficial for improving performance of activities of daily living, but not motor function and dexterity, after stroke when compared to Progressive exercise program (strenght, functional, balance, and endurance training).
- Enhanced upper limb therapy may be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Usual care.
- Robot-assisted training may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Usual care.
- High-Intensity Interval Training may be beneficial for improving performance of activities of daily living after stroke when compared to Rest control.
- Robot-assisted training may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Enhanced upper limb therapy.

Summary of Key Points: Exercise and Strength Training

Intervention	Control(s)	Function domain(s)	Effect

Functional strength training	Movement performance therapy	Motor function, muscle strength	–
Dynamic resistance training (POWER)	Functional Task Practice (FTP)	Motor function, performance of activities of daily living, spasticity, range of motion, stroke severity	–
Strength training	conventional therapy	Motor function, muscle strength, performance of activities of daily living	+
Strength training	conventional therapy	Spasticity	–
Strength training	conventional therapy	Range of motion, dexterity	=
Functional strength training with conventional physical therapy	Conventional physiotherapy X2	Motor function, dexterity	–
Exercise and custom physiotherapy protocols	conventional therapy	Motor function, muscle strength, proprioception	+
Exercise and custom physiotherapy protocols	conventional therapy	Stroke severity, spasticity, range of motion, performance of activities of daily living	–
Exercise and custom physiotherapy protocols	conventional therapy	Dexterity	=
Exercise and custom physiotherapy protocols	One another (different approaches compared)	Motor function, dexterity, performance of activities of daily living, muscle strength	–
Arm treatment for 3hr/d	Arm treatment for 2hr/d or Arm treatment for 1hr/d	Motor function, performance of activities of daily living	–
Arm treatment for 3hr/d	Arm treatment for 2hr/d	Motor function, performance of activities of daily living	–
Functional strength training UL	the other study arms	Motor function	+
Functional strength training UL	the other study arms	Dexterity	–
Graded Arm Supplementary Program	Conventional Therapy	Performance of activities of daily living, muscle strength	–
Graded Arm Supplementary Program	Conventional Therapy	Motor function	=
Strength training	One another (different approaches compared)	Motor function	=
Graded repetitive arm supplementary program protocol	Education book- self-administered homework exercise program	Motor function, performance of activities of daily living, muscle strength	+
Strength training combined with other interventions	stretching and positioning programs	Motor function, dexterity, performance of activities of daily living, spasticity, muscle strength	–
Exercise and custom physiotherapy protocols	no treatment	Stroke severity, muscle strength, performance of activities of daily living	+
Exercise and custom physiotherapy protocols	no treatment	Motor function, dexterity	–
Body-weight supported treadmill training	Education (reviewing home exercises)	Motor function, muscle strength	–
Strength training combined with other interventions	conventional therapy	Motor function, muscle strength, performance of activities of daily living	+

Exercise and custom physiotherapy protocols combined with other interventions	conventional therapy	Motor function, performance of activities of daily living	+
Exercise and custom physiotherapy protocols combined with other interventions	conventional therapy	Spasticity	=
Arm Ergometer with conventional treatment	Cryotherapy with Proprioceptive Neuromusucal Facilitation and Neurodevelopmental Techniques	Motor function	+
Arm Ergometer with conventional treatment	Cryotherapy with Proprioceptive Neuromusucal Facilitation and Neurodevelopmental Techniques	Spasticity, range of motion	−
Exercise and custom physiotherapy protocols combined with other interventions	exercise and custom physiotherapy protocols	Motor function, performance of activities of daily living, stroke severity	−
Leg rehab training	Immobilization therapy with inflatable pressure splint (arm and leg with splints)	Motor function, performance of activities of daily living	+
Graded repetitive arm supplementary program	Virtual reality	Motor function, muscle strength	+
Boxing training	No intervention or therapy	Motor function	+
Boxing training	Scapular stabilization training	Motor function	+
Forced-rate exercise with Repetitive task practice	Repetitive task practice	Motor function	−
Cycling exercise with feedback and Conventional therapy	Conventional therapy	Spasticity	+
Cycling exercise with feedback and Conventional therapy	Conventional therapy	Motor function, performance of activities of daily living	−
Cycling exercise with feedback and Conventional therapy	Conventional therapy	Stroke severity	=
Task-related Training (Grasping or Retrieving Objects)	Progressive Resistive Exercises	Motor function, spasticity	−
Smart Glove Upper Extremity Training (RAPAEL) with rehab	Upper Extremity Self-Training at home with rehab	Motor function	+
Smart Glove Upper Extremity Training (RAPAEL) with rehab	Upper Extremity Self-Training at home with rehab	Dexterity, performance of activities of daily living, muscle strength	−
Active-passive bilateral therapy (APBT) with Self-directed motor practice	Self-directed motor practice on affected upper limb	Motor function, stroke severity, muscle strength	−
Mental Practice with activities of daily living training session	Sham Relaxation Exercise with activities of daily living training session	Motor function	+
Whole-body vibration with Task Oriented Training and Conventional physical therapy	Upper- and lower-Cycle group with Task Specific Training and Conventional physical therapy	Motor function, muscle strength	+
Massage	Traditional medicine (Conventional unani drug therapy (Munzij, Mushil, Muaqwwi Aasab))	Motor function, performance of activities of daily living	+
Group Circuit	high intensity physio or usual physiotherapy	Motor function, performance of activities of daily living	−

Task-related Training with Trunk Restraint	Resistive Exercises with Trunk Restraint	Motor function, range of motion	–
Dextroamphetamine with physiotherapy	Placebo with Physiotherapy	Motor function, performance of activities of daily living	–
Mirror therapy with usual care	Lower-limb exercise with usual care	Motor function, dexterity, spasticity, proprioception, muscle strength	–
Telemonitored hand robotic-assisted therapy (Hand mentor pro) with home exercise program	Home exercise program only	Motor function	–
Modified constraint-induced movement therapy	Conventional rehabilitation	Motor function	+
Robot arm end effectors (ReoGO) with therapy	self-guided therapy with therapy	Motor function, performance of activities of daily living	–
Telerehabilitation	In clinic Rehabilitation	Motor function	–
Robot-Assisted Therapy	Usual care	Motor function, spasticity	–
Robot-Assisted Therapy	Dose-matched Intensive Comparison Therapy	Motor function, spasticity	–
Eccentric strength training	Task-oriented strength training	Motor function	+
Eccentric strength training	Task-oriented strength training	Muscle strength	–
Intermittent theta burst stimulation with dexterity training	Sham theta burst stimulation with dexterity training	Motor function, dexterity	–
Intermittent theta burst stimulation with dexterity training	Continuous theta burst stimulation with dexterity training	Motor function, dexterity	–
Functional task practice (FTP) with Power training	Functional task practice (FTP)	Performance of activities of daily living, muscle strength	+
Functional task practice (FTP) with Power training	Functional task practice (FTP)	Spasticity	–
Functional task practice (FTP) with Power training	Functional task practice (FTP)	Motor function	=
Task specific training with strength training or resistance	Task oriented training without resistance	Motor function, range of motion, muscle strength	+
Task specific training with strength training or resistance	Task oriented training without resistance	Spasticity	–
Upper extremity thermal stimulation	lower extremity thermal stimulation	Motor function	+
Upper extremity thermal stimulation	lower extremity thermal stimulation	Performance of activities of daily living, spasticity	–
Pointing movement practice with feedback	Pointing movement practice without feedback	Motor function	+
Pointing movement practice with feedback	Pointing movement practice without feedback	Spasticity	–
OnabotulinumtoxinA with upper limb rehabilitation	OnabotulinumtoxinA	Motor function	+
OnabotulinumtoxinA with upper limb rehabilitation	OnabotulinumtoxinA	Performance of activities of daily living, spasticity	–

Progressive abduction loading therapy with horizontal-plance viscous resistance device	Progressive abduction loading therapy	Motor function, muscle strength	–
Virtual Reality Boxing (Xbox Kinect)	Boxing Practice with Therapist	Motor function, dexterity	–
Intermittent theta burst stimulation with Physical therapy	Physical Therapy	Motor function, performance of activities of daily living, stroke severity	+
Intermittent theta burst stimulation with Physical therapy	functional electrical stimulation with Physical therapy	Motor function, performance of activities of daily living, stroke severity	–
Unilateral and bilateral task oriented exercises	Walking tasks	Motor function, dexterity, performance of activities of daily living, muscle strength	–
Physiotherapy	Acupuncture	Motor function, performance of activities of daily living	–
Physiotherapy	Physiotherapy with Acupuncture	Motor function, performance of activities of daily living	–
Acupuncture	Physiotherapy with Acupuncture	Motor function, performance of activities of daily living	–
Wii arm exercises	Home-based arm exercises	Motor function, performance of activities of daily living	–
Neuroanimation therapy using ARMEO exoskeleton	Modified Occupational therapy (stretching, task specific training)	Motor function, muscle strength	–
Robotic-assisted training with conventional therapy	Conventional therapy with arm specific physiotherapy	Motor function	+
Botulinum toxin injection with self-rehabilitation	BTI	Motor function, performance of activities of daily living	–
Dual-Task Training with Conventional occupational therapy	Single Task Training (combining sensory stimulation, UE muscle strength, cognitive and perceptual training, and fine hand movement) with Conventional occupational therapy	Motor function	+
Virtual reality therapy with ARMEO with combination of different exercises	Conventional physiotherapy	Motor function	+
Virtual reality therapy with ARMEO with combination of different exercises	Conventional physiotherapy	Muscle strength	–
High frequency repetitive transcranial magnetic stimulation with grip training and conventional rehab	repetitive transcranial magnetic stimulation with conventional rehab or Grip training and conventional rehab	Motor function, performance of activities of daily living, muscle strength	–
Three-Dimensional Upper Limb Robotic Exoskeleton Training	Manual Rehabilitation	Spasticity	–
Three-Dimensional Upper Limb Robotic Exoskeleton Training	Manual Rehabilitation	Motor function	=
Robot-assisted training (RAT) with conventional rehab	Enhanced upper extremity therapy (EUET) with conventional rehab	Motor function, performance of activities of daily living	–
Cueing or remind to move with exercise or custom physiotherapy protocols	Sham with exercise or custom physiotherapy protocols	Motor function, dexterity, performance of activities of daily living, stroke severity, muscle strength	–

Anodal transcranial direct current stimulation with Upper extremity strength training	Sham transcranial direct current stimulation with Upper extremity strength training	Motor function, dexterity, performance of activities of daily living, range of motion, muscle strength	–
Jintronix Virtual reality	graded repetitive arm supplementary program rehab	Motor function, performance of activities of daily living	–
Dual transcranial direct current stimulation with home exercise program	Sham transcranial direct current stimulation with home exercise program	Motor function	+
Dual transcranial direct current stimulation with home exercise program	Sham transcranial direct current stimulation with home exercise program	Muscle strength	–
Bihemispheric transcranial direct current stimulation with Custum physiotherapy protocol	Sham transcranial direct current stimulation with Custom physiotherapy protocol	Motor function	+
Bihemispheric transcranial direct current stimulation with Custum physiotherapy protocol	Sham transcranial direct current stimulation with Custom physiotherapy protocol	Spasticity	=
Bihemispheric transcranial direct current stimulation with Custum physiotherapy protocol	Unihemispheric transcranial direct current stimulation with Custum physiotherapy protocol	Motor function, spasticity	–
High-frequency repetitive transcranial magnetic stimulation with Conventional Therapy	Conventional therapy	Motor function, dexterity	+
High-frequency repetitive transcranial magnetic stimulation with Conventional Therapy	Conventional therapy	Muscle strength	=
High-frequency repetitive transcranial magnetic stimulation with Conventional Therapy	Contralateral limb Cross education (strength training) with Conventional therapy	Motor function, dexterity, muscle strength	–
Contralateral limb Cross education (strength training) with Conventional therapy	high-frequency repetitive transcranial magnetic stimulation with cross education and conventional therapy	Motor function, dexterity, muscle strength	–
High-frequency repetitive transcranial magnetic stimulation with Conventional Therapy	high-frequency repetitive transcranial magnetic stimulation with cross education and conventional therapy	Motor function, dexterity, muscle strength	–
Robotic training with Rebless	UE training with Motomed ergometer	Motor function	+
Robotic training with Rebless	UE training with Motomed ergometer	Performance of activities of daily living, spasticity, range of motion, muscle strength	–
Modified Constraint-Induced Movement Therapy with Exercise or custom physiotherapy (Telerehabilitation)	Home exercise program	Motor function, dexterity, performance of activities of daily living, muscle strength	+
Enriched Music-Supported Therapy (eMST)	Graded Repetitive Arm Supplementary Program	Dexterity, performance of activities of daily living, muscle strength	–
Enriched Music-Supported Therapy (eMST)	Graded Repetitive Arm Supplementary Program	Motor function	=
Task-oriented training with conventional therapy	Progressive resistance exercise with conventional therapy	Performance of activities of daily living	+
Task-oriented training with conventional therapy	Progressive resistance exercise with conventional therapy	Dexterity	–

Task-oriented training with conventional therapy	Progressive resistance exercise with conventional therapy	Motor function	=
Smart reminder wristwatch telerehabilitation with Conventional therapy	Conventional therapy	Motor function, performance of activities of daily living, range of motion	–
Cognitive motor rehabilitation with specific UE exercises	Specific UE exercises	Motor function	+
Dry Needling with exercise therapy	Exercise therapy	Motor function, spasticity	–
Dry Needling with exercise therapy	Exercise therapy	Range of motion	=
Graded Motor Imagery (included implicit and explicit motor imagery plus mirror therapy) with conventional rehabilitation	Upper limb exercise with conventional rehabilitation	Motor function, performance of activities of daily living	–
High intensity interval training (HIIT)	Moderate intensity constant-load exercise (MICE)	Dexterity, muscle strength	–
Botox with movement training	Botox plus excercise handout	Muscle strength	+
Botox with movement training	Botox plus excercise handout	Dexterity, performance of activities of daily living, spasticity, range of motion	–
Home-Based (Virtual) Rehabilitation with Treatment As Usual	Graded Repetitive Arm Supplementary Program with Treatment As Usual	Dexterity	–
Upper extremity aerobic exercise with conventional physiotherapy	Conventional physiotherapy	Performance of activities of daily living	+
Upper extremity aerobic exercise with conventional physiotherapy	Conventional physiotherapy	Spasticity, stroke severity	–
Augmented Community Telerehabilitation	Conventional Therapy	Performance of activities of daily living, muscle strength	–
Stretching with Joint-stabilizing exercises	exercise	Performance of activities of daily living	=
Stretching with Joint-stabilizing exercises	Stretching	Performance of activities of daily living	–
Traditional Chinese medicine with Tuina treatment (massage techniques), Acupuncture kinesiotherapy and Basic stroke treatment	Basic stroke treatment with modern rehabilitation techniques	Performance of activities of daily living, spasticity	+
Electroacupuncture with cycling	Electroacupuncture	Performance of activities of daily living, stroke severity, muscle strength	+
Radial extracorporeal shock wave therapy (radial extracorporeal shockwave therapy) with Designed physical therapy program for shoulder	Sham radial extracorporeal shockwave therapy with Designed physical therapy program for shoulder	Performance of activities of daily living	+
Kinesio taping with graded repetitive arm supplementary program (home program)	graded repetitive arm supplementary program (Home program)	Performance of activities of daily living	+
Strength training	One another (different approaches compared)	Performance of activities of daily living	+
Exercise and custom physiotherapy protocols	One another (different approaches compared)	Spasticity	=

Strength training	One another (different approaches compared)	Spasticity, range of motion, muscle strength	–
Dorsal hand splint with home-based exercise program	Home-based exercise program	Spasticity, range of motion	–
Electroacupuncture with strength training	Strength training	Spasticity	+
Proprioceptive neuromuscular facilitation exercises with neuromobilization of the affected upper extremity	proprioceptive neuromuscular facilitation exercises without neuromobilization or conventional care	Proprioception	+
Exercise and custom physiotherapy protocols	One another (different approaches compared)	Stroke severity	+
Arm cycling with conventional physiotherapy	conventional physiotherapy	Stroke severity, muscle strength	+
'BOOST' Intensive Arm-Hand Training Protocol	Lower-Limb Strengthening And Reconditioning	Motor function	+
'BOOST' Intensive Arm-Hand Training Protocol	Lower-Limb Strengthening And Reconditioning	Dexterity	–
Real bilateral tDCS with resistance training exercise	sham tDCS with resistance training exercise	Motor function, muscle strength, spasticity, performance of activities of daily living, dexterity	–
Mirror and strength training therapy	Strength training	Performance of activities of daily living	–
UE function training	lower extremity function training	Motor function	+
UE function training	lower extremity function training	Muscle strength, spasticity	–
Aerobic exercise	Stretching exercise	Muscle strength	+
Aerobic exercise	Stretching exercise	Motor function	–
Community-based upper extremity exercise program	Lower extremity exercise program	Motor function	+
Community-based upper extremity exercise program	Lower extremity exercise program	Muscle strength, performance of activities of daily living	–
Alternating hot-cold water immersion (AHCWI) with Standard rehabilitation	Upper limb cycling exercises with Standard rehabilitation	Motor function, muscle strength	+
Alternating hot-cold water immersion (AHCWI) with Standard rehabilitation	Upper limb cycling exercises with Standard rehabilitation	Spasticity, performance of activities of daily living	–
Cognitive Orientation to Daily Occupaitonal Performance	Conventional occupational therapy	Performance of activities of daily living	+
Cognitive Orientation to Daily Occupaitonal Performance	Conventional occupational therapy	Motor function, dexterity	–
Ergotact system (Videogames)	Home-based self-rehabilitation program	Motor function, spasticity, performance of activities of daily living, dexterity	–
Sensory Relearning with Task-Specific Training and home exercise	Task-Specific Training with strength training	Motor function, performance of activities of daily living, dexterity	–
Sensory Relearning with Task-Specific Training and home exercise	Task-Specific Training with strength training	Proprioception	=
Task-Oriented Training	Table-Top Activity Training	Motor function	+

Task-Oriented Training	Table-Top Activity Training	Performance of activities of daily living	–
Virtual Reality Training (Nintendo Wii) with general physical therapy	OT with general physical therapy	Muscle strength	+
Virtual Reality Training (Nintendo Wii) with general physical therapy	OT with general physical therapy	Motor function, performance of activities of daily living	–
TNRS with GRASP	Sham tRNS with GRASP	Motor function	+
TNRS with GRASP	Sham tRNS with GRASP	Stroke severity, performance of activities of daily living	–
Functional Training	Strength Training	Motor function, muscle strength, spasticity, performance of activities of daily living	–
Botox with intensive rehabilitation program	Botox	Spasticity, performance of activities of daily living, dexterity	–
Focal muscle vibration with progressive modular rebalancing	Conventional physiotherapy	Motor function, muscle strength, spasticity	–
Forced aerobic exercise with Repetitive task practice(RTP)	Voluntary exercise with RTP	Motor function	=
Forced aerobic exercise with Repetitive task practice(RTP)	RTP	Motor function	=
Voluntary exercise with RTP	RTP	Motor function	–
Superficial needling acupuncture plus club swing exercise with conventional therapy	Conventional therapy	Performance of activities of daily living	+
Superficial needling acupuncture plus club swing exercise with conventional therapy	Conventional therapy	Range of motion	=
Video game self training	Graded repetitive arm supplementary program	Motor function, performance of activities of daily living, dexterity	–
Repetitive Task Practice	Occupation-Based Intervention	Motor function, performance of activities of daily living	–
VR (YOUgrabber)	Gym training	Performance of activities of daily living, dexterity	–
VR based rehab	Group based rehab	Motor function	+
VR based rehab	Group based rehab	Performance of activities of daily living, dexterity	–
Music glove	Conventional care	Dexterity	+
Music glove	Conventional care	Motor function, muscle strength	–
Isometric hand therapy	Conventional care	Motor function, muscle strength, dexterity	–
Music glove	Isometric hand therapy	Motor function, muscle strength, dexterity	–
Repetitive peripheral nerve sensory stim (RPSS) with Motor Training	Sham with Motor Training	Motor function	+

Standard Acupuncture with Shixuan & Xiaohai acupoints with Functional training	Standard Acupuncture only with Functional training	Motor function, muscle strength	+
CIMT	Therapeutic Climbing	Motor function, muscle strength, range of motion, performance of activities of daily living	–
CIMT	Conventional neurological therapy	Motor function, stroke severity, muscle strength, range of motion, performance of activities of daily living	–
Therapeutic Climbing	Conventional neurological therapy	Motor function, stroke severity, muscle strength, range of motion, performance of activities of daily living	–
Robotic therapy (MIT-Manus) with conventional therapy	Occupational therapy	Motor function, performance of activities of daily living	–
Strength training	Standard care	Motor function, muscle strength	+
Lower-Limb Task-Specific Circuit Training	Upper-Limb Task-Specific Training	Muscle strength, dexterity	–
EMG triggered NMS (EMG-Stim) with Wrist Strengthening Exercises	Wrist Exercises	Motor function, performance of activities of daily living	+
High intensity FES assisted exercise therapy	Low FES assisted exercise therapy	Performance of activities of daily living	–
High intensity FES assisted exercise therapy	Low FES assisted exercise therapy	Motor function	=
Tilt table affected knee belt with Conventional Therapy	Tilt table alone (both knee belts) with Conventional Therapy	Muscle strength	–
Tilt table affected knee belt with Conventional Therapy	Tilt table alone (both knee belts) with Conventional Therapy	Motor function	=
Tilt table with task oriented training with Conventional Therapy	Tilt table alone (both knee belts) with Conventional Therapy	Motor function, muscle strength	+
Cognitive Orientation to Daily Occupaitonal Performance	Progressive exercise program (strenght, functional, balance, and endurance training)	Performance of activities of daily living	+
Cognitive Orientation to Daily Occupaitonal Performance	Progressive exercise program (strenght, functional, balance, and endurance training)	Motor function, dexterity	–
Enhanced upper limb therapy	Usual care	Motor function, performance of activities of daily living	+
Robot-assisted training	Usual care	Motor function, performance of activities of daily living	–
High-Intensity Interval Training	Rest control	Performance of activities of daily living	+
Robot-assisted training	Enhanced upper limb therapy	Motor function, performance of activities of daily living	–

Task-Specific Training



Adapted from: https://www.stltoday.com/lifestyles/health-med-fit/custom-made-rehab-helps-victims-of-stroke/article_06eb5759-3291-5730-930f-725c0d436450.html

A total of 71 RCTs were found that evaluated Task-Specific training for upper extremity motor rehabilitation. One RCT compared reaching and reach-to-grasp task training combined with other interventions with strength training (Thielman et al. (2004)). One RCT compared different approaches to reaching and reach-to-grasp task training (Ellis et al. (2009)). Fifteen RCTs compared task-specific training combined with other interventions with task-specific training (Li et al. (2024a); Park, JuHyung et al. (2022); Wong et al. (2022); Hsu et al. (2020); Song et al. (2019); Valkenborghs et al. (2019); Linder et al. (2017); Willigenburg et al. (2017); BaziledaSilva et al. (2015); Ahmad 2014 et al. (2014); Patten et al. (2013); Kutner et al. (2010); Alon et al. (2009); Michaelsen et al. (2006); Dean et al. (2000b)). Thirteen RCTs compared task-specific training with conventional therapy (Zaman et al. (2024); Alsubiheen et al. (2022); Aydilek et al. (2022); Girsa & Saharan (2022); Song et al. (2020); Marryam et al. (2017); Brkic et al. (2016); Pelicioni et al. (2016); Winstein et al. (2016); Hubbard et al. (2015); Kumar & Goyal (2012); Boyd et al. (2010); Nelles et al. (2001)). One RCT compared impairment-oriented training combined with other interventions with conventional therapy (Platz et al. (2005)). One RCT compared task-specific training combined with other interventions with exercise and custom physiotherapy protocols or conventional therapy (English et al. (2015)). Four RCTs evaluated task-specific training combined with other interventions (Folkerts et al. (2017); Hung et al. (2016); Thielman et al. (2008); Jongbloed et al. (1989)). Two RCTs compared different approaches to task-specific training (Lang et al. (2016); Ross et al. (2009)). Seven RCTs compared task-specific training combined with other interventions with conventional therapy (Wang et al. (2023f); Minami et al. (2021); Kirac-Unal et al. (2019); Khallaf et al. (2017); Kim et al. (2015b); Winstein et al. (2004); Platz et al. (2001)). Four RCTs compared task-specific training combined with other interventions with task-specific training or sham (Alwhaibi et al. (2021); Seo et al. (2019); Gharib et al. (2015); Kim et al. (2013a)). One RCT compared different approaches to computerized task specific training (Subramanian et al. (2013)). Two RCTs compared task-specific training with no treatment (Winstein et al. (2019); Almhdawi et al. (2016)). One RCT compared task-specific training combined with other interventions with stretching and positioning programs (Martins et al. (2020)). Two RCTs compared task-specific training combined with other interventions with sham or task-specific training (Carrico et al. (2018); Carrico et al. (2016b)). One RCT compared task-specific training combined with other interventions with proprioceptive neuromuscular facilitation (pnf) (Anandan et al. (2020)). One RCT compared task-specific training combined with other interventions with lower extremity exercise interventions (Higgins et al. (2006)). Two RCTs compared task-specific training combined with other interventions with neurodevelopmental techniques (bobath approach) (Jong-HoonMoon et al. (2018); Arya et al. (2012)). One RCT compared reaching and reach-to-grasp task training combined with other interventions with reaching and reach-to-grasp task training or sham or video game training (Levin et al. (2023)). One RCT compared computerized task specific training combined with other interventions with computerized task specific training or augmented feedback training (Kim et al. (2023c)). Three RCTs compared task-specific training combined with other interventions with exercise and custom physiotherapy protocols (Chintamani R. (2024); Milot et al. (2019); Skubik-Peplaski et al. (2017)). One RCT compared dexterity specific training with conventional therapy (Teremetz et al. (2023)). One RCT compared task-specific training with exercise and custom physiotherapy protocols (Choi et al. (2022b)). One RCT evaluated reaching and reach-to-grasp task

training combined with other interventions (Gomes et al. (2021)). One RCT compared reaching and reach-to-grasp task training with conventional therapy (Turton et al. (2017)). One RCT compared task-specific training combined with other interventions with no treatment (Lee et al. (2013c)). One RCT compared task-specific training combined with other interventions with orthotics (Jeon et al. (2012)). One RCT compared different approaches to dexterity specific training (Kumagai et al. (2022)).

In addition, 106 RCTs in which Task-Specific training formed part of a combined or comparative intervention are cross-referenced at the end of Table 4; their primary listings appear in other tables.

The methodological details and results of all 71 RCTs are presented in Table 4.

Table 4. RCTs Evaluating Task-Specific Training for Upper Extremity Motor Rehabilitation

Authors (Year) **Study Design (PEDro Score)** **Sample Size start** **Sample Size end** **Time post stroke category** **Study design**	**Interventions** **Duration: Session length, frequency per week for total number of weeks**	**Outcome Measures** **Result (direction of effect)**
Reaching and reach-to-grasp task training combined with other interventions compared to strength training		
Thielman et al. (2004) RCT (4) NStart=12 NEnd=12 TPS=Chronic A vs B *Also in Table 3 (Exercise and Strength Training)*	E: Task-related Training (Grasping/Retrieving Objects) C: Progressive Resistive Exercises Duration: 35min/d, 12 sessions, for 4wk	E vs C: Kinematic measures (-) Modified Ashworth Scale (-) Rivermead Motor Assessment (-)
Different approaches to reaching and reach-to-grasp task training compared against one another		
Ellis et al. (2009) RCT (4) NStart=14 NEnd=14 TPS=Chronic A1 vs A2	E1: Progressive Unsupported reaching tasks C: Supported reaching tasks Duration: 3x/wk, 8wks	E1 vs C: Work Area Change Scores (Combined shoulder elbow active range of motion kinematics) (+exp) EMG data (-) Isometric strength (-)
Task-specific training combined with other interventions compared to task-specific training		
Li et al. (2024a) RCT (6) NStart=44 NEnd=40 TPS=Subacute A + B vs A/B *Also in Table 16 (Robotics)*	E: Task-oriented training with force feedback hand rehab robot + Conventional upper limb rehabilitation C: Task-oriented training assisted by a therapist + Conventional upper limb rehabilitation Duration: 20min/d, 5d/wk for 4wks task-oriented training + 40min/d 5d/wk for 4wks conventional rehabilitation	E vs C: FMA-hand (+exp) finger mass flexion (-) finger mass extension (-) hook grasp (-) lateral pinch (-) interdigital pinch (-) cylindrical grasp (+exp) spherical grasp (+exp) ARAT (+exp) grip strength (+exp) modified Ashworth Scale (-) AROM (+exp) Brunnstrom Recovery Stages of the Hand (-) BI (-)
Park, JuHyung et al. (2022) RCT (9) NStart=37	E: Task oriented training + mental practice C: Task oriented training	E vs C: FMA-UE Total (+exp)

NEnd=34 TPS=Chronic A + B vs A/B *Also in Table 11 (Mental Practice)*	Duration: 15min/d(5min mental practice, 10min task training), 5d/wk, 3wks	Wrist (-) Hand (-) Shoulder (-) EMG-Coordination (-)
Wong et al. (2022) Pilot RCT (8) NStart=30 NEnd=30 TPS=Subacute A + B vs A/B *Also in Table 9 (Orthotics and Taping)*	E: Task oriented training + Lycra glove C: Task oriented training Duration: 60min/d (30min task training, 30min Lycra glove), 5d/wk, 4wks	E vs C: ARAT (-) 9HPT (-) Grip strength (-) MAS (-) FMA-UE (-) EQ5D (-) BI (-)
Hsu et al. (2020) Pilot RCT (6) NStart=20 NEnd=19 TPS=Chronic A + B vs A/B *Also in Table 5 (Sensorimotor Training)*	E: Perturbation-Based Pinch Task-Specific Training + Sensorimotor Stimulation training C: Upper Extremity Task-Specific Training + Sensorimotor Stimulation Training Duration: 20min/d task training & 10min/d sensorimotor stimulation, 2d/wk for 6wks	E vs C: Semmes-Weinstein MoNofilament Test- Thumb (+exp) Fugl-Meyer Assessment (-) Shoulder/Elbow/Forearm (-) Wrist (-) Hand (-) Coordination (-) Motor Activity Log (-) Amount of Use (-) Quantity of Movement (-) Box and Block Test (+exp) Modified Ashworth Scale Elbow (-) Wrist (-) Fingers (-)
Song et al. (2019) RCT (8) NStart=50 NEnd=49 TPS=Chronic A + B vs A/B *Also in Table 13 (Cognitive and Dual-Task Training)*	E: Cognitive orientation to daily occupational performance (CO-OP) C: taskspecific upper extremity training (TUET) Duration: 30min, 4d/wk, 4wk	E vs C: Box and block test (+exp) Canadian occupational performance measure satisfaction (+exp) performance (+exp) Community integration questionnaire (-) Wolf motor function test-functional score (+exp) community integration scale
Valkenborghs et al. (2019) Pilot RCT (8) NStart=20 NEnd=19 TPS=Chronic A + B vs A/B *Also in Table 3 (Exercise and Strength Training)*	E: Task-specific training preceded by aerobic exercise C: Task-specific training alone Duration: 6hr/wk, 10wk TST & 30 min, 3x/wk, 10wk aerobic exercise	E vs C: Action Research Arm Test (no stat) Wolf Motor Function (no stat) time (no stat) Motor Activity Log AOU (no stat) QOM (no stat) Stroke Impact Scale strength memory mood communication ADL mobility hand use activities (no stat) Fatigue Assessment Scale

		6-minute walk test International Physical Activity Questionnaire Peak VO2 (no stat) Peak Heart Rate (no stat) Brain derived neurotrophic factor (no stat)
Willigenburg et al. (2017) RCT (4) NStart=12 NEnd=12 TPS=Chronic A + B vs A/B *Also in Table 16 (Robotics)*	E: Myoelectric brace + Repetitive task-specific practice (RTP) C: Repetitive task-specific practice (RTP) Duration: 45min, 3d/wk for 8wks	E vs C: Stroke Impact Scale Arm: (-) Hand: (-) Activities of Daily Living: (-) Recovery: (+exp) Kinematics reach out task Range shoulder flex: (-) Range elbow extension: (-) Hand velocity: (-) Kinematics reach up task Range shoulder flex: (-) Range elbow extension: (-) Hand velocity: (+con)
Linder et al. (2017) Pilot RCT (6) NStart=20 NEnd=17 TPS=Chronic A + B1 vs A + B2 vs A *Also in Table 3 (Exercise and Strength Training)*	E1: Forced aerobic exercise + Repetitive task practice(RTP) E2: Voluntary exercise + RTP C: RTP Duration: 90min/session, 3x/wk for 8wk	E vs C: E1 vs E2: FMA (+exp1) WMFT (-) peak VO2 (+exp2) E1 vs C: FMA (+exp1) WMFT (-) Peak VO2 (-) E2 vs C: FMA (-) WMFT (-) Peak VO2 (+exp2)
BaziledaSilva et al. (2015) RCT (8) NStart=20 NEnd=20 TPS=Chronic A + B vs A/B *Also in Table 3 (Exercise and Strength Training)*	E: Task specific training with strength training/resistance C: Task oriented training without resistance Duration: 30min/d, 2d/wk for 6wk	E vs C: Active shoulder Range of Motion (+exp) FMA (+exp) Grip strength (+exp) TEMPA (+exp) Modified Ashworth Scale (-) shoulder flexors strength
Ahmad 2014 et al. (2014) Pilot RCT (7) NStart=40 NEnd=40 TPS=Subacute A + B1 vs A + B2 vs A *Also in Table 11 (Mental Practice)*	E1: Auditory imagery + task specific training E2: Visual imagery+ task specific training E3: Cumulative imagery+ task specific training C: Task specific training Duration: Single Session 45-50mins	E1 vs C: Action Research Arm Test: (-) Motor Activity Log (-) Quality of Movement: (-) Amount of Use: (-) Barthel Index: (-) E2 vs C: Action Research Arm Test: (-) Motor Activity Log (-) Quality of Movement: (-)

		Amount of Use: (-) Barthel Index: (-) E3 vs C: Action Research Arm Test: (-) Motor Activity Log (-): Quality of Movement: (-) Amount of Use: (-) Barthel Index: (-) E1 vs E2 vs E3: Action Research Arm Test: (-) Motor Activity Log (-) Quality of Movement: (-) Amount of Use: (-) Barthel Index: (-)
Patten et al. (2013) RCT Crossover (7) NStart=19 NEnd=18 TPS=Chronic A + B vs A/B *Also in Table 3 (Exercise and Strength Training)*	E: Functional task practice (FTP) + Power training C: Functional task practice (FTP) Duration: 75min/d, 3d/wk for 4wks; 4wk washout	E vs C: WMFT (+exp) Ashworth scale (-) FIM (+exp) FMA UE (-) Maximal isometric joint torque (+exp) agonist electromyographic activation (+exp) peak power (+exp) EMG position threshold during stretch reflex testing (+exp) EMG burst duration during stretch reflex testing (+exp) passive joint torque during stretch (+exp)
Kutner et al. (2010) RCT (6) NStart=21 NEnd=18 TPS=Chronic A + B vs A/B *Also in Table 16 (Robotics)*	E: Repetitive Task Practice + Robot-assisted therapy C: Repetitive task training Duration: E: 30h over 3wk C: 60h over 3wk	E vs C: SIS (-)
Alon et al. (2009) RCT (4) NStart=46 NEnd=46 TPS=Acute A + B vs A/B *Also in Table 22 (Neuromuscular Electrical Stimulation (NMES))*	E: FES + Task-specific training C: Task-specific training Duration: 30min, 2x/d, for 12wk	E vs C: Fast recovery profile Fugl-Meyer Assessment Upper Extremity (+exp) Box and Blocks Test (+exp) Jebsen-Taylor Light Object Lift (+exp) Slow recovery profile Fugl-Meyer Assessment Upper Extremity (+exp) Box and Blocks Test (+exp) Jebsen-Taylor Light Object Lift (-)
Michaelsen et al. (2006) RCT (7) NStart=30 NEnd=30 TPS=Chronic A + B vs A/B *Also in Table 7 (Trunk Restraint)*	E: Task specific training with trunk restraint C: Task specific training Duration: 60min/d, 3d/wk, 5wk	E vs C: FMA UE (+exp) TEMPA (+exp) Trunk displacement (-) Elbow extension (+exp) Elbow strength (-) BBT (-) Peak velocity (-) Trajectory smoothness (-)

		Trajectory straightness (-)
Dean et al. (2000b) Pilot RCT (5) NStart=12 NEnd=8 TPS=Chronic A vs B *Also in Table 3 (Exercise and Strength Training)*	E: Lower-Limb Task-Specific Circuit Training C: Upper-Limb Task-Specific Training Duration: 60min, 3x/wk, 4wks	E vs C: 6-Minute Walk Test -No device (+exp) 10-Meter Walk Test -With (-) and Without (+exp) Assistive Device Step Test (+exp) Timed Up and Go Test (-) Grip Strength (-) Purdue Pegboard Test (-) sit to stand
Task-specific training compared to conventional therapy		
Zaman et al. (2024) RCT (5) NStart=18 NEnd=18 TPS=Not Reported A vs 0	E: Task-oriented training C: Conventional therapy Duration: 45 mins/d, 5ds/wk, 6wks	E vs C: FMA-UE (+exp) WMFT (+exp) BI (+exp)
Aydilek et al. (2022) RCT (5) NStart=50 NEnd=48 TPS=Chronic A vs 0	E: Conventional rehab + Occupational therapy C: conventional rehab Duration: 90min/d(45min conventional for 5d/wk, 45min OT for 3d/wk), 3d/wk, 6wks	E vs C: BI (-) FMA-UE (+exp) ARAT (+exp)
Alsubiheen et al. (2022) RCT (5) NStart=33 NEnd=30 TPS=Chronic A vs 0	E: Task-Oriented Activities of Daily Living Training (T-ADL) C: Conventional Occupational Therapy Duration: 45min, 5x/wk, for 8wk	E vs C: Manual Function Test (MFT) (-) Box and Block Test (BBT) (+exp) modified Barthel Index (MBI) (-) Stroke-specific Quality of Life (SS-QoL) (-)
Girsa & Saharan (2022) RCT (4) NStart=24 NEnd=24 TPS=Not Reported A vs 0	E: Task specific training + conventional rehab C: conventional rehab Duration: 2hr/d(1hr conventional, 1hr Task training), 5d/wk, 8wks	E vs C: FMA-UE (+exp) WMFT (+exp)
Song et al. (2020) RCT (4) NStart=32 NEnd=32 TPS=Chronic A vs 0	E: Task Specific Training for upper limb C: Non-Task Specific Training Duration: 30min, 5d/wk for 4wks	E vs C: Fugl-Meyers Upper Extremity: (-) Modified Barthel Index: (-)
Marryam et al. (2017) RCT (5) NStart=43 NEnd=38 TPS=Subacute A vs 0	E: Task oriented training C: Conventional therapy Duration: 2h/d, 6wk Task Specific Training, 4wks Conventional Therapy	E vs C: Motor assessment scale (+exp)
Pelicioni et al. (2016) RCT (5) NStart=12 NEnd=12	E: Functional Rehabilitation Scheme (task-oriented) C: Non-Functional Rehabilitation Scheme (traditional)	E vs C: Action Research Arm Test (-) Barthel Index (-) Fugl-Meyer Assessment (-)

TPS=Chronic A vs 0	Duration: 90min, 5x/wk, 6wks	fMRI
Winstein et al. (2016) RCT (6) NStart=361 NEnd=315 TPS=Subacute A1 vs A2 vs 0	E1: Structured, task-oriented upper extremity training (Accelerated Skill Acquisition Program) E2: Dose-equivalent usual occupational therapy C: Monitoring-only Usual occupational therapy Duration: 1h/d, 3d/wk for 10wk	E1/E2 vs C: WMFT (-) SIS (-) E1 vs E2: WMFT (-) SIS (-) Wolf Motor Function Test: (-) E1/E2 vs C: E1 vs E2: Stroke Impact Scale (-)
Brkic et al. (2016) Pilot RCT (5) NStart=24 NEnd=22 TPS=Acute A vs 0	E: Repetitive upper limb functional task practice + Conventional therapy C: Conventional therapy Duration: E: 2x/d, 7d/wk for 4wk, C: 4wk	E vs C: ARAT (no stats) Grip strength (no stats) Motricity Index (no stats) Nottingham Extended Activities of Daily Living (no stats)
Hubbard et al. (2015) RCT (6) NStart=23 NEnd=23 TPS=Acute A vs 0	E: Task-specific training + conventional therapy C: Conventional therapy Duration: 2h/d, 5d/wk, 3wks task-specific training	E vs C: Upper limb Motor assessment scale (-) Modified rankin scale (-) fMRI brain activation
Kumar & Goyal (2012) RCT (3) NStart=30 NEnd=30 TPS=Subacute A vs 0	E: Task-Oriented Exercises (TOE) C: Conventional Therapy Duration: 90min/d, 3d/wk, 6wks TOE or Conventional Therapy	E vs C: Box and Block Test (+exp) Nine Hole Peg Test (-)
Boyd et al. (2010) RCT (5) NStart=18 NEnd=18 TPS=Chronic A vs 0	E: Task specific training C: General practice training Duration: 1 session/d, 3 sessions	E vs C: fMRI Reaction time (-) movement time (-) laterality index (-)
Nelles et al. (2001) RCT (4) NStart=10 NEnd=9 TPS=Subacute A vs 0	E: Task-oriented training C: Conventional Therapy Duration: MPL 30 min/d, 5d/wk,10wks	E vs C: Fugl Meyer Assessment (-) National Institutes of Health Stroke Scale (-) Contralateral activations Inferior parietal cortex (+exp) Premotor area (+exp) DLPFC (-) Precentral gyrus (-) Ipsilateral activations Premotor area (-) Inferior parietal cortex (-)
Impairment-oriented training combined with other interventions compared to conventional therapy		
Platz et al. (2005) RCT (8) NStart=62	E1: Impairment oriented training Arm BASIS + usual treatment E2: Bobath therapy + usual treatment	E1 vs E2: FMA arm motor score (+exp1)

NEnd=60 TPS=Subacute A vs B vs 0 *Also in Table 1 (Neurodevelopmental Techniques)*	C: usual treatment Duration: 45min/d, 5d/wk, 4wk	arm sensation (-) passive joint motion/pain (+exp1) Action Research Arm Test (-) Ashworth Scale (-) E1/E2 vs C: FMA arm motor score (-) arm sensation (-) passive joint motion/pain (no stat) Action Research Arm Test (-) Ashworth Scale (-)
Task-specific training combined with other interventions compared to exercise and custom physiotherapy protocols or conventional therapy		
English et al. (2015) RCT (7) NStart=283 NEnd=261 TPS=Acute A vs B vs 0 *Also in Table 3 (Exercise and Strength Training)*	E: Group Circuit C1: high intensity physio (7d/wk) C2: usual physiotherapy (5d/wk) Duration: 90min/d, 2x/d, 5d/wk, 4wk Circuit	E vs C1 vs C2: 6min walk test (-) Functional independence Measure (-) Wolf Motor Function Test (-) Stroke Impact Scale (-) Austrailian Quality of life (-) Functional Ambulation Classification (-) Length of stay (-)
Task-specific training combined with other interventions compared to control		
Folkerts et al. (2017) RCT Crossover (4) NStart=11 NEnd=10 TPS=Chronic A vs B *Also in Table 3 (Exercise and Strength Training)*	E1: Eccentric strength training E2: Task-oriented strength training Duration: 60min/d; 4wk+4wk	E1 vs E2: ARAT (+exp) muscle strength by hand held dynamometre (-)
Hung et al. (2016) RCT (7) NStart=21 NEnd=21 TPS=Chronic A + B vs A + C *Also in Table 16 (Robotics)*	E1: Robot therapy + task specific training E2: Robot therapy + impairment oriented training Duration: 90 to 100 min/d, 5 d/wk for 4wk	E1 vs E2: FMA-UE (+exp) Stroke Impact Scale (+exp) ARAT (-) Medical Research Council Scale (-)
Thielman et al. (2008) RCT (4) NStart=12 NEnd=11 TPS=Chronic A + B vs A + C *Also in Table 7 (Trunk Restraint); Table 3 (Exercise and Strength Training)*	E1: Task-related Training + Trunk Restraint E2: Resistive Exercises + Trunk Restraint Duration: 45min/d, 3x/wk, for 4wks	E1 vs E2: Movement time (-) First velocity peak (-) Trunk motion (-) Arm motion (-) Wolf Motor Function Test (-) Fugl-Meyer Assessment (-) Active Range of Motion (-)
Jongbloed et al. (1989) RCT (7) NStart=90 NEnd=90 TPS=Not Reported A vs B *Also in Table 5 (Sensorimotor Training)*	E1: functional integrative rehabilitation approache E2: sensorimotor integrative rehabilitation approache	E1 vs E2: Barthel index (-)

Different approaches to task-specific training compared against one another		
Lang et al. (2016) RCT (6) NStart=85 NEnd=82 TPS=Chronic A1 vs A2	E1: 3200 repetitions of task-specific upper limb training E2: 6400 repitions of task-specific training E3: 9600 repetitions of task-specific training E4: Individualized maximum repetitions Duration: 1h/d, 4d/wk for 8wk	E1 vs E2 vs E3 vs E4: ARAT (-) SIS (-) Canadian Occupational Performance Measure (-)
Ross et al. (2009) RCT (8) NStart=40 NEnd=37 TPS=Subacute A1 vs A2	E: Intensive Task-specific Training + Standard Therapy C: Task-Specific Training + Standard therapy Duration: E: 1hr/d, task-specific training + 20min/d standard therapy, 5x/wk for 6wks; C: 10min, 3x/wk task-specific training + 20min/d standard therapy, 5d/wk, 6wks	E vs C: Action Research Arm Test (-) Manual Muscle Test (-) Wolf Motor Function Test (no stat) Long finger flexor extensibility (no stat) The Disability of Shoulder Arm and Hand Assessment (no stat) Canadian Occupational Performance Measure (no stat)
Task-specific training combined with other interventions compared to conventional therapy		
Wang et al. (2023f) RCT (6) NStart=84 NEnd=75 TPS=Subacute A vs B vs 0 *Also in Table 6 (Constraint-Induced Movement Therapy (CIMT))*	E1: Constraint induced movement therapy (CIMT) + Conventional rehabilitation E2: Upper limb task-oriented training + Conventional rehabilitation C: Conventional rehabilitation Duration: C: 30min/d, 5d/wk for 3wks, E1: 60min/d, 5d/wk for 3wks CIMT + 30min/d, 5d/wk for 3wks conventional, E2: 30min/d, 5d/wk for 3wks UE training + 30min/d, 5d/wk for 3wks conventional	E1/E2 vs C: FMA-UE (+exp1) Barthel Index (+exp1) modified Ashworth scale (+exp1) Self-Rating Depression Scale (+exp1/2) E1 vs E2: FMA-UE (+exp1) Barthel Index (+exp1) modified Ashworth scale (+exp1) Self-Rating Depression Scale (+exp2)
Minami et al. (2021) RCT Crossover (5) NStart=9 NEnd=8 TPS=Chronic A + B vs 0 *Also in Table 22 (Neuromuscular Electrical Stimulation (NMES))*	E: purposeful activity + electrical stimulation therapy (FES) + occupational therapy C: occupational therapy Duration: 40min/d,4d/wk,3mo, (1mo washout)	E vs C: E: FMA-UE (+exp) MAL (+exp) quality of movement (+exp) Goal attainment scale (+exp) muscle thickness of upper limb (-)
Kirac-Unal et al. (2019) Pilot RCT (6) NStart=27 NEnd=23 TPS=Acute A + B vs 0 *Also in Table 22 (Neuromuscular Electrical Stimulation (NMES))*	E: Task Specific EMG triggered ES therapy + Conventional PT C: Conventional PT Duration: 15 min/d, 5d/wk, for 4wks EMG-triggered ES training, 60min/d, 5d/wk, for 4wks Conventional PT	E vs C: ARAT: Grasp (+exp) Grip (+exp) Pinch (+exp) Gross movement (-) FIM self-care (-) Grip strength (+exp) Brunnstrom recover stages: UE (-), hand (+exp) SIS: strength (-), ADL (-), Hand function (-)
Khallaf et al. (2017) RCT (5) NStart=24 NEnd=24 TPS=Chronic	E: task specific exercises + wrist/finger extension splint C: Traditional passive stretch and range of motion exercises Duration: 16 wks, 5x/wk, 60 min and study group wore splint for 2h each 3h	E vs C: Nine Hole Peg Test: (+exp) Fugl-Meyers Assessment Upper Extremity: (-) Hand: (-)

A + B vs 0 *Also in Table 9 (Orthotics and Taping)*		Wrist Extension: (+exp) Metacarpophalangeal Extension: (+exp) Thumb Carpometacarpal Extension: (+exp)
Kim et al. (2015b) RCT (9) NStart=44 NEnd=40 TPS=Chronic A + B vs 0 *Also in Table 20 (Feedback-Based Training)*	E: Spatial target reaching training based on visual biofeedback + Routine therapy C: Routine Therapy Duration: 1h/d, 3d/wk for 4wk	E vs C: Fugl-Meyer Upper Extremity (+exp) Wolf Motor Function Test (+exp) Kinematic variables
Winstein et al. (2004) Pilot RCT (6) NStart=64 NEnd=60 TPS=Acute A vs B vs 0 *Also in Table 3 (Exercise and Strength Training)*	E1: Strength training E2: Functional task practice C: Standard care Duration: 1h/d, 5d/wk, 4wk	E1 vs E2 vs C: Fugl Meyer Assessment: (+exp, +exp2) Functional test of the hemiparetic upper extremity (+exp, +exp2) Isometric torque (+exp , +exp2)
Platz et al. (2001) RCT (6) NStart=74 NEnd=60 TPS=Subacute A + B vs A/B vs 0 *Also in Table 20 (Feedback-Based Training)*	E1: Arm ability training with knowledge of results (feedback on their performance presented as charts to them) E2: arm ability training without knowledge of results C: Routine Rehab Duration: 5d/wk, 3wks	E1 vs E2: TEMPA (-) Kinematic analysis (-) E1/E2 vs C: TEMPA (+exp1, +exp2) Kinematic analysis (-)
Task-specific training combined with other interventions compared to task-specific training or sham		
Alwhaibi et al. (2021) RCT (7) NStart=40 NEnd=40 TPS=Chronic A + B vs A/B *Also in Table 23 (Transcutaneous Electrical Nerve Stimulation (TENS))*	E: Task specific training + TENS acupoint C: Task-specific training + Sham electrical stimulation Duration: 80min/d, 3d/wk, 6wks	E vs C: FMA-UE (-) BBT (-) QEEG (+exp)
Seo et al. (2019) Pilot RCT (9) NStart=12 NEnd=12 TPS=Chronic A + B vs A/B *Also in Table 27 (Additional Afferent and Peripheral Stimulation Methods)*	E: task practice therapy with TheraBracelet stimulation C: task practice therapy with sham stimulation Duration: 2hr, 3x/wk, 2wk	E vs C: Box and Block Test: (+exp) Wolf Motor Function Test: (-)
Gharib et al. (2015) RCT (8) NStart=40 NEnd=40 TPS=Chronic A + B vs A/B *Also in Table 22 (Neuromuscular Electrical Stimulation (NMES))*	E: Electrical stim+repetitive task practice C: Sham electrical +repetitive task practice Duration: 3x/wk; 2mo	E vs C: Motor assess Scale (+exp) JTHFT (+exp)
Kim et al. (2013a)	E: Task related training + TENS	E vs C:

RCT (6) NStart=34 NEnd=30 TPS=Chronic A + B vs A/B *Also in Table 23 (Transcutaneous Electrical Nerve Stimulation (TENS))*	C: Task related training + Sham TENS Duration: 30 min/d, 5d/wk, for 4 wks	Fugl-Meyer Assessment (+exp) Manual Function Test (+exp) Box and Block Test (+exp) Modified Ashworth Scale (-)
Different approaches to computerized task specific training compared against one another		
Subramanian et al. (2013) RCT (7) NStart=32 NEnd=25 TPS=Chronic A1 vs A2	E: Reaching task training in a 3D virtual environment C: Reaching task training in physical environment (PE) Duration: 45min/d, 3x/wk, 4wk	E vs C: shoulder horizontal adduction lower target (+exp) upper targets (-) shoulder flexion lower target (-) upper targets (+exp) Elbow extension degree (-) Trunk displacement (-) Reaching Performance Scale- close target (no stat) Wolf Motor Function Test (no stat) Fugl-Meyer Assessment (no stat) Motor Activity Log-AS (no stat)
Task-specific training compared to no treatment		
Winstein et al. (2019) RCT (6) NStart=44 NEnd=41 TPS=Chronic A vs 0	E1: Task-oriented Motor Therapy for 15 hrs E2: Task-oriented Motor Therapy for 30 hrs E3: Task-oriented Motor Therapy for 60 hrs C: No Treatment Duration: 60 min/session, number of sessions over 3 weeks depends on the duration of scheduled therapy	E3 vs C: Motor Activity Log-Quality of Movement (+exp3) Wolf Motor Function Test (-) E1 vs C: Motor Activity Log-Quality of Movement (+exp1) Wolf Motor Function Test (-)
Almhdawi et al. (2016) RCT Crossover (7) NStart=21 NEnd=20 TPS=Chronic A vs 0	E: Immediate task specific training (TST) C: Delayed TST, waitlist Duration: 3hr 1x/wk for 6wks	E vs C: Canadian Occupational Performance Measure (+exp) Motor Activity Log (+exp) Wolf Motor Function Test (+exp) Grip Strength (-) Upper Extremity Active Range of Motion (-)
Task-specific training combined with other interventions compared to stretching and positioning programs		
Martins et al. (2020) RCT (8) NStart=36 NEnd=28 TPS=Chronic A vs B *Also in Table 8 (Stretching Programs)*	E: Task-Specific Circuit Training C: Stretching + Memory exercises + Education Duration: 60min, 3x/wk, 12wks	E vs C: Human Activity Profile Adjusted Activity Score (-) 10-Meter Walk Test (-) Test d'Evaluation Des Membres Superieurs de Personnes Agees (tempa) (-) Grip Strength (-) Knee Extensor Strength (-) 6-Minute Walk Test (-) Stroke Specific Quality of Life Scale (+exp) EnergyExpenditure (-)

Task-specific training combined with other interventions compared to sham or task-specific training		
Carrico et al. (2018) RCT (9) NStart=55 NEnd=55 TPS=Chronic A + B vs A/B *Also in Table 27 (Additional Afferent and Peripheral Stimulation Methods)*	E: Somatosensory Stimulation (PNS) + Intensive Task-Oriented Training C: Sham Stimulation + Intensive Task-Oriented Training Duration: 2hrs stimulation, 4hrs training, 3x/wk, 6wks	E vs C: Fugl-Meyer Assessment (-) Wolf Motor Function Test (+exp) Action Research Arm Test (+exp) Stroke Impact Scale (-)
Carrico et al. (2016b) RCT (7) NStart=37 NEnd=36 TPS=Chronic A + B vs A/B *Also in Table 27 (Additional Afferent and Peripheral Stimulation Methods)*	E: Peripheral nerve stimulation + task oriented training C: Sham stimulation + task oriented training Duration: 2h/d stimulation/sham, 4h/d task training, 5d/wk, for 2wks	E vs C: Fugl-Meyer Assessment (+exp) Wolf Motor Function Test (+exp) Action Research Arm Test (+exp)
Task-specific training combined with other interventions compared to proprioceptive neuromuscular facilitation (pnf)		
Anandan et al. (2020) RCT (4) NStart=74 NEnd=50 TPS=Chronic A vs B *Also in Table 1 (Neurodevelopmental Techniques)*	E: Task Specific Training C: Proprioceptive Neuromuscular Facilitation Duration: 60min/d, 10wks	E vs C: MAS (+exp) ARAT (+exp) BBS (+exp) dynamic gait index (+exp)
Task-specific training combined with other interventions compared to lower extremity exercise interventions		
Higgins et al. (2006) RCT (8) NStart=91 NEnd=84 TPS=Chronic A vs B *Also in Table 3 (Exercise and Strength Training)*	E: Unilateral and bilateral task oriented exercises. C: Walking tasks Duration: 90min/d, 3d/wk; 6wks	E vs C: BBT (-) 9HPT (-) Maximal grip strength (-) TEMPA (-) Stroke Rehab assessment of movement (-) Barthel index (-) OARS-IADL (-) SF36 (-)
Task-specific training combined with other interventions compared to neurodevelopmental techniques (bobath approach)		
Jong-HoonMoon et al. (2018) Pilot RCT (5) NStart=18 NEnd=18 TPS=Acute A vs B *Also in Table 1 (Neurodevelopmental Techniques)*	E: Task oriented circuit training C: Neurodevelopmental techniques Duration: 30min, 5-6x/wk for 4wks	E vs C: Fugl-Meyer Assessment Upper Extremity (-) Shoulder/elbow (-) Wrist (-) Hand (-) Coordination (-) Motor Activity Log Amount of Use (+exp) Quality of Movement (-) Stroke Impact Scale (-) Arm Strength (+exp) Hand Grip Strength (+exp) Using Spoon & Chopsticks (+exp) Dress Top Up (-)

		Wash (-) Toenail (-) Doorknob (-) Can or Jar (-) Shoe Lace (-) Coin Grip (-) Recovery (-)
Arya et al. (2012) RCT (8) NStart=103 NEnd=102 TPS=Subacute A vs B *Also in Table 1 (Neurodevelopmental Techniques)*	E: Task-specific training C: Standard training using the Bobath approach Duration: 1h/d, 4-5d/wk for 4wk	E vs C: Fugl-Meyer Assessment (+exp) Action Research Arm Test (+exp) Graded Wolf Motor Function Test (+exp) Motor Activity Log (+exp)
Reaching and reach-to-grasp task training combined with other interventions compared to reaching and reach-to-grasp task training or sham or video game training		
Levin et al. (2023) RCT (8) NStart=52 NEnd=46 TPS=Subacute A + B1 vs A + B2 vs A *Also in Table 31 (Transcranial Direct Current Stimulation (tDCS)); Table 17 (Virtual Reality)*	E1: Personalized reach training (active control-restricted range) + anodal tDCS + Virtual reality games E2: Non personalized (entire range of motion) + anodal tDCS + Virtual reality games C: Personal reach training (active control-restricted range) + Sham tDCS + video games Duration: 80min/d(50min training, 30min tDCS), 5d/wk, 2wks	E1/E2 vs C: Tonic Stretch Reflex Threshold angle by EMG (-) arm kinematics (-) velocity of TSRT (-) Tactile sensation (-) PROM (-) FMA-UE (-) WMFT (-)
Computerized task specific training combined with other interventions compared to computerized task specific training or augmented feedback training		
Kim et al. (2023c) RCT (7) NStart=29 NEnd=26 TPS=Chronic A + B1 vs A + B2 *Also in Table 20 (Feedback-Based Training)*	E: Autonomy support (training with more-affected arm and could actively adjust task difficulty) + Verbal feedback C: Training with more-affected arm with no opportunity to adjust difficulty + General verbal feedback Duration: 60min/d, 3d/wk for 3wks	E vs C: IMES variables use (+exp) impairment (-) performance (-) Actual Amount of Use Test (-) FMA-UE (-) WMFT (-) Confidence in the Arm and Hand Movement (CAHM) (-)
Task-specific training combined with other interventions compared to exercise and custom physiotherapy protocols		
Chintamani R. (2024) RCT (5) NStart=66 NEnd=40 TPS=Chronic A vs B *Also in Table 3 (Exercise and Strength Training)*	E: Task-oriented training + conventional therapy C: Progressive resistance exercise + conventional therapy Duration: 60-90min/d, 3d/wk, 4wks	E vs C: CAHAI (+exp) SIS (+exp) Wolf motor function test (-) ARAT (+exp) 9HPT (-)
Milot et al. (2019) Pilot RCT (7) NStart=12 NEnd=12	E: Functional Training C: Strength Training Duration: 60min, 3x/wk, 4wks	E vs C: Fugl-Meyer Assessment (-) Wolf Motor Function Test (-) Motor Activity Log (-)

TPS=Chronic A vs B *Also in Table 3 (Exercise and Strength Training)*		Modified Ashworth Scale (-) Grip Strength (-)
Skubik-Peplaski et al. (2017) Pilot RCT (7) NStart=16 NEnd=16 TPS=Chronic A vs B *Also in Table 3 (Exercise and Strength Training)*	E: Repetitive Task Practice C: Occupation-Based Intervention Duration: 55min/d, 2d/wk, 4wk	E vs C: Fugl-Meyer Assessment (-) Stroke Impact Scale (-) Canadian Occupational Performance Measure satisfaction (-) performance (-) Goal Attainment Scale (-) Center of gravity affected hemispher (-) unaffected hemisphere (-) MEP amplitude
Dexterity specific training compared to conventional therapy		
Teremetz et al. (2023) Pilot RCT (7) NStart=42 NEnd=42 TPS=Chronic A vs 0	E: Dextrain Manipulandum exercises (dexterity specific exercises with real-time feedback) + Conventional therapy C: Conventional therapy Duration: 60min/session, 12 sessions	E vs C: BBT (-) MAL (-) ARAT (-) Semmes–Weinstein monoflament-light touch (-) Moberg Pick-up Test (-) maximal grip force (%) (-) max Finger tapping speed (+exp) Dextrain outcomes: Tracking Error (+exp) Success rate (-) Reaction Time (+exp)
Task-specific training compared to exercise and custom physiotherapy protocols		
Choi et al. (2022b) Pilot RCT (4) NStart=24 NEnd=20 TPS=Subacute A vs B *Also in Table 3 (Exercise and Strength Training)*	E: Task-Oriented Training C: Table-Top Activity Training Duration: 30min/d, 5d/wk, 6wks	E vs C: MFT (+exp) MVPT-Vertical (-) mBI (-)
Reaching and reach-to-grasp task training combined with other interventions compared to control		
Gomes et al. (2021) Pilot RCT (5) NStart=12 NEnd=12 TPS=Chronic A + B1 vs A + B2 *Also in Table 21 (Wearable Cueing and Reminder Devices)*	E1: Reach-Pointing + Internal Focus E2: Reach-Pointing + External Focus E3: Reach-Hold-Fit + Internal Focus E4: Reach-Hold-Fit + External Focus Duration: 10min/d, 1d/wk, 1 wk wash out period	E1 vs E2: Motor Behaviour ; - Movement Time (+exp1) ; - Velocity (+exp 1) ; - Peak Velocity (-) E3 vs E4: Motor Behaviour Movement Time (+exp3) Velocity (+exp3) Peak Velocity (-)
Reaching and reach-to-grasp task training compared to conventional therapy		
Turton et al. (2017) Pilot RCT (7) NStart=47 NEnd=32 TPS=Subacute A vs 0	E: Reach-to-Grasp training + Home based rehab C: Usual care Duration: 1hr/d, 14x over 6wk training with therapist + 1hr/d, 56d self-practice	E vs C: Action Research Arm Test Wolf Motor Function Test Motor Activity Log Stroke Impact Scale

Task-specific training combined with other interventions compared to no treatment		
Lee et al. (2013c) RCT (2) NStart=33 NEnd=33 TPS=Chronic A + B vs A vs B vs 0 *Also in Table 12 (Action Observation)*	E1: Task specific training + action observation E2: Task specific training E3: Action observation C: No treatment Duration: 10min/d, 3wk	E1/E2/E3 vs C: E1 v E2/E3/C: improvement in Drinking from a cup (+exp1)
Task-specific training combined with other interventions compared to orthotics		
Jeon et al. (2012) Pilot RCT (3) NStart=15 NEnd=10 TPS=Chronic A + B vs A/B *Also in Table 9 (Orthotics and Taping)*	E: Saebo flex Orthotic splint + intensive training C: Orthotic splint Duration: 1hr/d; 5x/wk+/- training	E vs C: FMA (+exp) BBT (+exp) ARAT (-) resultant velocity shoudler (no stat) elbow (no stat) wrist (no stat)
Different approaches to dexterity specific training compared against one another		
Kumagai et al. (2022) Pilot RCT (8) NStart=24 NEnd=24 TPS=Subacute A vs B	E: Bilateral dexterity training + usual rehabilitation C: Unilateral dexterity training + usual rehabilitation Duration: NHPT: 10 trials/side/d, 1wk (20 trials for ABT, 10 trials for UT), 60min physical therapy, 60min OT	E vs C: NHPT paretic (-) non-paretic (+exp) PPT (-) BBT (-)
Cross-Referenced RCTs: Combined or Comparative Interventions Involving Task-Specific Training (results included in this table's levels of evidence)		
Ali et al. (2024) RCT (8) NStart=120 NEnd=115 TPS=Acute A vs B *Primary listing: Table 17 (Virtual Reality)*	E: Gamified training with ArmAble + Conventional therapy C: UE task-based training + Conventional therapy Duration: 45-60min/d, 6d/wk for 2wks	E vs C: FMA-UE (+exp) Motricity Index (-) ARAT (-) modified Rankin Scale (-) SIS (-) gamer user experience satisfaction scale (no stat)
Choi & Cho (2024) RCT (5) NStart=50 NEnd=46 TPS=Chronic A + B vs A/B *Primary listing: Table 16 (Robotics)*	E: VR-based robot therapy with smart glove + task-oriented therapy C: Task-oriented therapy Duration: 40min/d, 5d/wk for 8wks	E vs C: FMA-UE (+exp) Manual Function Test (+exp) Motor Activity Log amount of use (+exp) quality of movement (-) JTHFT (-) MEP amplitudes (+exp)
Chou et al. (2024) RCT (6) NStart=41 NEnd=41 TPS=Subacute A + B vs A/B *Primary listing: Table 9 (Orthotics and Taping)*	E: Kinesio-taping + hand function training + conventional rehabilitation C: Sham kinesio-taping + hand function training + conventional rehabilitation Duration: 5d/wk for 3wks taping + 30min/d hand training + 1 hour conventional rehab	E vs C: FMA UE (no between-group stat) wrist (no between-group stat) hand (no between-group stat) modified Ashworth Scale (no between-group stat) modifed Barthel Index (no between-group stat) Stroke Impact Scale (no between-group stat)

Linder et al. (2024) RCT (8) NStart=60 NEnd=56 TPS=Chronic A + B vs A/B *Primary listing: Table 3 (Exercise and Strength Training)*	E: Forced-rate exercise + Repetitive task practice C: Repetitive task practice Duration: 90min/d 3d/wk for 8wks	E vs C: FMA (-) ARAT (-) grasp (-) grip (-) pinch (-) gross (-) Wolf Motor Function Test log performance time (-) functional ability score (-) number of incomplete tasks in 120s (no stat) grip strength (-) weight to box (-) 6minWT (+exp) peak O2 consumption (+exp)
Shi et al. (2024) RCT (7) NStart=34 NEnd=34 TPS=Chronic A + B vs A/B *Primary listing: Table 16 (Robotics)*	E: Robotic hand therapy (with objects) + Task-Oriented training + Conventional therapy C: Robotic hand therapy (without objects) + Conventional therapy Duration: Robot therapy (45 mins/d, 5ds/wk, 4 wks); Conventional therapy (30mins/d, 5ds/wk, 4wks)	E vs C: FMA-UE total (+exp) wrist and hand (+exp) shoulder and elbow (+exp) ARAT grasp (+exp) grip (+exp) pinch (+exp) gross movement (-) BBT (+exp) Maximum Grip Strength (+exp) Modified Ashworth Scale finger (+exp) wrist (-) elbow (-) AROM PIP-I (+exp) MCP-I (+exp) MCP-T (-) Muscle co-contraction index flexor digitorum and extensor digitorum (+exp) biceps brachii and triceps brachii (+exp) flexor digitorum and biceps brachii (+exp) flexor digitorum and triceps brachii (+exp) extensor digitorum and biceps brachii (+exp) extensor digitorum and triceps brachii (+exp)
Jung K.-S. et al. (2024) RCT (5) NStart=42 NEnd=40 TPS=Chronic A + B + C vs A/A + B *Primary listing: Table 23 (Transcutaneous Electrical Nerve Stimulation (TENS))*	E: TENS + wrist extensor taping + Tast-related training C: TENS + task-related training Duration: 30min TENS + 30min TRT/d, 5d/wk, 6wks	E vs C: Modified ashworth scale (+exp) Isometric muscle strength - wrist extensor (dynamometer) (-) FMA - UE (+exp)
Abdelkader et al. (2024) RCT (10)	E1: Bilateral rTMS + Task-oriented therapy	E1 vs C: FMA (+exp1)

NStart=55 NEnd=55 TPS=Subacute A + B1 vs A + B2 vs A *Primary listing: Table 29 (Repetitive Transcranial Magnetic Stimulation (rTMS))*	E2: Excitatory rTMS + Sham inhibitory rTMS + Task-oriented therapy E3: Inhibitory rTMS + Sham excitatory + Task-oriented therapy C: Sham bilateral rTMS + Task-oriented therapy Duration: rTMS (1 session/d, 5ds, 1wk); Task-oriented physiotherapy (1 session/d, 3 ds/wk, 5wks)	WMFT (+exp1) Modified Ashworth Scale (-) E1 vs E2: FMA (-) WMFT (-) Modified Ashworth Scale (-) E1 vs E3: FMA (-) WMFT (-) Modified Ashworth Scale (-) E2 vs C: FMA (+exp2) WMFT (+exp2) Modified Ashworth Scale (-) E2 vs E3: FMA (-) WMFT (-) Modified Ashworth Scale (-) E3 vs C: FMA (+exp3) WMFT (+exp3) Modified Ashworth Scale (-)
Feingold-Polak et al. (2024) Pilot RCT (4) NStart=33 NEnd=26 TPS=Subacute A + B1 vs A + B2 vs 0 *Primary listing: Table 20 (Feedback-Based Training)*	E1: Reach-To-Grasp with robot feedback + Conventional therapy E2: Reach-To-Grasp with computer feedback + Conventional therapy C: Conventional therapy Duration: 45-60min/d, 2-3d/wk for 5-7wks	E1/E2 vs C: FMA-UE (+exp1) ARAT (+exp1) Motor Activity Log quality of movement (-) amount of use (-) SIS (-) kinematic measurements; -velocity of movement (-); -smoothness of movement (+exp1/2); -trunk displacement (-) E1 vs E2: FMA-UE (-) ARAT (-) Motor Activity Log -quality of movement (-) -amount of use (-) SIS (-) kinematic measurements velocity of movement (-) smoothness of movement (-) trunk displacement (-)
Wang M.-H. et al. (2024) Pilot RCT (5) NStart=42 NEnd=40 TPS=Subacute A + B vs A/B *Primary listing: Table 23 (Transcutaneous Electrical Nerve Stimulation (TENS))*	E: Transcutaneous auricular vagus nerve stimulation + task-oriented training C: Task-oriented training Duration: 60min/d, 5d/wk, 4wks	E vs C: FMA - UE (+exp) ARAT (+exp) mBI (+exp) Heart rate variability (-) fNIRS (+exp) MEP amplitude (-) MEP Latency (+exp)
Chen et al. (2023a) RCT (8)	E: Exoskeleton training Armule + TST C: Conventional Rehab	E vs C: FMA-UE (+exp)

NStart=80 NEnd=72 TPS=Subacute A + B vs 0 *Primary listing: Table 16 (Robotics)*	Duration: 45min/d, 5d/wk, 4wks	MBI (+exp) WHODAS (-)
Edwards et al. (2023) RCT (8) NStart=60 NEnd=50 TPS=Chronic A + B vs A/B *Primary listing: Table 29 (Repetitive Transcranial Magnetic Stimulation (rTMS))*	E: rTMS + TST C: Sham rTMS +TST Duration: 75min/d(15min rTMS, 60min TST), 3d/wk, 6wks	E vs C: FMA-UE (-) ARAT (-) NIHSS (-) EQ-5D (-)
Hsu et al. (2023) RCT (8) NStart=27 NEnd=27 TPS=Acute A + B vs A/B *Primary listing: Table 31 (Transcranial Direct Current Stimulation (tDCS))*	E: Bilateral tDCS + TST C: Sham tDCS + TST Duration: 3.3hrs(3hrs conventional rehab + 20min tDCS)	E vs C: FMA-UE (+exp) ARAT (-) FMA-LE (-)
Kuo et al. (2023a) RCT Crossover (7) NStart=18 NEnd=17 TPS=Chronic A vs B *Primary listing: Table 16 (Robotics)*	E: Orthosis assistance TIGER + conventional rehab C: Task specific training at home + conventional Duration: 30min 2x/d, 5d/wk for 4wks + 2hr/wk conventional therapy	E vs C: BBT (-) MAS (-) MAL (-) SWM (-) PCGI-I patient clinical global impression improvements (-) FMA-UE (-) AROM wrist flexion (-) wrist extension (+exp)
Li et al. (2023) RCT (6) NStart=70 NEnd=63 TPS=Chronic A + B vs A + C vs A *Primary listing: Table 16 (Robotics)*	E1: Bilateral robotic priming training + mirror training (R-mirr) E2: Bilateral robotic priming training + the same training without mirror (sham: exactly the R-mirr protocol without mirror) C: Bilateral robotic priming training + movement oriented training Duration: 90min/d, 3d/wk, 6wks	E1/E2 vs C: E1 vs E2/C: FMA-UE (+exp1) ABILHAND (-) SIS (-) Lateral pinch (-) Accelerometer (-)
Stuerner et al. (2023) RCT (7) NStart=60 NEnd=60 TPS=Subacute A + B + C vs A/A + B vs 0 *Primary listing: Table 11 (Mental Practice)*	E1: Motor Imagery + Audio Feedback + Task Specific Training E2: Motor imagery + TST C: Task-specific Training Duration: 30min/1 session	E1 vs C: Mental chronometry MC (motor execution time-motor imagery time / motor execution time while doing BBT) (+exp1) BBT (-) E2 vs C: Mental chronometry MC (-) BBT (-) E1 vs E2: Mental chronometry MC (+exp1) BBT (-)

Tang et al. (2023) RCT (6) NStart=24 NEnd=24 TPS=Acute A vs B *Primary listing: Table 16 (Robotics)*	E: Bilateral upper limb robot-assisted training + Conventional Therapy C: Task-specific Therapy + Conventional Therapy Duration: 90min/d, 6d/wk, 3wks	E vs C: FMA-UE (-) MBI (+exp) Quantitative EEG evaluations Current source density (no between group stst) functional connectivity (no between group stst)
Green et al. (2023) RCT (3) NStart=19 NEnd=18 TPS=Acute A + B1 vs A + B2 vs C *Primary listing: Table 11 (Mental Practice)*	E1: Mental Practice + Visual feedback E2: Mental Practice + Audio feedback C: Repititive task-specific training Duration: 30 repititions/d (20 mental practice, 10 physical practice), 3 days a week; 20 repititions of only mental training/d, 2 days a week; until patient is discharged	E1 vs E2 vs C1 vs C2: FMA-UE (no stat) WMFT (no stat)
Fu J. et al. (2023) RCT (7) NStart=66 NEnd=61 TPS=Subacute A + B + C vs A + D *Primary listing: Table 18 (Brain Computer Interfaces)*	E: Portable BCI-based hand robot system + Conventional therapy + neuromuscular electrical stimulation C: Task-specific training + Conventional therapy + neuromuscular electrical stimulation Duration: 90mins/d (30 mins of BCI/task-specific training, 20 mins of physical therapy, 20 mins of occupational therapy + 20 mins of neuromuscular electrical stimulation), 5ds/wk, 4 wks	E vs C: FMA-UE (+exp) EEG-derived Laterality Index (no stat) BCI accuracy (no stat)
Badran et al. (2023) Pilot RCT (7) NStart=20 NEnd=16 TPS=Chronic A + B1 vs A + B2 *Primary listing: Table 27 (Additional Afferent and Peripheral Stimulation Methods)*	E: EMG paired taVNS + TST C: Active unpaired taVNS + TST Duration: 120min/d(60m electrical stimulation, 60m TST), 3d/wk, 4wks	E vs C: FMA-UE (-) WMFT (-)
Maguire et al. (2023) Pilot RCT (5) NStart=17 NEnd=13 TPS=Chronic A + B vs A + C *Primary listing: Table 3 (Exercise and Strength Training)*	E: Moderate intensity ergometer training + ARMEO robotic training C: Low intensity task oriented balance training + ARMEO robotic training Duration: 80min/d(40min exercise, 40min robotics), 3d/wk, 12wks	E vs C: Serum BDNF (no stat) ARAT (no stat) FMA-UE (no stat) BESTest (no stat) FSS (no stat) EQ-5D (no stat)
Chen et al. (2022a) RCT (8) NStart=120 NEnd=111 TPS=Chronic A + B1 vs A + B2 vs A vs 0 *Primary listing: Table 23 (Transcutaneous Electrical Nerve Stimulation (TENS))*	E1: Bi-TENS + Task Oriented Training (TOT) E2: Uni-TENS + TOT E3: Placebo-TENS + TOT C: No Treatment Duration: 60min/d,3d/wk, 7wks (20 sessions)	E1/E2/E3 vs C: E1 vs E2/E3/C: FMA-UE (+exp1)
Chen et al. (2022b) RCT Crossover (5)	E: EMG-driven Robot-assisted Hand Training	E vs C: FMA-UE (+exp)

NStart=31 NEnd=24 TPS=Chronic A + B vs C *Primary listing: Table 16 (Robotics)*	C: Task-Oriented intervention Duration: 70min/d, 3d/wk, 4wks (1mo washout)	WMFT (-) ARAT (-) MAL AOU (-) QOM (+exp)
Hsu et al. (2022a) RCT (7) NStart=34 NEnd=32 TPS=Chronic A + B vs A/B *Primary listing: Table 16 (Robotics)*	E: Tenodesis-induced-group-exoskeleton robot (TIGER) training + Regular task-specific motor training C: Conventional OT + Regular task-specific motor training Duration: 40min/d(20min TIGER/OT, 20min task-specific), 2d/wk, 9wks	E vs C: FMA-UE (+exp) shoulder/elbow/forearm (-) wrist (+exp) hand (+exp) coordination (-) BBT (-) MAL (-) MAS (-)
Kashoo et al. (2022) RCT (8) NStart=64 NEnd=64 TPS=Chronic A + B + C vs A/A + B *Primary listing: Table 31 (Transcranial Direct Current Stimulation (tDCS))*	E: anodal tDCS + motor imagery (MI) + upper-limb functional training C: sham tCDS + motor imagery (MI) + upper-limb functional training Duration: 30min/d, 5d/wk, 2wks (10 sessions)	E vs C: FMA (+exp) ARAT (+exp)
Luk et al. (2022) RCT (8) NStart=24 NEnd=22 TPS=Subacute A + B vs A/B *Primary listing: Table 29 (Repetitive Transcranial Magnetic Stimulation (rTMS))*	E: low-frequency rTMS + motor task practice C: sham rTMS + motor task practice Duration: stim +30min motor task practice/d, 5d/wk, 2wks (10 practice sessions); continued 2d/wk, 10wks	E vs C: FMA (+exp) MEP; paretic hand (+exp) nonparetic hand (-) IHA (+exp) grip strength (-) ARAT (+exp) 9HPT (-) BBT (+exp) reaction time (-) SIS (-)
Shamili et al. (2022) RCT (7) NStart=27 NEnd=24 TPS=Chronic A + B vs A/B *Primary listing: Table 12 (Action Observation)*	E: Action observation with task-specific training C: Sham observation with task-specific training Duration: 45-60 min, 3d/wk, 4 wks	E vs C: COPM (+exp) FMA (-) ARAT (-) BBT (-) MEP abductor policis brevis (+exp) extensor indicis (-)
Hegazy R.M. et al. (2022) RCT (8) NStart=20 NEnd=20 TPS=Subacute A + B vs A/B *Primary listing: Table 17 (Virtual Reality)*	E: Virtual reality + task based training C: Task-specific Training Duration: 75min/d(15min VR, 60min TST), 3d/wk, 6wks	E vs C: UEFI (+exp) Grip strength (+exp)
Schick et al. (2022) RCT (8) NStart=12 NEnd=12	E: cNMES + task oriented training + conventional rehab C: EMG-NMES + task oriented training + conventional rehab	E vs C: FMA-UE (-) BBT (-) SIS (-)

TPS=Subacute A + B vs A + C *Primary listing: Table 22 (Neuromuscular Electrical Stimulation (NMES))*	Duration: 1hr/d(30min TST, 30 min nMES), 5d/wk, 3wks	
Carlsson et al. (2022) Pilot RCT (7) NStart=27 NEnd=27 TPS=Chronic A + B vs A + C *Primary listing: Table 5 (Sensorimotor Training)*	E: Sensory Relearning + Task-Specific Training + home exercise C: Task-Specific Training + strength training Duration: 2.5hr/d, 2d/wk, 5wks	E vs C: SWM (+exp) STI (-) FMA-UE (-): light touch (-) proprioception (-) mSHFT (-) BBT (-) MAL (-) COPM (-) SIS (-)
Conforto et al. (2021) RCT (6) NStart=38 NEnd=25 TPS=Chronic A + B + C vs A/A + B *Primary listing: Table 27 (Additional Afferent and Peripheral Stimulation Methods)*	E: Repetitive peripheral sensory stimulation + functional electrical stimulation + task specific training C: Sham RPSS + FES + TST Duration: 3hrs(RPSS:1.5hrs FES:0.5hrs TST:0.75hrs), 3d/wk, 6wks	E vs C: WMFT (-) Pinch Strength (-) Grasp Strength (-) FMA (-) BI (-) BDI (-) MAI (-) mAS (-) SIS (-) ROM - wrist (-)
Ozen et al. (2021) RCT (5) NStart=38 NEnd=30 TPS=Subacute A vs B *Primary listing: Table 16 (Robotics)*	E: Rejoyce system + OT C: task based exercises + OT Duration: 90min/d, 5d/wk, 4wks	E vs C: E: FMA-U (-) BrunnstromStagesofStrokeRecovery (-) MMSE (-) MoCA (-) SS-QOL (-)
Yu et al. (2021) RCT (6) NStart=18 NEnd=14 TPS=Chronic A + B + C vs 0 *Primary listing: Table 9 (Orthotics and Taping)*	E1: phase 1 (6wks of no treatment) then phase 2 (6wks of Occupational Therapy Task-Oriented (OTTO)) E2: phase 1 (6wks of Forearm Rotation Orthosis) then phase 2 (6wks of Forearm Rotation Orthosis+ OTTO) C: OT Task-Oriented (OTTO) Duration: OTTO: 60-90min, 2-3x/wk, for 6wk, Orthosis + OTTO: 12wk (6wk each)	E1/E2 vs C: COPM (-) WMFT (-) MAL (-)
Adeagbo et al. (2021) RCT (4) NStart=99 NEnd=78 TPS=Chronic A + B1 vs A + B2 vs A *Primary listing: Table 31 (Transcranial Direct Current Stimulation (tDCS))*	E1: Anodal tDCS + Repetitive Functional Task-Oriented Programme (RFTOP) E2: Cathodal tDCS + RFTTOP C: Repetitive Functional Task Oriented Programme Duration: 20min tDCS + 60min RFTOP, 2d/wk, 6wks	E1/E2 vs C: E1 vs E2/C: FMA Hand (+exp1) Wrist (-) Upper Extremity (-) Coordination (-) Motor function (-) BBT (+exp1)

Moon et al. (2021) RCT (7) NStart=48 NEnd=43 TPS=Subacute A + B vs A/B *Primary listing: Table 23 (Transcutaneous Electrical Nerve Stimulation (TENS))*	E: TENS + Task oriented occupational therapy + conventional therapy C: Sham TENS + Task oriented occupational therapy + conventional therapy Duration: 1hr/d(30min TENS; 30 mins OT), 5d/wk, 4wks	E vs C: MAS (-) JTHFT (-) MFT (+exp) MBI (-)
De Bruyn et al. (2021) RCT (7) NStart=30 NEnd=28 TPS=Subacute A vs B *Primary listing: Table 5 (Sensorimotor Training)*	E: sensorimotor therapy + conventional therapy C: motor therapy+ conventional rehab Duration: 1hr/d, 4d/wk, 4wks	E vs C: FMA-UE (-) ARAT (-) SULCS (-) Em-NSA (-) Perceptual threshold of touch (PTT) (-) Texture Discrimination Tests (-) Wrist Position Sense Test (-) fTORT (-)
Esquenazi et al. (2021) Pilot RCT (6) NStart=45 NEnd=40 TPS=Acute A vs B *Primary listing: Table 16 (Robotics)*	E: ARMEO exoskeleton + conventional care C: Tabletop assisted exercises + conventional therapy Duration: 1hr intervention + 3hr conventional therapy, 4d/wk, wks dependant on individual patient stay	E vs C: FIM (-) FMA-UE (-) MAS (-) AROM elbow flexion (+exp) elbow extension (-) PROM elbow flexion (+exp) elbow extension (+exp) RPE (-)
Kim et al. (2020a) RCT (8) NStart=77 NEnd=73 TPS=Acute A + B vs A/B *Primary listing: Table 29 (Repetitive Transcranial Magnetic Stimulation (rTMS))*	E: rTMS + Task Based occupational Therapy C: Sham rTMS + Task Based Occupational Therapy Duration: 30min/d, 7d/wk, 10d rTMS or Sham, 30min/d, 7d/wk, 10d Task-Based OT	E vs C: Box and Block Test (-) Fugl-meyer Assessment (-) Finger Tapping Test (-) Brunnstrom Stage Arm (-) Hand (-) Hand Grip strength (-) Pinch Grip strength (-) Grip strength Lateral Prehension (-) grip strength Three Jaw Chuck (-) Modified Ashworth Scale Elbow flexor (-) Wrist flexor (-) Finger Flexor (-) Korean Modified Barthel index (-)
De Bruyn et al. (2020) RCT (7) NStart=40 NEnd=36 TPS=Subacute A vs B *Primary listing: Table 5 (Sensorimotor Training)*	E: Sensorimotor Training + conventional therapy C: Motor Training (Task-specific Training ands table top games) + conventional therapy Duration: 60min, 4x/wk, 4wks	E vs C: Action Research Arm Test (-) Fugl-Meyer Assessment (+con) Stroke Upper Limb Capacity Scale (-) ABILHAND (-) Erasmus Modified Nottingham Sensory Assessment (-) Perceptual Touch Threshold (-)

		Texture Discrimination Test (-) Wrist Position Sense Test (-) Functional Tactile Object Recognition Test (-)
Page et al. (2020) RCT (7) NStart=34 NEnd=31 TPS=Chronic A + B vs A vs B *Primary listing: Table 16 (Robotics)*	E1: Myomo electromyography (EMG) powered orthosis + repetitive task-specific practice (RTP) E2: Myomo EMG powered orthosis C: Repetitive task-specific practice Duration: 1hr/d, 3d/wk for 8wk	E1 vs E2 vs C: FMA EU (-) AMAT (-)
Ahn et al. (2019) RCT (4) NStart=60 NEnd=60 TPS=Subacute A + B vs A + C *Primary listing: Table 25 (Muscle Vibration)*	E1: Whole-body vibration + Task Oriented Training + Conventional PT E2: Upper- and lower-Cycle group+ Task Specific Training + Conventional PT Duration: 30min/d, 5d/wk for 4wk	E1 vs E2: Manual Function Test (+exp1) Grip Strength (+exp1)
Huang et al. (2019a) RCT (5) NStart=10 NEnd=10 TPS=Chronic A + B vs A/B *Primary listing: Table 9 (Orthotics and Taping)*	E: Three-Dimensional Printed Dynamic Hand Device + Task-Specific Training C: Task-Specific Training Duration: 2d/wk, 4wk task-specific training & 2wk home program	E vs C: Box and Block Test (-) Palmar Pinch Force Test (-) Lateral Pinch Force (-) Grasp Force (-) Motivation during home program (+exp)
Doost et al. (2019) RCT Crossover (7) NStart=21 NEnd=21 TPS=Chronic A + B vs A/B *Primary listing: Table 31 (Transcranial Direct Current Stimulation (tDCS))*	E: Dual-tDCS + CIRCUIT (bimanual co-op task) C: Sham dual-tDCS + CIRCUIT Duration: 30min session; 2-week washout	E vs C: Bimanual speed/accurace (Bi-SAT) (-) Bimanual coordination factor (Bi-CO) (-)
Oh et al. (2019) RCT (7) NStart=33 NEnd=31 TPS=Chronic A + B vs 0 *Primary listing: Table 17 (Virtual Reality)*	E: Joystim VR + real instrumentation training C: Conventional therapy Duration: 30min, 3x/wk for 6wk	E vs C: Tip Pinch Power (+exp) Grip, Palmar Pinch, Lateral Pinch (-) Modified Ashworth Scale (-) Manual Muscle Test (-) Fugl-Meyer Assessment Upper Extremity (-) Box and Block Test (-) Nine Hole Peg Test (-) Korean mini mental state examination MoCA
Hsu et al. (2019) RCT (8) NStart=43 NEnd=43 TPS=Chronic A + B + C vs A/A + B *Primary listing: Table 16 (Robotics)*	E: Robot-Assisted Therapy with Bilateral Practice + Task-Specific Training C: Conventional Care + Task-Specific Training Duration: 50 min/d, 3d/wk, 4wks	E vs C: Motor Activity Log Amount of Use (+exp) Quantity of Movement (-) Fugl-Meyer Assessment Shoulder/ElbowForearm (+exp) Wrist (+exp) Hand (-)

Conroy et al. (2019) RCT (6) NStart=45 NEnd=41 TPS=Chronic A + B vs A/B *Primary listing: Table 16 (Robotics)*	E: Robot therapy + task training (Inmotion) C: Robot therapy Duration: 1hr, 3x/wk, 12wk	E vs C: FMA (-) WMFT (+exp) SIS (+exp)
Fasoli et al. (2019) Pilot RCT (7) NStart=10 NEnd=10 TPS=Chronic A + B + C vs A/A + B *Primary listing: Table 16 (Robotics)*	E: Robotic Therapy (Armeo Spring & Amadeo) + Task Oriented Training with Active Learning Program for Stroke (ALPS) C: Robotic Therapy with Active Learning Program for Stroke (ALPS) Duration: 60min, 2-3x/wk, 6-8wks	E vs C: Fugl-Meyer Assessment (+exp) Modified Ashworth Scale (-) Wolf Motor Function Test (-) Motor Activity Log (-) Stroke Impact Scale (-) Confidence in Arm & Hand Movement (CAHM)
Huang et al. (2019b) Pilot RCT (6) NStart=36 NEnd=31 TPS=Subacute A + B vs A/B *Primary listing: Table 9 (Orthotics and Taping)*	E: Kinesiotaping + stretching & task specific trainings+ conventional rehab C: stretching & task specific trainings+ conventional rehab+ Conventional Therapy Duration: 7d/wk for 3 weeks tape; 20min/session, 2x/d, 5d/wk for 3wks conventional therapy	E vs C: Fugl-Meyers Upper Extremity [Proximal (-), Distal (+exp) Mod Ashworth scale (-) Brunnstrom stage (-) Simple test for Evaluating Hand Function (STEF) (-)
Kim et al. (2019b) Pilot RCT (6) NStart=20 NEnd=20 TPS=Chronic A vs B *Primary listing: Table 2 (Bilateral Arm Training)*	E: Occupation-based bilateral upper extremity training C: Task-based bilateral upper extremity training Duration: 30min, 5x/wk for 4wks	E vs C: Canadian Occupational Performance Measure: Performance (+exp), Satisfaction: (+exp)] [Stroke Impact Scale: Strength: (+exp) Activities of Daily Living and Instrumental Activities of Daily Living: (+exp) Mobility: (-) Hand Function: (-) Memory: (-) Communication: (-)Emotion: (+exp) Participant: (+exp)] [Action Research Arm Test: Grasp: (-) Grip: (-) Pinch: (-) Gross Movement: (-)] [Yonsei-Bilateral Activity Test: Quality of performance: (-), Satisfaction: (+exp)] [Accelerometer Use of unaffected side: (-) Use of affected side: (+exp)
Umar et al. (2018) RCT (7) NStart=46 NEnd=41 TPS=Chronic A + B vs A/B *Primary listing: Table 33 (Botulinum Toxin)*	E: Botulinum Toxin A + Task Specific Training C: Task-Specific Training Duration: single dose injection, 1wk rest, 1hr, 3x/wk, 8wk training	E vs C: Fugl-Meyer Assessment- upper limb (-) Motor Assessment Scale (-)
Abdullahi et al. (2018) RCT (8) NStart=48 NEnd=48 TPS=Acute A + B1 vs A + B2 vs 0 *Primary listing: Table 6 (Constraint-Induced Movement Therapy (CIMT))*	E1: Received modifed CIMT + task-specific training 3hr E2: CIMT-received 300 repetitions of task specific training E3: CIMT + 600 repetitions task specific training C: Traditional therapy Duration: 5x/wk, 4wk.	E1/E2/E3 vs C: Fugl-Meyer assessment (+exp1, +exp2, +exp3) Motor Activity Log (+exp1, +exp2, +exp3) Wolf Motor Function (+exp1, +exp2, +exp3) UPSET (no stats) E1 vs E2 vs E3: Fugl-Meyer assessment (-) Motor Activity Log (-) Wolf Motor Function (-) UPSET (no stats)
Ghaziani et al. (2018) RCT (7)	E: High-dose electrical somatosensory stimulation + task oriented training	E vs C: BBT (-)

NStart=102 NEnd=98 TPS=Acute A + B vs A/B *Primary listing: Table 27 (Additional Afferent and Peripheral Stimulation Methods)*	C: Sham (Low dose) + task oriented training Duration: 60min/d ESS + 15min/d task-oriented training, 7d/wk, max 4wks	FMA (-) grip/pinch strength (-) perceptual threshold of touch (-) pain in the arm (-) modified rankin scale (-)
Hsieh et al. (2018a) RCT Crossover (5) NStart=26 NEnd=18 TPS=Chronic A + B1 vs A + B2 *Primary listing: Table 10 (Mirror Therapy)*	E1: Home-based mirror therapy and task specific training E2: Clinic-based mirror therapy and task specific training Duration: 30-45min/d mirror therapy & 45-60min/d task-specific training, 12 sessions, 4wks, 4wk washout	E1 vs E2: FMA (-) BBT (-) Revised Nottingham Sensory assessment (-) Motor activity log Amount of use (+exp1) Quality of movement (-) 10m walk test (-) Sit to stand (+exp1) Canadian Occupational Performance Measure (-) EuroQoL 5D Q - Index (+exp1) EQ-Visual analog scale (-)
Harvey et al. (2018) RCT (7) NStart=199 NEnd=169 TPS=Chronic A + B vs A/B *Primary listing: Table 29 (Repetitive Transcranial Magnetic Stimulation (rTMS))*	E: Low frequency rTMS + Motor Training C: Sham rTMS + Motor Training Duration: 1Hr, 3x/wk, 6wk therapy (15min of stimulation/sham before)	E vs C: ARAT (-) FMA-UE (-) WMFT (-)
Jonsdottir et al. (2017) RCT (6) NStart=82 NEnd=68 TPS=Subacute A + B vs A/B *Primary listing: Table 22 (Neuromuscular Electrical Stimulation (NMES))*	E: Myoelectric Continuous Control of Functional Electrical Stimulation + Task Oriented Therapy C: Task Oriented Therapy Duration: 45min/d, 5d/wk for 5wk	E vs C: Action Research Arm Test (-) Fugl-Meyer Assessment-Upper Extremity (-) Disability of the Arm, Shoulder, and Hand Questionnaire (-)
Pavlova et al. (2017) RCT (7) NStart=11 NEnd=11 TPS=Chronic A + B vs A/B *Primary listing: Table 31 (Transcranial Direct Current Stimulation (tDCS))*	E: Anodal tDCS with visuomotor gripforce tracking task C: Sham tDCS with visuomotor gripforce tracking task Duration: 20min (2x/d), 5d/wk for 4wk	E vs C: FMA (-) WMFT function ability scale (-) BBT (-) Grip MVC Grip Tracking Task
Carda et al. (2017) RCT Crossover (7) NStart=11 NEnd=10 TPS=Chronic A + B vs 0 *Primary listing: Table 22 (Neuromuscular Electrical Stimulation (NMES))*	E: Electrically assisted movement therapy (FES + task specific) C: Standard care Duration: 90min/d, 5d/wk for 2wk	E vs C: Fugl-Meyer Assessment (+exp) Motor Activity Log (+exp) Wolf Motor Function Test (-) Resistance to Passive Movement Scale (-)

Jung et al. (2017) RCT (7) NStart=46 NEnd=46 TPS=Chronic A + B vs A/B *Primary listing: Table 23 (Transcutaneous Electrical Nerve Stimulation (TENS))*	E: Transcutaneous Electrical Nerve Stimulation and Task-Related Training C: Sham Transcutaneous Electrical Nerve Stimulation and Task-Related Training Duration: 1h, 5d/wk for 4wk	E vs C: Manual Muscle strength test (+exp) Active range of motion (+exp) Fugl-Meyer Assessment-Upper extremity (+exp)
Hayward et al. (2017) Pilot RCT (7) NStart=4 NEnd=4 TPS=Chronic A + B vs A/B *Primary listing: Table 32 (Other Non-Invasive Brain Stimulation Methods)*	E: Transcranial Random Noise Sitmulation (tRNS) + Reaching Training C: Sham tRNS + Reaching task Duration: 45min, 3d/wk, 4wks	E vs C: Motor Assessment Scale Upper Arm () Hand () Advanced Hand () Strength; - Trciceps () Carpi Radialis () Modified Ashworth Scale () Tardieu Scale () Richie Articular Index () Rating of Everyday Arm Use in the Community and Home () - all No STATS
Hsieh et al. (2017) Pilot RCT (6) NStart=31 NEnd=31 TPS=Subacute A + B vs A/B *Primary listing: Table 16 (Robotics)*	E: Bilateral robotic priming (Bi-Manu-Track) + task oriented exercises C: Task oriented exercises Duration: 40-45min/d, 5d/wk for 4wks bilateral robotic priming; 40-45min/d, 5d/wk for 4wks task-oriented approach	E vs C: FMA (-) Grip strength (-) BBT (-) modified rankin scale (-) FIM (-) actigraphy (-) SIS (+exp) self reported fatigue scale (-)
Ward et al. (2017) Pilot RCT (8) NStart=12 NEnd=9 TPS=Chronic A + B vs A/B *Primary listing: Table 43 (Other Pharmacological and Medical Interventions)*	E: Atomoxetine + Task Oriented Upper Extremity Training C: Placebo + Task Oriented Upper Extremity Training Duration: 40 mg, 1x/d followed by 2hr-training, 10d	E vs C: Fugl-Meyer Assessment (+exp) Action Research Arm Test (-) Wolf Motor Function Test less affected UL (-) more affected UL (-) heart rate blood pressure
Saposnik et al. (2016) RCT (7) NStart=141 NEnd=121 TPS=Acute A + B vs A/B *Primary listing: Table 17 (Virtual Reality)*	E: task-oriented training with non-immersive virtual reality + conventional rehabilitation C: task-oriented training with simple recreational activities + conventional rehabilitation Duration: 60min, 5d/wk, 2wk	E vs C: Wolf Motor Function Test (-) Box and Block Test (+con) Stroke Impact Scale perception of recovery (-) hand function (-) subscale 16 (-) Barthel Index (-) Functional Independence Measure (-) Grip Strength (-)
Kong et al. (2016) RCT (5) NStart=105 NEnd=103 TPS=Acute	E: Nintendo Wii virtual reality training + Usual Care (conventional OT) C1: dose matched task oriented therapy (as Conventional therapy) + Usual Care (conventional OT)	E vs C: FMA (-) ARAT (-) SIS (-) FIM (-)

A vs B vs 0 *Primary listing: Table 17 (Virtual Reality)*	C2: Usual Care (conventional OT) Duration: 60min/d, 4d/wk for 3wk	VAS Pain (-)
Levy et al. (2016) RCT (6) NStart=164 NEnd=147 TPS=Chronic A + B vs A/B *Primary listing: Table 28 (Invasive Cortical and Nerve Electrode Implant Stimulation)*	E: Electrical Epidural Motor Cortex Stimulation (EECS) + Task specific Training C: Task-specific training Duration: 6wks	E vs C: Arm Motor Ability Test (-) FMAUE (-)
Kim et al. (2016d) RCT (5) NStart=20 NEnd=20 TPS=Chronic A + B vs A/B *Primary listing: Table 22 (Neuromuscular Electrical Stimulation (NMES))*	E: EMG-Triggered Neuromuscular Stimulation + Task-Oriented Training C: EMG-Triggered Neuromuscular Stimulation Duration: 30min/d, 5d/wk, 4wks (experimental) & 20min/d, 5d/wk, 4wks (control)	E vs C: Fugl-Meyer Assessment- Upper Extremity (+exp) Box and Block Test (+exp) Jebsen-Taylor Hand Function Test (-) muscle activation (%RVC)
Kim & Bang (2016) Pilot RCT (6) NStart=22 NEnd=22 TPS=Subacute A + B vs A/B *Primary listing: Table 12 (Action Observation)*	E: Action observation + task-specific training C: Task-specific training Duration: 40min/d, 5d/wk, 4wk	E vs C: FMA UE (+exp) BBT (+exp) mod BI (+exp) mod Ashworth scale (-)
Lee et al. (2016e) Pilot RCT (6) NStart=56 NEnd=45 TPS=Chronic A + B vs A/B vs 0 *Primary listing: Table 25 (Muscle Vibration)*	E1: Whole-Body Vibration (5-15 Hz) E2: Whole-Body Vibration + Task-Related Training C: Conventional Physical Therapy Duration: 30 min/d, 3d/wk, 4wks	E1/E2 vs C: Fugl-Meyer Assessment- Upper Extremity (+exp1,+exp2) Wolf Motor Function Test (+exp2) Modified Ashworth Scale Shoulder (+exp1,+exp2,+con) Elbow (+exp2) Wrist and Finger (+exp2) Maximal Grip Strength (+exp2)
Fleming et al. (2015) RCT (6) NStart=33 NEnd=21 TPS=Chronic A + B vs A/B *Primary listing: Table 27 (Additional Afferent and Peripheral Stimulation Methods)*	E: Somatosensory (peripheral nerve) stimulation + task specific training C: Sham stimulation + task specific training Duration: 2h/d, 3d/wk for a total of 12 sessions of somatosensory stimulation (TENs); 30mins/d, 3d/wk for a total of 12 sessions of task-specific training	E vs C: ARAT grasp (+exp) grip (+exp) pinch (+exp) gross (+exp) FMA (-) MAI Amount of use (-) Quality (-9) Goal attainment scale (-)
Higgins et al. (2015) Pilot RCT (6) NStart=11 NEnd=9 TPS=Chronic	E: 1 Hz rTMS + task oriented exercise C: Sham rTMS + task oriented exercise Duration: E: 90min task-oriented training + rTMS , 2x/wk, 4wks; C:	E vs C: WMFT (-) Grip/Pinch strength BBT (-) SIS

A + B vs A/B *Primary listing: Table 29 (Repetitive Transcranial Magnetic Stimulation (rTMS))*	90min task-oriented training + sham rTMS, 2x/wk, 4wks	Motor activity Log (-) MEP amplitude (+exp)
Kim & Kim (2015b) RCT (6) NStart=30 NEnd=30 TPS=Chronic A + B vs A/B *Primary listing: Table 9 (Orthotics and Taping)*	E: Taping + Task specific training C: Task specific training Duration: 30min/d, 3d/wk for 28wk	E vs C: Manual Function Test (-) Modified Motor Assessment Scale (-) Brunnstrom (-) Functional Independence Measure (+con)
Lin et al. (2014a) RCT (7) NStart=43 NEnd=42 TPS=Chronic A + B vs A/B vs 0 *Primary listing: Table 10 (Mirror Therapy)*	E1: Mirror therapy + Mesh glove (afferent stimulation, primarily NMES) E2: Mirror therapy C: task oriented exercise Duration: 90min/d, 5d/wk for 4wk	E1 vs C: FMA (+exp1) BBT (-) 10MWT (-) MAL (-) ABILHAND (-) E2 vs C: FMA (+exp2) BBT (+con) 10MWT (+con) MAL (-) ABILHAND (-) E1 vs E2: FMA (-) BBT (+exp1) 10MWT (+exp1) MAL (-) ABILHAND (-)
Timmermans et al. (2014) RCT (8) NStart=22 NEnd=22 TPS=Chronic A vs B *Primary listing: Table 16 (Robotics)*	E: Task-oriented Robotic arm training (Haptic Master) C: Task oriented arm training Duration: 30min (2x/d), 4d/wk for 8wk	E vs C: Fugl-Meyer Assessment (-) Action Research Arm Test (-) Motor Activity Log (-) EuroQol-5D (-) SF-36 Health Survey (-)
Cruz et al. (2014) RCT Crossover (7) NStart=44 NEnd=43 TPS=Acute A + B vs A/B *Primary listing: Table 20 (Feedback-Based Training)*	E: Repetitive motor task under vibratory feedback C: Repetitive motor task Duration: 1 session, 20min washout	E vs C: Movement accuracy and movements per minute (+exp) Range of Motion (-) Fatigue VAS Pain VAS
Vongvaivanichakul et al. (2014) RCT (5) NStart=14 NEnd=14 TPS=Chronic A + B vs A/B *Primary listing: Table 29 (Repetitive Transcranial Magnetic Stimulation (rTMS))*	E: Low frequency r-TMS + reach-to-grasp (RTG) training C: Sham stimulation + reach-to-grasp (RTG) training Duration: 20min stimulation & 7min x 6 sessions RTG	E vs C: wolf motor function test (+exp) movement time of RTG actions (+exp) maximum aperture (-), MEP amplitude

Thielbar et al. (2014) RCT (6) NStart=16 NEnd=14 TPS=Chronic A vs B *Primary listing: Table 17 (Virtual Reality)*	E: Virtual reality keypad/glove (PneuGlove) C: Task Specific Training Occupational Therapy Duration: 60min, 3d/wk for 6wk	E vs C: Action Research Arm Test (+exp) Jebsen-Taylor Hand Function Test (-) Fugl-Meyer Assessment (-) Grip strength (-) pinch strength (-)
Rose et al. (2014) RCT (6) NStart=22 NEnd=20 TPS=Chronic A + B vs A/B *Primary listing: Table 29 (Repetitive Transcranial Magnetic Stimulation (rTMS))*	E: Functional task practice + rTMS C: Functional task practice + Sham rTMS Duration: 20min rTMS + 60min functional task	E vs C: Wolf Motor Function Test time (-) Functional Assessment Scale (-) Fugl-Meyer assessment- upper extremity (-) grip force (-) Lateral Pinch (-) Palmer Pinch (-) Three Jaw Chuck (-) Action Research Arm Test (-) Modified Ashworth Scale (-) Motor Activity Log AOU (-) HW (-) Late Life Function and Disability Index (-) ROM shoulder (-) elbow (-) wrist (-) Trunk displacement (-) Max resultant velocity (-) Movement time (-) Short intracortical inhibition MEP (+exp) 50% stimulation intensity (+exp)
Waller et al. (2014) RCT (7) NStart=30 NEnd=27 TPS=Chronic A + B vs A/B *Primary listing: Table 2 (Bilateral Arm Training)*	E: Bilateral UE Training +Unilateral task-oriented training C: Unilateral task-oriented Training (using a hand orthosis) Duration: 60min, 3x/wk, 6wk bilateral, 6wks unilateral & 60min, 3x/wk, 12 wk unilateral	E vs C: Fugl-Meyer Assessment (-) Wolf Motor Function Test (+exp) Box and Block Test (-) University of Maryland Arm Questionnaire for Stroke (-) Modified Ashworth Scale (-) fMRI activation (+exp)
Hesse et al. (2014) RCT (7) NStart=50 NEnd=46 TPS=Subacute A + B vs A/B *Primary listing: Table 16 (Robotics)*	E: Robot-assisted Group Therapy + Individual Arm Therapy C: Individual arm therapy Duration: 30min/d RAGT, 30min/d IAT, 5d/wk for 4wk, 2x30mins/d, 5d/wk, 4wks IAT	E vs C: Action Research Arm Test (+exp) Fugl-Meyer Assessment (-) Box and Block Test (-) Medical research council (-) Barthel Index (-) Modified ashworth (-)
Kim et al. (2014b) RCT (8) NStart=31 NEnd=31 TPS=Chronic A + B vs A/B	E: High frequency (10Hz) rTMS+ task-oriented training C: Sham rTMS+ task-oriented training Duration: 10min/d, 5d/wk for 4wk	E vs C: Motor Function Test (+exp) MEP latency (-) MEP amplitude (+exp)

Primary listing: Table 29 (Repetitive Transcranial Magnetic Stimulation (rTMS))		
ShimodozoNo et al. (2014) Pilot RCT (7) NStart=27 NEnd=24 TPS=Subacute A + B vs A/B vs 0 *Primary listing: Table 22 (Neuromuscular Electrical Stimulation (NMES))*	E1: NMES + repetitive facilitative exercise; E2 Repetitive facilitative exercise C: Conventional Therapy Duration: 40min/d, 5d/wk,4wk	E1/E2 vs C: Fugl-Meyer Assessment (+exp2) AROM; shoulder flexion (-); - elbow extension (+exp2); - wrist dorsiflexion (-) Modified Ashworth scale elbow flexor (-) wrist flexors (-)
Wu et al. (2013b) RCT (6) NStart=33 NEnd=21 TPS=Chronic A + B vs A/B *Primary listing: Table 10 (Mirror Therapy)*	E: Mirror therapy+ task-oriented functional practice C: task-oriented functional practice Duration: 1.5h/d, 5d/wk, 4wk	E vs C: Revised Nottingham Sensory Assessment (-) Light touch (-) temperature (+exp) Pinprick (-) pressure (-) Tactile localization (-) Bilateral simultaneous touch (-) Tactile total (-) Fugl-Meyer Assessment (+exp) proximal (-) distal (+exp) Motor Activity Log AOU (-) QOM (-) ABILHAND (-) kinematic reaction time (+exp)
Byl et al. (2013) Pilot RCT (5) NStart=18 NEnd=15 TPS=Chronic A + B1 vs A + B2 vs 0 *Primary listing: Table 16 (Robotics)*	E1: Robotic orthosis + Task-Specific training + Videogames (Unilateral) E2: Robotic orthosis + Task-Specific Training + Videogames (Bilateral) C: Usual Physical Therapy Duration: 2x/wk, for 6wk	E1/E2 vs C: Upper Limb Fugl Meyer (FMA) (-) Saint Louis University Mental Status Exam (SLUMS) (-) Stroke impact scale (-) California Functional Independence Scale (CAFE-40) (-) Active Range of Motion (-) Muscle Strength (-) Pain NRS (-) Box and Block (-) Finger Tapper Test (-) Wolf Motor Function Test (-) Digital Reaction Time Test (-) Modified Ashworth Scale (-)
Page et al. (2013) Pilot RCT (5) NStart=16 NEnd=16 TPS=Chronic A + B vs A/B *Primary listing: Table 16 (Robotics)*	E: Myomo brace (EMG triggered micro robot device) + repetitive task practice C: Repetitive task practice Duration: 30min/d, 3d/wk for 8wk	E vs C: Fugl-Meyer Assessment (-) Canadian Occupational Performance Measure (-) Stroke Impact Scale (-)
Thorsen et al. (2013) Pilot RCT (8) NStart=11	E: FES + Task specific training C: Sham + Task specific training	E vs C: Action Research Arm Test (+exp)

NEnd=11 TPS=Chronic A + B vs A/B *Primary listing: Table 22 (Neuromuscular Electrical Stimulation (NMES))*	Duration: 45min/session, 3-5d/wk, 25 sessions	Individually Prioritized Problem Assessment (+exp)
Corti et al. (2012) RCT Crossover (6) NStart=14 NEnd=14 TPS=Chronic A vs B *Primary listing: Table 3 (Exercise and Strength Training)*	E1: Dynamic resistance training (POWER) E2: Functional Task Practice (FTP) Duration: 90min/d, 3x/wk for 10wk	E1 vs E2: Fugl-Meyer Assessment Upper Extremity (-) Shoulder/Elbow (-) Modified Ashworth Scale (-) European Stroke Scale (-) Chedoke-McMaster Hand and Arm Inventory (-) Kinematic parameters mean velocity (-) elbow ext ROM (+exp1) trunk displacement (+exp1) ROM Shoulder Flexion (-) Shoulder Extension (-) Reintegration to Normal Living Index (-)
Page et al. (2012) RCT (6) NStart=32 NEnd=32 TPS=Chronic A + B1 vs A + B2 vs 0 *Primary listing: Table 22 (Neuromuscular Electrical Stimulation (NMES))*	E1: 30min electrical stimulation therapy + repetitive task specific practice E2: 60min electrical stimulation therapy + repetitive task specific practice E3: 120min electrical stimulation + repetitive task specific practice C: Home Exercise (part of their standard of care) Duration: E1: 30 min; E2: 60 min; E3: 120 min, 5d/wk for 8wk; C: 30min, 5d/wk for 8wk	E3 vs E2/E1: Fugl-Meyer Assessment (+exp3) Arm Motor Ability Test Functional Ability (+exp3) Movement Quality (+exp3) Action Research Arm Test (+exp3)
Knutson et al. (2012) RCT (5) NStart=21 NEnd=17 TPS=Chronic A + B vs A + C *Primary listing: Table 22 (Neuromuscular Electrical Stimulation (NMES))*	E: Contralaterally controlled FES + Task specific training C: Cyclic NMES+ Task specific training Duration: CCFES: 55 mins/d, 2ds/wk, 6wks; Cyclic NMES: 75 mins/d, 2ds/wl, 6wks; Task-specific training: 90 mins/d, 2ds/wk, 6wks	E vs C: Maximum voluntary finger extension angle (+exp) Finger tracking test (+exp) FMA-UE (+exp) BBT (+exp) Arm motor abilities test - functional abilities component (+exp)
Sullivan et al. (2012) RCT (8) NStart=43 NEnd=38 TPS=Chronic A + B vs A/B *Primary listing: Table 27 (Additional Afferent and Peripheral Stimulation Methods)*	E: Repetitive task exercise + sensory amplitude electrical stimulation (SES) C: repetitive task exercise + Sham stimulation Duration: 30min, 2x/d, 4wk	E vs C: Arm Motor Ability Test (-) median time (-) Fugl-Meyer Assessment (-) time difference (-) Motor Activity Log-14 (-) Nottingham Stereognosis Assessment (-) Perceptual Threshold Test – Electrical Stimulation (-) Stroke Impact Scale-16 (-)
Chang et al. (2012) RCT (4)	E: High Frequency (10Hz) rTMS + Motor Task Training	E vs C: Movement Time on Task (-)

NStart=21 NEnd=17 TPS=Chronic A + B vs A/B *Primary listing: Table 29 (Repetitive Transcranial Magnetic Stimulation (rTMS))*	C: Sham rTMS + Motor Task Training Duration: 20min, 5x/wk, 2wks	Accuracy on Task (+exp) Jebsen Hand Function Test (-) Writing (-) Card Turning (-) Picking Up Small Object (-) Simulated Feeding (+exp) Stacking Checkers (-) Lifting Lightweight Object (-) Lifting Heavy Object (-) fMRI (No stats)
Brunner et al. (2012) RCT (8) NStart=30 NEnd=28 TPS=Subacute A + B vs A + C *Primary listing: Table 6 (Constraint-Induced Movement Therapy (CIMT))*	E: CIMT + Task-specific training C: Bimanual training + Task-specific training Duration: 4h/d, 7d/wk for 4wks	E vs C: Action research arm test (-) Nine hole peg test (-) MAL amount of use (-) quality of use (-)
Writer & Nayak (2012) RCT (4) NStart=30 NEnd=30 TPS=Not Reported A + B vs A/B *Primary listing: Table 7 (Trunk Restraint)*	E: Task Specific training + Trunk restraint training C: Task Specific Training without Trunk restraint Duration: Not reported	E vs C: Fugl-Meyer Assessment (+exp) TEMPA (+exp) ROM-albow extension (+exp)
Barry et al. (2012) Pilot RCT (7) NStart=22 NEnd=19 TPS=Chronic A + B vs A/B *Primary listing: Table 9 (Orthotics and Taping)*	E: Dynamic Wrist hand orthosis (wearing while doing reach and grasp practice) + home exercise C: Manual-assisted reach and grasp training therapy + home exercise Duration: 60min/wk, for 6wks therapy session, 4d/wk home exercise	E vs C: ARAT (-) BBT (-) SIS (-) Grip strength (-)
IkuNo et al. (2012) Pilot RCT (7) NStart=22 NEnd=22 TPS=Subacute A + B vs A/B *Primary listing: Table 27 (Additional Afferent and Peripheral Stimulation Methods)*	E: PNES + Task Specific Training C: Task-Specific Training Duration: 60min/d, 6d/wk; 2wk	E vs C: WMFT (-) BBT (-) Pinch strength (-) Grip strength (-)
O'Brien et al. (2011) RCT (4) NStart=10 NEnd=10 TPS=Subacute A + B vs A + C *Primary listing: Table 11 (Mental Practice)*	E: Kinaesthetic Motor Imagery + Task specific training (Grasp) C: Relaxation + Task Specific Training (Grasp) Duration: 3 sessions	E vs C: Grasp Movement Time (-) Magnitude of extension of index finger (+exp) Angular displacement of proximal phalageal joints (+exp) Angular displacement of metacarpophalangeal joints (+exp)
Weber et al. (2010) Pilot RCT (6) NStart=23	E: FES + botulinum toxin-A + home based task-oriented exercise	E vs C: Motor Activity Log observation (-)

NEnd=18 TPS=Chronic A + B + C vs A/A + B *Primary listing: Table 22 (Neuromuscular Electrical Stimulation (NMES))*	C: Botulinum toxin-A + home-based exercise program Duration: 1hr/d, 5d/wk, 4 wk	self-reported (-) Action Research Arm Test (-)
Platz et al. (2009) RCT (8) NStart=148 NEnd=144 TPS=Subacute A vs B vs 0 *Primary listing: Table 9 (Orthotics and Taping)*	E1: Impairment-oriented training E2: Inflatable Splint Arm Therapy C: Conventional therapy Duration: 45min/d, 5d/wk; 4wk	E1 vs E2 vs C: Fugl-Meyer Assessment (-) Upper Extremity Performance Test for the Elderly (-)
Iwamuro et al. (2008) RCT Crossover (5) NStart=10 NEnd=10 TPS=Chronic A + B vs A/B *Primary listing: Table 16 (Robotics)*	E: Reaching task + Wilmington Robotic Exoskeleton assistant (WREX) C: Reaching task only Duration: 2 sessions	E vs C: Arm movement kinematics (+exp) Muscle Activity EMG analysis (+exp)
Takeuchi et al. (2008) RCT (6) NStart=20 NEnd=20 TPS=Chronic A + B vs A/B *Primary listing: Table 29 (Repetitive Transcranial Magnetic Stimulation (rTMS))*	E: Low frequency (1Hz) rTMS + pinch motor training (a metronome-paced pinch of their index finger and thumb of the affected hand as fast as possible) C: pinch motor training + sham rTMS Duration: 25min stimulation + 15min training, 1x	E vs C: Pinch force (+exp) Acceleration (+exp) MEP amplitude (-) Resting motor threshold (-) Intracortical inhibition (-)
Alon et al. (2008) RCT (4) NStart=26 NEnd=26 TPS=Acute A + B vs A/B *Primary listing: Table 22 (Neuromuscular Electrical Stimulation (NMES))*	E: FES + Task-specific training C: Task-specific training Duration: Task Specific training: 30min/2x/d, 5d/wk, 12wk; FES: 1hr/session, 4x/d, 12wk	E vs C: Modified Fugl-Meyer Assessment (+exp) Box and Blocks Test (-) Jebsen-Taylor light object lift (-)
Alon et al. (2007) Pilot RCT (4) NStart=15 NEnd=15 TPS=Acute A + B vs A/B *Primary listing: Table 22 (Neuromuscular Electrical Stimulation (NMES))*	E: FES + Standard task-specific training C: Standard task-specific training Duration: 30 min(2x/d), 5d/wk for 12 wk	E vs C: Box and Blocks Test (+exp) Jebsen Taylor Hand Function Test (+exp) Ful-Meyer Assessment (+exp)
Fischer et al. (2007) Pilot RCT (4) NStart=15 NEnd=15 TPS=Chronic A + B vs A + C vs A	E1: Cable orthosis + Virtual Reality E2: Pneumatic orthosis + Virtual Reality C: Virtual Reality Duration: 60min/d, 3d/wk, for 6wks	E1/E2 vs C: WMFT (-) BBT (-) FMA-UE (-) Rancho los amigos functional test (-) grip strength (-) Spasticity with hand manipulatory system (-)

Primary listing: Table 9 (Orthotics and Taping)		Isometric flexion (-) Isometric extension (-) Peak extension velocity (-) Extension ROM (-)
McDonnell et al. (2007) Pilot RCT (8) NStart=20 NEnd=20 TPS=Subacute A + B vs A/B *Primary listing: Table 27 (Additional Afferent and Peripheral Stimulation Methods)*	E: Task-specific training + Peripheral Nerve Stimulation C: Task-specific training + Sham Stimulation Duration: 1h stim + 1h task-specific/d, 3d/wk for 3wk	E vs C: Corticospinal Excitability: (-) Fugl-Meyer Assessment (-) Action Research Arm Test (-) Grip lift task (+exp) Motor Activity Log (-) Grip strength (-) Tapping speed (-) Resting Motor Threshold (-) MEP Parameters Other EMG parameters (-)
Kahn et al. (2006) Pilot RCT (4) NStart=19 NEnd=19 TPS=Chronic A + B vs A/B *Primary listing: Table 16 (Robotics)*	E: Active-assistive reaching exercise using a robotic device (Arm Guide) C: Task-matched amount of reaching without assistance Duration: 45min/d, for 8wk	E vs C: Rancho Los Amigos Functional Test (-) Chedoke McMaster Stroke Assessment (-) Supportive range of motion
Michaelsen et al. (2004) RCT (5) NStart=28 NEnd=28 TPS=Chronic A + B vs A/B *Primary listing: Table 7 (Trunk Restraint)*	E: Reach training with physical trunk restraint C: Reach training w/o physical trunk restraint Duration: 60 trials/session; 1session training (+Additional 10 trials pre and post session)	E vs C: Kinematics performance outcome measures (-) trunk anterior displacement (+exp) trunk rotation (-) elbow exension (+exp) shoulder horizontal adduction (-) shoulder flexion (-) Temporal Coordination Index (+exp)
Popovic et al. (2002) RCT (3) NStart=16 NEnd=16 TPS=Subacute A + B vs A/B *Primary listing: Table 22 (Neuromuscular Electrical Stimulation (NMES))*	E: Functional Electrical Stimulation + Task Specific Training C: Task specific training Duration: 30min/d, 3wks	E vs C: Upper Extremity Function Test (No stats)
Kwakkel et al. (1999) RCT (7) NStart=101 NEnd=89 TPS=Acute A vs B vs 0 *Primary listing: Table 3 (Exercise and Strength Training)*	E1: Leg rehab training E2: Arm rehab training C: Immobilization therapy with inflatable pressure splint (arm and leg with splints) Duration: 30min/d, 5d/wk, 20wk	E1/E2 vs C: BI (+exp1) Functional ambulation categories (+exp1) ARAT (+exp1, +exp2) gait speed (+exp1) used walking aids (-) sickness impact proffile (+exp1) Nottinghal health profile (-) Frenchy activity index (-)
Wolf et al. (1994) RCT (4) NStart=16 NEnd=16	E: EMG biofeedback with task practice C: Sham biofeedback with task practice	E vs C: Active Range of Motion: (-) Passive Range of Motion: (-) EMG activity of triceps and biceps

TPS=Chronic A + B vs A/B *Primary listing: Table 19 (EMG Biofeedback)*	Duration: 25min, 2-4x/wk, 10x over 6wk	Reaching task: (-) extension task resisted extension task

Abbreviations and table notes: C=control group; D=days; E=experimental group; H=hours; Min=minutes; RCT=randomized controlled trial; TPS=time post stroke category (Acute: less than 30 days, Subacute: more than 1 month but less than 6 months, Chronic: over 6 months); Wk=weeks.

+exp indicates a statistically significant between groups difference at α=0.05 in favour of the experimental group

+exp1/+exp2/+exp3 indicates a statistically significant between groups difference at α=0.05 in favour of the first, second or third experimental group

+con indicates a statistically significant between groups difference at α=0.05 in favour of the control group

- indicates no statistically significant between groups differences at α=0.05

1. Body Functions and Structures

MOTOR FUNCTION

LoE	Conclusion Statement	RCTs	References
2	Task-related Training (Grasping or Retrieving Objects) may not have a difference in efficacy when compared to Progressive Resistive Exercises for improving motor function.	1	Thielman et al. (2004)
1a	There is conflicting evidence about the effect of Task-specific training combined with other interventions when compared to task-specific training for improving motor function.	11	Li et al. (2024a); Park, JuHyung et al. (2022); Wong et al. (2022); Hsu et al. (2020); Song et al. (2019); Linder et al. (2017); BaziledaSilva et al. (2015); Ahmad 2014 et al. (2014); Patten et al. (2013); Alon et al. (2009); Michaelsen et al. (2006)
1b	Task-specific training may not have a difference in efficacy when compared to conventional therapy for improving motor function.	8	Zaman et al. (2024); Alsubiheen et al. (2022); Aydilek et al. (2022); Girsa & Saharan (2022); Song et al. (2020); Pelicioni et al. (2016); Winstein et al. (2016); Nelles et al. (2001)
1b	Structured, task-oriented upper extremity training (Accelerated Skill Acquisition Program) may not have a difference in efficacy when compared to Dose-equivalent usual occupational therapy for improving motor function.	1	Winstein et al. (2016)
1b	Impairment oriented training Arm BASIS with usual treatment may not have a difference in efficacy when compared to usual treatment for improving motor function.	1	Platz et al. (2005)
1b	There is conflicting evidence about the effect of Impairment oriented training Arm BASIS with usual treatment when compared to Bobath therapy with usual treatment for improving motor function.	1	Platz et al. (2005)
1b	Group Circuit may not have a difference in efficacy when compared to high intensity physio or usual physiotherapy for improving motor function.	1	English et al. (2015)
1b	Different approaches to task-specific training combined with other interventions may not have a difference in efficacy when compared with one another for improving motor function.	3	Folkerts et al. (2017); Hung et al. (2016); Thielman et al. (2008)
1a	Different approaches to task-specific training may not have a difference in efficacy when compared with one another for improving motor function.	2	Lang et al. (2016); Ross et al. (2009)
1a	Task-specific training combined with other interventions may produce greater improvements in motor function than conventional therapy.	7	Wang et al. (2023f); Minami et al. (2021); Kirac-Unal et al. (2019); Khallaf et al. (2017); Kim et al.

			(2015b); Winstein et al. (2004); Platz et al. (2001)
1b	Constraint induced movement therapy (constraint-induced movement therapy) with Conventional rehabilitation may produce greater improvements in motor function than Upper limb task-oriented training with Conventional rehabilitation.	1	Wang et al. (2023f)
1b	Arm ability training with knowledge of results (feedback on their performance presented as charts to them) may not have a difference in efficacy when compared to arm ability training without knowledge of results for improving motor function.	1	Platz et al. (2001)
1a	There is conflicting evidence about the effect of Task-specific training combined with other interventions when compared to task-specific training or sham for improving motor function.	4	Alwhaibi et al. (2021); Seo et al. (2019); Gharib et al. (2015); Kim et al. (2013a)
1b	Reaching task training in a 3D virtual environment may not have a difference in efficacy when compared to Reaching task training in physical environment (PE) for improving motor function.	1	Subramanian et al. (2013)
1a	There is conflicting evidence about the effect of Task-specific training when compared to no treatment for improving motor function.	2	Winstein et al. (2019); Almhdawi et al. (2016)
1b	Task-Specific Circuit Training may not have a difference in efficacy when compared to Stretching with Memory exercises and Education for improving motor function.	1	Martins et al. (2020)
1a	Task-specific training combined with other interventions may produce greater improvements in motor function than sham or task-specific training.	2	Carrico et al. (2018); Carrico et al. (2016b)
2	Task Specific Training may produce greater improvements in motor function than Proprioceptive Neuromuscular Facilitation.	1	Anandan et al. (2020)
1b	Unilateral and bilateral task oriented exercises may not have a difference in efficacy when compared to Walking tasks for improving motor function.	1	Higgins et al. (2006)
1b	Task-specific training may produce greater improvements in motor function than training using the Bobath approach.	1	Arya et al. (2012)
1b	Personalized reach training (active control-restricted range) with anodal transcranial direct current stimulation and Virtual reality games may not have a difference in efficacy when compared to Personal reach training (active control-restricted range) with Sham transcranial direct current stimulation and video games for improving motor function.	1	Levin et al. (2023)
1b	Autonomy support (training with more-affected arm and could actively adjust task difficulty) with Verbal feedback may not have a difference in efficacy when compared to Training with more-affected arm with no opportunity to adjust difficulty with General verbal feedback for improving motor function.	1	Kim et al. (2023c)
2	There is conflicting evidence about the effect of Task-oriented training with conventional therapy when compared to Progressive resistance exercise with conventional therapy for improving motor function.	1	Chintamani R. (2024)
1b	Dynamic resistance training (POWER) may not have a difference in efficacy when compared to Functional Task Practice (FTP) for improving motor function.	1	Corti et al. (2012)
1b	Mirror therapy with Mesh glove (afferent stimulation, primarily neuromuscular electrical stimulation) may produce greater improvements in motor function than task oriented exercise.	1	Lin et al. (2014a)
1b	Mirror therapy with Mesh glove (afferent stimulation, primarily neuromuscular electrical stimulation) may not have a difference in	1	Lin et al. (2014a)

	efficacy when compared to Mirror therapy for improving motor function.		
1b	Botulinum Toxin A with Task Specific Training may not have a difference in efficacy when compared to Task-Specific Training for improving motor function.	1	Umar et al. (2018)
2	Whole-body vibration with Task Oriented Training and Conventional physical therapy may produce greater improvements in motor function than Upper- and lower-Cycle group with Task Specific Training and Conventional physical therapy.	1	Ahn et al. (2019)
1b	Task-oriented training with non-immersive virtual reality with conventional rehabilitation may not have a difference in efficacy when compared to task-oriented training with simple recreational activities with conventional rehabilitation for improving motor function.	1	Saposnik et al. (2016)
1b	Impairment-oriented training may not have a difference in efficacy when compared to Conventional therapy for improving motor function.	1	Platz et al. (2009)
1b	Task-oriented Robotic arm training (Haptic Master) may not have a difference in efficacy when compared to Task oriented arm training for improving motor function.	1	Timmermans et al. (2014)
1b	120min electrical stimulation with repetitive task specific practice may produce greater improvements in motor function than 60min electrical stimulation therapy with repetitive task specific practice or 30min electrical stimulation therapy and repetitive task specific practice.	1	Page et al. (2012)
1b	Repetitive motor task under vibratory feedback may produce greater improvements in motor function than Repetitive motor task.	1	Cruz et al. (2014)
2	There is conflicting evidence about the effect of Functional electrical stimulation with Task-specific training when compared to Task-specific training for improving motor function.	1	Alon et al. (2008)
1b	Received modifed constraint-induced movement therapy with task-specific training 3hr may produce greater improvements in motor function than Traditional therapy.	1	Abdullahi et al. (2018)
1b	Received modifed constraint-induced movement therapy with task-specific training 3hr may not have a difference in efficacy when compared to constraint-induced movement therapy-received 300 repetitions of task specific training or constraint-induced movement therapy with 600 repetitions task specific training for improving motor function.	1	Abdullahi et al. (2018)
1b	Repetitive transcranial magnetic stimulation with Task Based occupational Therapy may not have a difference in efficacy when compared to Sham repetitive transcranial magnetic stimulation with Task Based Occupational Therapy for improving motor function.	1	Kim et al. (2020a)
1b	High-dose electrical somatosensory stimulation with task oriented training may not have a difference in efficacy when compared to Sham (Low dose) with task oriented training for improving motor function.	1	Ghaziani et al. (2018)
2	Nintendo Wii virtual reality training with Usual Care (conventional occupational therapy) may not have a difference in efficacy when compared to dose matched task oriented therapy (as Conventional therapy) with Usual Care (conventional occupational therapy) or Usual Care (conventional occupational therapy) for improving motor function.	1	Kong et al. (2016)
2	Low frequency repetitive transcranial magnetic stimulation with reach-to-grasp (RTG) training may produce greater improvements in	1	Vongvaivanichakul et al. (2014)

	motor function than Sham stimulation with reach-to-grasp (RTG) training.		
1b	Virtual reality keypad or glove (PneuGlove) may not have a difference in efficacy when compared to Task Specific Training Occupational Therapy for improving motor function.	1	Thielbar et al. (2014)
2	Contralaterally controlled functional electrical stimulation with Task specific training may produce greater improvements in motor function than Cyclic neuromuscular electrical stimulation with Task specific training.	1	Knutson et al. (2012)
1b	Functional task practice with repetitive transcranial magnetic stimulation may not have a difference in efficacy when compared to Functional task practice with Sham repetitive transcranial magnetic stimulation for improving motor function.	1	Rose et al. (2014)
1b	Mirror therapy with task-oriented functional practice may produce greater improvements in motor function than task-oriented functional practice.	1	Wu et al. (2013b)
1b	Somatosensory (peripheral nerve) stimulation with task specific training may produce greater improvements in motor function than Sham stimulation with task specific training.	1	Fleming et al. (2015)
1b	Repetitive task exercise with sensory amplitude electrical stimulation (SES) may not have a difference in efficacy when compared to repetitive task exercise with Sham stimulation for improving motor function.	1	Sullivan et al. (2012)
1b	Sensorimotor Training with conventional therapy may not have a difference in efficacy when compared to Motor Training (Task-specific Training ands table top games) with conventional therapy for improving motor function.	1	De Bruyn et al. (2020)
1b	Myoelectric Continuous Control of Functional Electrical Stimulation with Task Oriented Therapy may not have a difference in efficacy when compared to Task Oriented Therapy for improving motor function.	1	Jonsdottir et al. (2017)
1b	Electrical Epidural Motor Cortex Stimulation (EECS) with Task specific Training may not have a difference in efficacy when compared to Task-specific training for improving motor function.	1	Levy et al. (2016)
1b	Anodal transcranial direct current stimulation with visuomotor gripforce tracking task may not have a difference in efficacy when compared to Sham transcranial direct current stimulation with visuomotor gripforce tracking task for improving motor function.	1	Pavlova et al. (2017)
1b	There is conflicting evidence about the effect of Electrically assisted movement therapy (functional electrical stimulation with task specific) when compared to care for improving motor function.	1	Carda et al. (2017)
2	There is conflicting evidence about the effect of Electromyography-Triggered Neuromuscular Stimulation with Task-Oriented Training when compared to electromyography-Triggered Neuromuscular Stimulation for improving motor function.	1	Kim et al. (2016d)
2	High Frequency repetitive transcranial magnetic stimulation with Motor Task Training may not have a difference in efficacy when compared to Sham repetitive transcranial magnetic stimulation with Motor Task Training for improving motor function.	1	Chang et al. (2012)
2	Home-based mirror therapy and task specific training may not have a difference in efficacy when compared to Clinic-based mirror therapy and task specific training for improving motor function.	1	Hsieh et al. (2018a)
1b	Bilateral UE Training with Unilateral task-oriented training may not have a difference in efficacy when compared to Unilateral task-	1	Waller et al. (2014)

	oriented Training (using a hand orthosis) for improving motor function.		
1b	Constraint-induced movement therapy with bilateral arm training may not have a difference in efficacy when compared to Bimanual task-related training for improving motor function.	1	Brunner et al. (2012)
1b	Joystim virtual reality with real instrumentation training may not have a difference in efficacy when compared to Conventional therapy for improving motor function.	1	Oh et al. (2019)
1b	Myomo electromyography powered orthosis with repetitive task-specific practice (RTP) may not have a difference in efficacy when compared to Repetitive task-specific practice for improving motor function.	1	Page et al. (2020)
1b	Robot-Assisted Therapy with Bilateral Practice with Task-Specific Training may produce greater improvements in motor function than Conventional Care with Task-Specific Training.	1	Hsu et al. (2019)
1b	There is conflicting evidence about the effect of Robot therapy with task training (Inmotion) when compared to Robot therapy for improving motor function.	1	Conroy et al. (2019)
1b	Transcutaneous Electrical Nerve Stimulation and Task-Related Training may produce greater improvements in motor function than Sham Transcutaneous Electrical Nerve Stimulation and Task-Related Training.	1	Jung et al. (2017)
1b	There is conflicting evidence about the effect of Robot-assisted Group Therapy with Individual Arm Therapy when compared to Individual arm therapy for improving motor function.	1	Hesse et al. (2014)
1b	Leg rehab training may produce greater improvements in motor function than Immobilization therapy with inflatable pressure splint (arm and leg with splints).	1	Kwakkel et al. (1999)
1b	Low frequency repetitive transcranial magnetic stimulation with Motor Training may not have a difference in efficacy when compared to Sham repetitive transcranial magnetic stimulation with Motor Training for improving motor function.	1	Harvey et al. (2018)
2	Task Specific training with Trunk restraint training may produce greater improvements in motor function than Task Specific Training without Trunk restraint.	1	Writer & Nayak (2012)
1b	Repetitive peripheral sensory stimulation with functional electrical stimulation and task specific training may not have a difference in efficacy when compared to Sham RPSS with functional electrical stimulation and TST for improving motor function.	1	Conforto et al. (2021)
2	Rejoyce system with occupational therapy may not have a difference in efficacy when compared to task based exercises with occupational therapy for improving motor function.	1	Ozen et al. (2021)
1b	Forearm rotation orthosis with occupational therapy Task-Oriented (OTTO) may not have a difference in efficacy when compared to occupational therapy Task-Oriented (OTTO) for improving motor function.	1	Yu et al. (2021)
2	Anodal transcranial direct current stimulation with Repetitive Functional Task-Oriented Programme (RFTOP) may not have a difference in efficacy when compared to Repetitive Functional Task Oriented Programme for improving motor function.	1	Adeagbo et al. (2021)
1b	There is conflicting evidence about the effect of Transcutaneous electrical nerve stimulation with Task oriented occupational therapy and conventional therapy when compared to Sham transcutaneous electrical nerve stimulation with Task oriented occupational therapy and conventional therapy for improving motor function.	1	Moon et al. (2021)

1b	Sensorimotor therapy with conventional therapy may not have a difference in efficacy when compared to motor therapy with conventional rehab for improving motor function.	1	De Bruyn et al. (2021)
1b	Bi-transcutaneous electrical nerve stimulation with Task Oriented Training (TOT) may produce greater improvements in motor function than No Treatment.	1	Chen et al. (2022a)
2	Electromyography-driven Robot-assisted Hand Training may not have a difference in efficacy when compared to Task-Oriented intervention for improving motor function.	1	Chen et al. (2022b)
1b	Tenodesis-induced-group-exoskeleton robot (TIGER) training with Regular task-specific motor training may produce greater improvements in motor function than Conventional occupational therapy with Regular task-specific motor training.	1	Hsu et al. (2022a)
1b	Anodal transcranial direct current stimulation with motor imagery and upper-limb functional training may produce greater improvements in motor function than sham tCDS with motor imagery and upper-limb functional training.	1	Kashoo et al. (2022)
1b	Low-frequency repetitive transcranial magnetic stimulation with motor task practice may produce greater improvements in motor function than sham repetitive transcranial magnetic stimulation with motor task practice.	1	Luk et al. (2022)
1b	Action observation with task-specific training may not have a difference in efficacy when compared to Sham observation with task-specific training for improving motor function.	1	Shamili et al. (2022)
1b	Virtual reality with task based training may produce greater improvements in motor function than Task-specific Training.	1	Hegazy R.M. et al. (2022)
1b	CNMES with task oriented training and conventional rehab may not have a difference in efficacy when compared to electromyography-triggered neuromuscular electrical stimulation with task oriented training and conventional rehab for improving motor function.	1	Schick et al. (2022)
1b	Exoskeleton training Armule with TST may produce greater improvements in motor function than Conventional Rehab.	1	Chen et al. (2023a)
1b	Repetitive transcranial magnetic stimulation with TST may not have a difference in efficacy when compared to Sham repetitive transcranial magnetic stimulation with TST for improving motor function.	1	Edwards et al. (2023)
1b	There is conflicting evidence about the effect of Bilateral transcranial direct current stimulation with TST when compared to Sham transcranial direct current stimulation with TST for improving motor function.	1	Hsu et al. (2023)
1b	Orthosis assistance TIGER with conventional rehab may not have a difference in efficacy when compared to Task specific training at home with conventional for improving motor function.	1	Kuo et al. (2023a)
1b	Bilateral robotic priming training with mirror training (R-mirr) may produce greater improvements in motor function than Bilateral robotic priming training with movement oriented training.	1	Li et al. (2023)
1b	Bilateral upper limb robot-assisted training with Conventional Therapy may not have a difference in efficacy when compared to Task-specific Therapy with Conventional Therapy for improving motor function.	1	Tang et al. (2023)
1b	Portable brain-computer interface-based hand robot system with Conventional therapy and neuromuscular electrical stimulation may produce greater improvements in motor function than Task-specific training with Conventional therapy and neuromuscular electrical stimulation.	1	Fu J. et al. (2023)

1b	There is conflicting evidence about the effect of Gamified training with ArmAble with Conventional therapy when compared to UE task-based training with Conventional therapy for improving motor function.	1	Ali et al. (2024)
2	Virtual reality-based robot therapy with smart glove with task-oriented therapy may produce greater improvements in motor function than Task-oriented therapy.	1	Choi & Cho (2024)
1b	Forced-rate exercise with Repetitive task practice may not have a difference in efficacy when compared to Repetitive task practice for improving motor function.	1	Linder et al. (2024)
1b	Robotic hand therapy (with objects) with Task-Oriented training and Conventional therapy may produce greater improvements in motor function than Robotic hand therapy (without objects) with Conventional therapy.	1	Shi et al. (2024)
2	Transcutaneous electrical nerve stimulation with wrist extensor taping and Tast-related training may produce greater improvements in motor function than transcutaneous electrical nerve stimulation with task-related training.	1	Jung K.-S. et al. (2024)
1b	Bilateral repetitive transcranial magnetic stimulation (high-frequency repetitive transcranial magnetic stimulation with low-frequency repetitive transcranial magnetic stimulation) and Task-oriented therapy may produce greater improvements in motor function than Sham high-frequency repetitive transcranial magnetic stimulation with Sham low-frequency repetitive transcranial magnetic stimulation and Task-oriented therapy.	1	Abdelkader et al. (2024)
1b	Bilateral repetitive transcranial magnetic stimulation (high-frequency repetitive transcranial magnetic stimulation with low-frequency repetitive transcranial magnetic stimulation) and Task-oriented therapy may not have a difference in efficacy when compared to Excitatory repetitive transcranial magnetic stimulation (high-frequency repetitive transcranial magnetic stimulation with sham low-frequency repetitive transcranial magnetic stimulation) and Task-oriented therapy for improving motor function.	1	Abdelkader et al. (2024)
1b	Bilateral repetitive transcranial magnetic stimulation (high-frequency repetitive transcranial magnetic stimulation with low-frequency repetitive transcranial magnetic stimulation) and Task-oriented therapy may not have a difference in efficacy when compared to Inhibitory repetitive transcranial magnetic stimulation (sham high-frequency repetitive transcranial magnetic stimulation with low-frequency repetitive transcranial magnetic stimulation) and Task-oriented therapy for improving motor function.	1	Abdelkader et al. (2024)
1b	Excitatory repetitive transcranial magnetic stimulation (high-frequency repetitive transcranial magnetic stimulation with sham low-frequency repetitive transcranial magnetic stimulation) and Task-oriented therapy may not have a difference in efficacy when compared to Inhibitory repetitive transcranial magnetic stimulation (sham high-frequency repetitive transcranial magnetic stimulation with low-frequency repetitive transcranial magnetic stimulation) and Task-oriented therapy for improving motor function.	1	Abdelkader et al. (2024)
1b	There is conflicting evidence about the effect of Dextrain Manipulandum exercises (dexterity specific exercises with real-time feedback) with Conventional therapy when compared to Conventional therapy for improving motor function.	1	Teremetz et al. (2023)
2	Task-Oriented Training may produce greater improvements in motor function than Table-Top Activity Training.	1	Choi et al. (2022b)

1a	Task-specific training combined with other interventions may not have a difference in efficacy when compared to exercise and custom physiotherapy protocols for improving motor function.	2	Milot et al. (2019); Skubik-Peplaski et al. (2017)
2	Task-specific training combined with other interventions may not have a difference in efficacy when compared to neurodevelopmental techniques (bobath approach) for improving motor function.	1	Jong-HoonMoon et al. (2018)
1b	There is conflicting evidence about the effect of Forced aerobic exercise with Repetitive task practice(RTP) when compared to Voluntary exercise with RTP for improving motor function.	1	Linder et al. (2017)
1b	Auditory imagery with task specific training may not have a difference in efficacy when compared to Cumulative imagery with task specific training for improving motor function.	1	Ahmad 2014 et al. (2014)
1b	Visual imagery with task specific training may not have a difference in efficacy when compared to Cumulative imagery with task specific training for improving motor function.	1	Ahmad 2014 et al. (2014)
2	There is conflicting evidence about the effect of Saebo flex Orthotic splint with intensive training when compared to Orthotic splint for improving motor function.	1	Jeon et al. (2012)
2	Reach-To-Grasp with robot feedback with Conventional therapy may produce greater improvements in motor function than Conventional therapy.	1	Feingold-Polak et al. (2024)
2	Reach-To-Grasp with computer feedback with Conventional therapy may not have a difference in efficacy when compared to Conventional therapy for improving motor function.	1	Feingold-Polak et al. (2024)
2	Reach-To-Grasp with robot feedback with Conventional therapy may not have a difference in efficacy when compared to Reach-To-Grasp with computer feedback with Conventional therapy for improving motor function.	1	Feingold-Polak et al. (2024)
2	Transcutaneous auricular vagus nerve stimulation with task-oriented training may produce greater improvements in motor function than Task-oriented training.	1	Wang M.-H. et al. (2024)
1b	EMG paired taVNS with TST may not have a difference in efficacy when compared to Active unpaired taVNS with TST for improving motor function.	1	Badran et al. (2023)
1b	Sensory Relearning with Task-Specific Training and home exercise may not have a difference in efficacy when compared to Task-Specific Training with strength training for improving motor function.	1	Carlsson et al. (2022)
1b	There is conflicting evidence about the effect of Robotic Therapy (Armeo Spring & Amadeo) with Task Oriented Training with Active Learning Program for Stroke (ALPS) when compared to Robotic Therapy with Active Learning Program for Stroke (ALPS) for improving motor function.	1	Fasoli et al. (2019)
1b	There is conflicting evidence about the effect of Kinesiotaping with stretching & task specific trainings and conventional rehab when compared to stretching & task specific trainings with conventional rehab and Conventional Therapy for improving motor function.	1	Huang et al. (2019b)
1b	Bilateral robotic priming (Bi-Manu-Track) with task oriented exercises may not have a difference in efficacy when compared to Task oriented exercises for improving motor function.	1	Hsieh et al. (2017)
1b	Atomoxetine with Task Oriented Upper Extremity Training may not have a difference in efficacy when compared to Placebo with Task Oriented Upper Extremity Training for improving motor function.	1	Ward et al. (2017)
1b	Action observation with task-specific training may produce greater improvements in motor function than Task-specific training.	1	Kim & Bang (2016)

1b	1 Hz rTMS with task oriented exercise may not have a difference in efficacy when compared to Sham rTMS with task oriented exercise for improving motor function.	1	Higgins et al. (2015)
1b	Taping with Task specific training may not have a difference in efficacy when compared to Task specific training for improving motor function.	1	Kim & Kim (2015b)
1b	High frequency (10Hz) rTMS with task-oriented training may produce greater improvements in motor function than Sham rTMS with task-oriented training.	1	Kim et al. (2014b)
2	Robotic orthosis with Task-Specific training and Videogames (Unilateral) may not have a difference in efficacy when compared to Usual Physical Therapy for improving motor function.	1	Byl et al. (2013)
2	Robotic orthosis with Task-Specific Training and Videogames (Bilateral) may not have a difference in efficacy when compared to Usual Physical Therapy for improving motor function.	1	Byl et al. (2013)
2	Myomo brace (EMG triggered micro robot device) with repetitive task practice may not have a difference in efficacy when compared to Repetitive task practice for improving motor function.	1	Page et al. (2013)
1b	FES with Task specific training may produce greater improvements in motor function than Sham with Task specific training.	1	Thorsen et al. (2013)
1b	Dynamic Wrist hand orthosis (wearing while doing reach and grasp practice) with home exercise may not have a difference in efficacy when compared to Manual-assisted reach and grasp training therapy with home exercise for improving motor function.	1	Barry et al. (2012)
1b	PNES with Task Specific Training may not have a difference in efficacy when compared to Task-Specific Training for improving motor function.	1	IkuNo et al. (2012)
1b	FES with botulinum toxin-A and home based task-oriented exercise may not have a difference in efficacy when compared to Botulinum toxin-A with home-based exercise program for improving motor function.	1	Weber et al. (2010)
2	FES with Standard task-specific training may produce greater improvements in motor function than Standard task-specific training.	1	Alon et al. (2007)
2	Cable orthosis with Virtual Reality may not have a difference in efficacy when compared to Virtual Reality for improving motor function.	1	Fischer et al. (2007)
2	Pneumatic orthosis with Virtual Reality may not have a difference in efficacy when compared to Virtual Reality for improving motor function.	1	Fischer et al. (2007)
1b	Task-specific training with Peripheral Nerve Stimulation may not have a difference in efficacy when compared to Task-specific training with Sham Stimulation for improving motor function.	1	McDonnell et al. (2007)
1b	NMES with repetitive facilitative exercise may not have a difference in efficacy when compared to Conventional Therapy for improving motor function.	1	ShimodozoNo et al. (2014)
1b	Repetitive facilitative exercise may produce greater improvements in motor function than Conventional Therapy.	1	ShimodozoNo et al. (2014)
1b	There is conflicting evidence about the effect of Whole-Body Vibration (5-15 Hz) when compared to Conventional Physical Therapy for improving motor function.	1	Lee et al. (2016e)
1b	Whole-Body Vibration with Task-Related Training may produce greater improvements in motor function than Conventional Physical Therapy.	1	Lee et al. (2016e)

1b	ARMEO exoskeleton with conventional care may not have a difference in efficacy when compared to Tabletop assisted exercises with conventional therapy for improving motor function.	1	Esquenazi et al. (2021)

STROKE SEVERITY			
LoE	**Conclusion Statement**	**RCTs**	**References**
1b	Task-specific training combined with other interventions may not have a difference in efficacy when compared to task-specific training for improving stroke severity.	1	Li et al. (2024a)
1b	Task-specific training may not have a difference in efficacy when compared to conventional therapy for improving stroke severity.	2	Hubbard et al. (2015); Nelles et al. (2001)
1b	Dynamic resistance training (POWER) may not have a difference in efficacy when compared to Functional Task Practice (FTP) for improving stroke severity.	1	Corti et al. (2012)
1b	Repetitive transcranial magnetic stimulation with Task Based occupational Therapy may not have a difference in efficacy when compared to Sham repetitive transcranial magnetic stimulation with Task Based Occupational Therapy for improving stroke severity.	1	Kim et al. (2020a)
1b	High-dose electrical somatosensory stimulation with task oriented training may not have a difference in efficacy when compared to Sham (Low dose) with task oriented training for improving stroke severity.	1	Ghaziani et al. (2018)
2	Rejoyce system with occupational therapy may not have a difference in efficacy when compared to task based exercises with occupational therapy for improving stroke severity.	1	Ozen et al. (2021)
1b	Repetitive transcranial magnetic stimulation with TST may not have a difference in efficacy when compared to Sham repetitive transcranial magnetic stimulation with TST for improving stroke severity.	1	Edwards et al. (2023)
1b	Gamified training with ArmAble with Conventional therapy may not have a difference in efficacy when compared to UE task-based training with Conventional therapy for improving stroke severity.	1	Ali et al. (2024)
1b	Task-specific training combined with other interventions may produce greater improvements in stroke severity than conventional therapy.	1	Kirac-Unal et al. (2019)
1b	Kinesiotaping with stretching & task specific trainings and conventional rehab may not have a difference in efficacy when compared to stretching & task specific trainings with conventional rehab and Conventional Therapy for improving stroke severity.	1	Huang et al. (2019b)
1b	Bilateral robotic priming (Bi-Manu-Track) with task oriented exercises may not have a difference in efficacy when compared to Task oriented exercises for improving stroke severity.	1	Hsieh et al. (2017)
1b	Taping with Task specific training may not have a difference in efficacy when compared to Task specific training for improving stroke severity.	1	Kim & Kim (2015b)
2	Active-assistive reaching exercise using a robotic device (Arm Guide) may not have a difference in efficacy when compared to Task-matched amount of reaching without assistance for improving stroke severity.	1	Kahn et al. (2006)

MUSCLE STRENGTH			
LoE	**Conclusion Statement**	**RCTs**	**References**
1a	Task-specific training combined with other interventions may produce greater improvements in muscle strength than task-specific training.	6	Li et al. (2024a); Wong et al. (2022); BaziledaSilva et al. (2015); Patten et al. (2013); Michaelsen et al. (2006); Dean et al. (2000b)
1b	Different approaches to task-specific training combined with other interventions may not have a difference in efficacy when compared with one another for improving muscle strength.	2	Folkerts et al. (2017); Hung et al. (2016)
1b	Different approaches to task-specific training may not have a difference in efficacy when compared with one another for improving muscle strength.	1	Ross et al. (2009)
1a	Task-specific training combined with other interventions may not have a difference in efficacy when compared to conventional therapy for improving muscle strength.	3	Minami et al. (2021); Kirac-Unal et al. (2019); Winstein et al. (2004)
1b	Task-specific training may not have a difference in efficacy when compared to no treatment for improving muscle strength.	1	Almhdawi et al. (2016)
1b	Task-Specific Circuit Training may not have a difference in efficacy when compared to Stretching with Memory exercises and Education for improving muscle strength.	1	Martins et al. (2020)
1b	Unilateral and bilateral task oriented exercises may not have a difference in efficacy when compared to Walking tasks for improving muscle strength.	1	Higgins et al. (2006)
2	Whole-body vibration with Task Oriented Training and Conventional physical therapy may produce greater improvements in muscle strength than Upper- and lower-Cycle group with Task Specific Training and Conventional physical therapy.	1	Ahn et al. (2019)
1b	Task-oriented training with non-immersive virtual reality with conventional rehabilitation may not have a difference in efficacy when compared to task-oriented training with simple recreational activities with conventional rehabilitation for improving muscle strength.	1	Saposnik et al. (2016)
1b	Low frequency repetitive transcranial magnetic stimulation with pinch motor training (a metronome-paced pinch of their index finger and thumb of the affected hand as fast as possible) may produce greater improvements in muscle strength than pinch motor training with sham repetitive transcranial magnetic stimulation.	1	Takeuchi et al. (2008)
1b	Repetitive transcranial magnetic stimulation with Task Based occupational Therapy may not have a difference in efficacy when compared to Sham repetitive transcranial magnetic stimulation with Task Based Occupational Therapy for improving muscle strength.	1	Kim et al. (2020a)
1b	High-dose electrical somatosensory stimulation with task oriented training may not have a difference in efficacy when compared to Sham (Low dose) with task oriented training for improving muscle strength.	1	Ghaziani et al. (2018)
1b	Virtual reality keypad or glove (PneuGlove) may not have a difference in efficacy when compared to Task Specific Training Occupational Therapy for improving muscle strength.	1	Thielbar et al. (2014)
1b	Functional task practice with repetitive transcranial magnetic stimulation may not have a difference in efficacy when compared to Functional task practice with Sham repetitive transcranial magnetic stimulation for improving muscle strength.	1	Rose et al. (2014)

2	Three-Dimensional Printed Dynamic Hand Device with Task-Specific Training may not have a difference in efficacy when compared to Task-Specific Training for improving muscle strength.	1	Huang et al. (2019a)
1b	There is conflicting evidence about the effect of Joystim virtual reality with real instrumentation training when compared to Conventional therapy for improving muscle strength.	1	Oh et al. (2019)
1b	Transcutaneous Electrical Nerve Stimulation and Task-Related Training may produce greater improvements in muscle strength than Sham Transcutaneous Electrical Nerve Stimulation and Task-Related Training.	1	Jung et al. (2017)
1b	Robot-assisted Group Therapy with Individual Arm Therapy may not have a difference in efficacy when compared to Individual arm therapy for improving muscle strength.	1	Hesse et al. (2014)
1b	Repetitive peripheral sensory stimulation with functional electrical stimulation and task specific training may not have a difference in efficacy when compared to Sham RPSS with functional electrical stimulation and TST for improving muscle strength.	1	Conforto et al. (2021)
1b	Low-frequency repetitive transcranial magnetic stimulation with motor task practice may not have a difference in efficacy when compared to sham repetitive transcranial magnetic stimulation with motor task practice for improving muscle strength.	1	Luk et al. (2022)
1b	Virtual reality with task based training may produce greater improvements in muscle strength than Task-specific Training.	1	Hegazy R.M. et al. (2022)
1b	Bilateral robotic priming training with mirror training (R-mirr) may not have a difference in efficacy when compared to Bilateral robotic priming training with movement oriented training for improving muscle strength.	1	Li et al. (2023)
1b	Gamified training with ArmAble with Conventional therapy may not have a difference in efficacy when compared to UE task-based training with Conventional therapy for improving muscle strength.	1	Ali et al. (2024)
1b	Robotic hand therapy (with objects) with Task-Oriented training and Conventional therapy may produce greater improvements in muscle strength than Robotic hand therapy (without objects) with Conventional therapy.	1	Shi et al. (2024)
2	Transcutaneous electrical nerve stimulation with wrist extensor taping and Tast-related training may not have a difference in efficacy when compared to transcutaneous electrical nerve stimulation with task-related training for improving muscle strength.	1	Jung K.-S. et al. (2024)
2	Progressive unsupported reaching tasks may not have a difference in efficacy when compared to Supported reaching tasks for improving muscle strength.	1	Ellis et al. (2009)
1b	Dextrain Manipulandum exercises (dexterity specific exercises with real-time feedback) with Conventional therapy may not have a difference in efficacy when compared to Conventional therapy for improving muscle strength.	1	Terematz et al. (2023)
1b	Task-specific training combined with other interventions may not have a difference in efficacy when compared to exercise and custom physiotherapy protocols for improving muscle strength.	1	Milot et al. (2019)
1b	Bilateral robotic priming (Bi-Manu-Track) with task oriented exercises may not have a difference in efficacy when compared to Task oriented exercises for improving muscle strength.	1	Hsieh et al. (2017)
2	Robotic orthosis with Task-Specific training and Videogames (Unilateral) may not have a difference in efficacy when compared to Usual Physical Therapy for improving muscle strength.	1	Byl et al. (2013)

2	Robotic orthosis with Task-Specific Training and Videogames (Bilateral) may not have a difference in efficacy when compared to Usual Physical Therapy for improving muscle strength.	1	Byl et al. (2013)
1b	Dynamic Wrist hand orthosis (wearing while doing reach and grasp practice) with home exercise may not have a difference in efficacy when compared to Manual-assisted reach and grasp training therapy with home exercise for improving muscle strength.	1	Barry et al. (2012)
1b	PNES with Task Specific Training may not have a difference in efficacy when compared to Task-Specific Training for improving muscle strength.	1	IkuNo et al. (2012)
2	Cable orthosis with Virtual Reality may not have a difference in efficacy when compared to Virtual Reality for improving muscle strength.	1	Fischer et al. (2007)
2	Pneumatic orthosis with Virtual Reality may not have a difference in efficacy when compared to Virtual Reality for improving muscle strength.	1	Fischer et al. (2007)
1b	There is conflicting evidence about the effect of Task-specific training with Peripheral Nerve Stimulation when compared to Task-specific training with Sham Stimulation for improving muscle strength.	1	McDonnell et al. (2007)
1b	Whole-Body Vibration (5-15 Hz) may not have a difference in efficacy when compared to Conventional Physical Therapy for improving muscle strength.	1	Lee et al. (2016e)
1b	Whole-Body Vibration with Task-Related Training may produce greater improvements in muscle strength than Conventional Physical Therapy.	1	Lee et al. (2016e)

SPASTICITY			
LoE	**Conclusion Statement**	**RCTs**	**References**
2	Task-related Training (Grasping or Retrieving Objects) may not have a difference in efficacy when compared to Progressive Resistive Exercises for improving spasticity.	1	Thielman et al. (2004)
1a	Task-specific training combined with other interventions may not have a difference in efficacy when compared to task-specific training for improving spasticity.	5	Li et al. (2024a); Wong et al. (2022); Hsu et al. (2020); BaziledaSilva et al. (2015); Patten et al. (2013)
1b	Impairment oriented training Arm BASIS with usual treatment may not have a difference in efficacy when compared to usual treatment for improving spasticity.	1	Platz et al. (2005)
1b	Impairment oriented training Arm BASIS with usual treatment may not have a difference in efficacy when compared to Bobath therapy with usual treatment for improving spasticity.	1	Platz et al. (2005)
1b	Task-specific training combined with other interventions may produce greater improvements in spasticity than conventional therapy.	1	Wang et al. (2023f)
1b	Constraint induced movement therapy (constraint-induced movement therapy) with Conventional rehabilitation may produce greater improvements in spasticity than Upper limb task-oriented training with Conventional rehabilitation.	1	Wang et al. (2023f)
1b	Task-specific training combined with other interventions may not have a difference in efficacy when compared to task-specific training or sham for improving spasticity.	1	Kim et al. (2013a)
2	Task Specific Training may produce greater improvements in spasticity than Proprioceptive Neuromuscular Facilitation.	1	Anandan et al. (2020)

1b	Dynamic resistance training (POWER) may not have a difference in efficacy when compared to Functional Task Practice (FTP) for improving spasticity.	1	Corti et al. (2012)
1b	Repetitive transcranial magnetic stimulation with Task Based occupational Therapy may not have a difference in efficacy when compared to Sham repetitive transcranial magnetic stimulation with Task Based Occupational Therapy for improving spasticity.	1	Kim et al. (2020a)
1b	Functional task practice with repetitive transcranial magnetic stimulation may not have a difference in efficacy when compared to Functional task practice with Sham repetitive transcranial magnetic stimulation for improving spasticity.	1	Rose et al. (2014)
1b	Electrically assisted movement therapy (functional electrical stimulation with task specific) may not have a difference in efficacy when compared to care for improving spasticity.	1	Carda et al. (2017)
1b	Bilateral UE Training with Unilateral task-oriented training may not have a difference in efficacy when compared to Unilateral task-oriented Training (using a hand orthosis) for improving spasticity.	1	Waller et al. (2014)
1b	Joystim virtual reality with real instrumentation training may not have a difference in efficacy when compared to Conventional therapy for improving spasticity.	1	Oh et al. (2019)
1b	Robot-assisted Group Therapy with Individual Arm Therapy may not have a difference in efficacy when compared to Individual arm therapy for improving spasticity.	1	Hesse et al. (2014)
1b	Repetitive peripheral sensory stimulation with functional electrical stimulation and task specific training may not have a difference in efficacy when compared to Sham RPSS with functional electrical stimulation and TST for improving spasticity.	1	Conforto et al. (2021)
1b	Transcutaneous electrical nerve stimulation with Task oriented occupational therapy and conventional therapy may not have a difference in efficacy when compared to Sham transcutaneous electrical nerve stimulation with Task oriented occupational therapy and conventional therapy for improving spasticity.	1	Moon et al. (2021)
1b	Tenodesis-induced-group-exoskeleton robot (TIGER) training with Regular task-specific motor training may not have a difference in efficacy when compared to Conventional occupational therapy with Regular task-specific motor training for improving spasticity.	1	Hsu et al. (2022a)
1b	Orthosis assistance TIGER with conventional rehab may not have a difference in efficacy when compared to Task specific training at home with conventional for improving spasticity.	1	Kuo et al. (2023a)
1b	Robotic hand therapy (with objects) with Task-Oriented training and Conventional therapy may not have a difference in efficacy when compared to Robotic hand therapy (without objects) with Conventional therapy for improving spasticity.	1	Shi et al. (2024)
2	Transcutaneous electrical nerve stimulation with wrist extensor taping and Tast-related training may produce greater improvements in spasticity than transcutaneous electrical nerve stimulation with task-related training.	1	Jung K.-S. et al. (2024)
1b	Bilateral repetitive transcranial magnetic stimulation (high-frequency repetitive transcranial magnetic stimulation with low-frequency repetitive transcranial magnetic stimulation) and Task-oriented therapy may not have a difference in efficacy when compared to Sham high-frequency repetitive transcranial magnetic stimulation with Sham low-frequency repetitive transcranial magnetic stimulation and Task-oriented therapy for improving spasticity.	1	Abdelkader et al. (2024)
1b	Bilateral repetitive transcranial magnetic stimulation (high-frequency repetitive transcranial magnetic stimulation with low-frequency	1	Abdelkader et al. (2024)

	repetitive transcranial magnetic stimulation) and Task-oriented therapy may not have a difference in efficacy when compared to Excitatory repetitive transcranial magnetic stimulation (high-frequency repetitive transcranial magnetic stimulation with sham low-frequency repetitive transcranial magnetic stimulation) and Task-oriented therapy for improving spasticity.		
1b	Bilateral repetitive transcranial magnetic stimulation (high-frequency repetitive transcranial magnetic stimulation with low-frequency repetitive transcranial magnetic stimulation) and Task-oriented therapy may not have a difference in efficacy when compared to Inhibitory repetitive transcranial magnetic stimulation (sham high-frequency repetitive transcranial magnetic stimulation with low-frequency repetitive transcranial magnetic stimulation) and Task-oriented therapy for improving spasticity.	1	Abdelkader et al. (2024)
1b	Excitatory repetitive transcranial magnetic stimulation (high-frequency repetitive transcranial magnetic stimulation with sham low-frequency repetitive transcranial magnetic stimulation) and Task-oriented therapy may not have a difference in efficacy when compared to Inhibitory repetitive transcranial magnetic stimulation (sham high-frequency repetitive transcranial magnetic stimulation with low-frequency repetitive transcranial magnetic stimulation) and Task-oriented therapy for improving spasticity.	1	Abdelkader et al. (2024)
1b	Task-specific training combined with other interventions may not have a difference in efficacy when compared to exercise and custom physiotherapy protocols for improving spasticity.	1	Milot et al. (2019)
1b	Robotic Therapy (Armeo Spring & Amadeo) with Task Oriented Training with Active Learning Program for Stroke (ALPS) may not have a difference in efficacy when compared to Robotic Therapy with Active Learning Program for Stroke (ALPS) for improving spasticity.	1	Fasoli et al. (2019)
1b	Kinesiotaping with stretching & task specific trainings and conventional rehab may not have a difference in efficacy when compared to stretching & task specific trainings with conventional rehab and Conventional Therapy for improving spasticity.	1	Huang et al. (2019b)
1b	Action observation with task-specific training may not have a difference in efficacy when compared to Task-specific training for improving spasticity.	1	Kim & Bang (2016)
2	Robotic orthosis with Task-Specific training and Videogames (Unilateral) may not have a difference in efficacy when compared to Usual Physical Therapy for improving spasticity.	1	Byl et al. (2013)
2	Robotic orthosis with Task-Specific Training and Videogames (Bilateral) may not have a difference in efficacy when compared to Usual Physical Therapy for improving spasticity.	1	Byl et al. (2013)
2	Cable orthosis with Virtual Reality may not have a difference in efficacy when compared to Virtual Reality for improving spasticity.	1	Fischer et al. (2007)
2	Pneumatic orthosis with Virtual Reality may not have a difference in efficacy when compared to Virtual Reality for improving spasticity.	1	Fischer et al. (2007)
1b	NMES with repetitive facilitative exercise may not have a difference in efficacy when compared to Conventional Therapy for improving spasticity.	1	ShimodozoNo et al. (2014)
1b	Repetitive facilitative exercise may not have a difference in efficacy when compared to Conventional Therapy for improving spasticity.	1	ShimodozoNo et al. (2014)
1b	Whole-Body Vibration (5-15 Hz) may not have a difference in efficacy when compared to Conventional Physical Therapy for improving spasticity.	1	Lee et al. (2016e)

1b	Whole-Body Vibration with Task-Related Training may produce greater improvements in spasticity than Conventional Physical Therapy.	1	Lee et al. (2016e)
1b	ARMEO exoskeleton with conventional care may not have a difference in efficacy when compared to Tabletop assisted exercises with conventional therapy for improving spasticity.	1	Esquenazi et al. (2021)

RANGE OF MOTION			
LoE	**Conclusion Statement**	**RCTs**	**References**
1a	Task-specific training combined with other interventions may produce greater improvements in range of motion than task-specific training.	2	Li et al. (2024a); BaziledaSilva et al. (2015)
2	Different approaches to task-specific training combined with other interventions may not have a difference in efficacy when compared with one another for improving range of motion.	1	Thielman et al. (2008)
1b	Task-specific training may not have a difference in efficacy when compared to no treatment for improving range of motion.	1	Almhdawi et al. (2016)
1b	Personalized reach training (active control-restricted range) with anodal transcranial direct current stimulation and Virtual reality games may not have a difference in efficacy when compared to Personal reach training (active control-restricted range) with Sham transcranial direct current stimulation and video games for improving range of motion.	1	Levin et al. (2023)
1b	Dynamic resistance training (POWER) may not have a difference in efficacy when compared to Functional Task Practice (FTP) for improving range of motion.	1	Corti et al. (2012)
1b	Repetitive motor task under vibratory feedback may not have a difference in efficacy when compared to Repetitive motor task for improving range of motion.	1	Cruz et al. (2014)
1b	Functional task practice with repetitive transcranial magnetic stimulation may not have a difference in efficacy when compared to Functional task practice with Sham repetitive transcranial magnetic stimulation for improving range of motion.	1	Rose et al. (2014)
2	Electromyography biofeedback with task practice may not have a difference in efficacy when compared to Sham biofeedback with task practice for improving range of motion.	1	Wolf et al. (1994)
1b	Transcutaneous Electrical Nerve Stimulation and Task-Related Training may produce greater improvements in range of motion than Sham Transcutaneous Electrical Nerve Stimulation and Task-Related Training.	1	Jung et al. (2017)
2	Task Specific training with Trunk restraint training may produce greater improvements in range of motion than Task Specific Training without Trunk restraint.	1	Writer & Nayak (2012)
1b	Repetitive peripheral sensory stimulation with functional electrical stimulation and task specific training may not have a difference in efficacy when compared to Sham RPSS with functional electrical stimulation and TST for improving range of motion.	1	Conforto et al. (2021)
1b	There is conflicting evidence about the effect of Orthosis assistance TIGER with conventional rehab when compared to Task specific training at home with conventional for improving range of motion.	1	Kuo et al. (2023a)
1b	Robotic hand therapy (with objects) with Task-Oriented training and Conventional therapy may produce greater improvements in range of motion than Robotic hand therapy (without objects) with Conventional therapy.	1	Shi et al. (2024)

2	Contralaterally controlled functional electrical stimulation with Task specific training may produce greater improvements in range of motion than Cyclic neuromuscular electrical stimulation with Task specific training.	1	Knutson et al. (2012)
2	Cable orthosis with Virtual Reality may not have a difference in efficacy when compared to Virtual Reality for improving range of motion.	1	Fischer et al. (2007)
2	Pneumatic orthosis with Virtual Reality may not have a difference in efficacy when compared to Virtual Reality for improving range of motion.	1	Fischer et al. (2007)
1b	NMES with repetitive facilitative exercise may not have a difference in efficacy when compared to Conventional Therapy for improving range of motion.	1	ShimodozoNo et al. (2014)
1b	Repetitive facilitative exercise may not have a difference in efficacy when compared to Conventional Therapy for improving range of motion.	1	ShimodozoNo et al. (2014)
1b	ARMEO exoskeleton with conventional care may produce greater improvements in range of motion than Tabletop assisted exercises with conventional therapy.	1	Esquenazi et al. (2021)

PROPRIOCEPTION			
LoE	**Conclusion Statement**	**RCTs**	**References**
1b	High-dose electrical somatosensory stimulation with task oriented training may not have a difference in efficacy when compared to Sham (Low dose) with task oriented training for improving proprioception.	1	Ghaziani et al. (2018)
1b	Mirror therapy with task-oriented functional practice may not have a difference in efficacy when compared to task-oriented functional practice for improving proprioception.	1	Wu et al. (2013b)
1b	Sensorimotor Training with conventional therapy may not have a difference in efficacy when compared to Motor Training (Task-specific Training ands table top games) with conventional therapy for improving proprioception.	1	De Bruyn et al. (2020)
2	Home-based mirror therapy and task specific training may not have a difference in efficacy when compared to Clinic-based mirror therapy and task specific training for improving proprioception.	1	Hsieh et al. (2018a)
1b	Sensorimotor therapy with conventional therapy may not have a difference in efficacy when compared to motor therapy with conventional rehab for improving proprioception.	1	De Bruyn et al. (2021)
1b	Dextrain Manipulandum exercises (dexterity specific exercises with real-time feedback) with Conventional therapy may not have a difference in efficacy when compared to Conventional therapy for improving proprioception.	1	Teremetz et al. (2023)
1b	Task-specific training combined with other interventions may produce greater improvements in proprioception than task-specific training.	1	Hsu et al. (2020)
1b	There is conflicting evidence about the effect of Sensory Relearning with Task-Specific Training and home exercise when compared to Task-Specific Training with strength training for improving proprioception.	1	Carlsson et al. (2022)
1b	Orthosis assistance TIGER with conventional rehab may not have a difference in efficacy when compared to Task specific training at home with conventional for improving proprioception.	1	Kuo et al. (2023a)

1b	Repetitive task exercise with sensory amplitude electrical stimulation (SES) may not have a difference in efficacy when compared to repetitive task exercise with Sham stimulation for improving proprioception.	1	Sullivan et al. (2012)

2. Activities

ACTIVITIES OF DAILY LIVING			
LoE	**Conclusion Statement**	**RCTs**	**References**
1a	Task-specific training combined with other interventions may not have a difference in efficacy when compared to task-specific training for improving performance of activities of daily living.	6	Li et al. (2024a); Wong et al. (2022); Hsu et al. (2020); Song et al. (2019); Ahmad 2014 et al. (2014); Patten et al. (2013)
1b	Task-specific training may not have a difference in efficacy when compared to conventional therapy for improving performance of activities of daily living.	7	Zaman et al. (2024); Alsubiheen et al. (2022); Aydilek et al. (2022); Song et al. (2020); Marryam et al. (2017); Pelicioni et al. (2016); Hubbard et al. (2015)
1b	Group Circuit may not have a difference in efficacy when compared to high intensity physio or usual physiotherapy for improving performance of activities of daily living.	1	English et al. (2015)
1b	Functional integrative rehabilitation approache may not have a difference in efficacy when compared to sensorimotor integrative rehabilitation approache for improving performance of activities of daily living.	1	Jongbloed et al. (1989)
1a	Different approaches to task-specific training may not have a difference in efficacy when compared with one another for improving performance of activities of daily living.	2	Lang et al. (2016); Ross et al. (2009)
1a	There is conflicting evidence about the effect of Task-specific training combined with other interventions when compared to conventional therapy for improving performance of activities of daily living.	3	Wang et al. (2023f); Minami et al. (2021); Kirac-Unal et al. (2019)
1b	Constraint induced movement therapy (constraint-induced movement therapy) with Conventional rehabilitation may produce greater improvements in performance of activities of daily living than Upper limb task-oriented training with Conventional rehabilitation.	1	Wang et al. (2023f)
1a	Task-specific training may produce greater improvements in performance of activities of daily living than no treatment.	2	Winstein et al. (2019); Almhdawi et al. (2016)
1b	Unilateral and bilateral task oriented exercises may not have a difference in efficacy when compared to Walking tasks for improving performance of activities of daily living.	1	Higgins et al. (2006)
1b	Task-specific training may produce greater improvements in performance of activities of daily living than training using the Bobath approach.	1	Arya et al. (2012)
1b	Autonomy support (training with more-affected arm and could actively adjust task difficulty) with Verbal feedback may not have a difference in efficacy when compared to Training with more-affected arm with no opportunity to adjust difficulty with General verbal feedback for improving performance of activities of daily living.	1	Kim et al. (2023c)
2	Task-oriented training with conventional therapy may produce greater improvements in performance of activities of daily living than Progressive resistance exercise with conventional therapy.	1	Chintamani R. (2024)
1b	Mirror therapy with Mesh glove (afferent stimulation, primarily neuromuscular electrical stimulation) may not have a difference in	1	Lin et al. (2014a)

	efficacy when compared to task oriented exercise for improving performance of activities of daily living.		
1b	Mirror therapy with Mesh glove (afferent stimulation, primarily neuromuscular electrical stimulation) may not have a difference in efficacy when compared to Mirror therapy for improving performance of activities of daily living.	1	Lin et al. (2014a)
1b	Botulinum Toxin A with Task Specific Training may not have a difference in efficacy when compared to Task-Specific Training for improving performance of activities of daily living.	1	Umar et al. (2018)
1b	Task-oriented training with non-immersive virtual reality with conventional rehabilitation may not have a difference in efficacy when compared to task-oriented training with simple recreational activities with conventional rehabilitation for improving performance of activities of daily living.	1	Saposnik et al. (2016)
1b	Task-oriented Robotic arm training (Haptic Master) may not have a difference in efficacy when compared to Task oriented arm training for improving performance of activities of daily living.	1	Timmermans et al. (2014)
1b	120min electrical stimulation with repetitive task specific practice may produce greater improvements in performance of activities of daily living than 60min electrical stimulation therapy with repetitive task specific practice or 30min electrical stimulation therapy and repetitive task specific practice.	1	Page et al. (2012)
1b	Received modifed constraint-induced movement therapy with task-specific training 3hr may produce greater improvements in performance of activities of daily living than Traditional therapy.	1	Abdullahi et al. (2018)
1b	Received modifed constraint-induced movement therapy with task-specific training 3hr may not have a difference in efficacy when compared to constraint-induced movement therapy-received 300 repetitions of task specific training or constraint-induced movement therapy with 600 repetitions task specific training for improving performance of activities of daily living.	1	Abdullahi et al. (2018)
1b	Repetitive transcranial magnetic stimulation with Task Based occupational Therapy may not have a difference in efficacy when compared to Sham repetitive transcranial magnetic stimulation with Task Based Occupational Therapy for improving performance of activities of daily living.	1	Kim et al. (2020a)
2	Nintendo Wii virtual reality training with Usual Care (conventional occupational therapy) may not have a difference in efficacy when compared to dose matched task oriented therapy (as Conventional therapy) with Usual Care (conventional occupational therapy) or Usual Care (conventional occupational therapy) for improving performance of activities of daily living.	1	Kong et al. (2016)
2	Contralaterally controlled functional electrical stimulation with Task specific training may produce greater improvements in performance of activities of daily living than Cyclic neuromuscular electrical stimulation with Task specific training.	1	Knutson et al. (2012)
1b	Functional task practice with repetitive transcranial magnetic stimulation may not have a difference in efficacy when compared to Functional task practice with Sham repetitive transcranial magnetic stimulation for improving performance of activities of daily living.	1	Rose et al. (2014)
1b	Mirror therapy with task-oriented functional practice may not have a difference in efficacy when compared to task-oriented functional practice for improving performance of activities of daily living.	1	Wu et al. (2013b)
1b	Somatosensory (peripheral nerve) stimulation with task specific training may not have a difference in efficacy when compared to	1	Fleming et al. (2015)

	Sham stimulation with task specific training for improving performance of activities of daily living.		
1b	Repetitive task exercise with sensory amplitude electrical stimulation (SES) may not have a difference in efficacy when compared to repetitive task exercise with Sham stimulation for improving performance of activities of daily living.	1	Sullivan et al. (2012)
1b	Sensorimotor Training with conventional therapy may not have a difference in efficacy when compared to Motor Training (Task-specific Training ands table top games) with conventional therapy for improving performance of activities of daily living.	1	De Bruyn et al. (2020)
1b	Electrical Epidural Motor Cortex Stimulation (EECS) with Task specific Training may not have a difference in efficacy when compared to Task-specific training for improving performance of activities of daily living.	1	Levy et al. (2016)
1b	Electrically assisted movement therapy (functional electrical stimulation with task specific) may produce greater improvements in performance of activities of daily living than care.	1	Carda et al. (2017)
2	Home-based mirror therapy and task specific training may not have a difference in efficacy when compared to Clinic-based mirror therapy and task specific training for improving performance of activities of daily living.	1	Hsieh et al. (2018a)
1b	Constraint-induced movement therapy with bilateral arm training may not have a difference in efficacy when compared to Bimanual task-related training for improving performance of activities of daily living.	1	Brunner et al. (2012)
1b	Myomo electromyography powered orthosis with repetitive task-specific practice (RTP) may not have a difference in efficacy when compared to Repetitive task-specific practice for improving performance of activities of daily living.	1	Page et al. (2020)
1b	There is conflicting evidence about the effect of Robot-Assisted Therapy with Bilateral Practice with Task-Specific Training when compared to Conventional Care with Task-Specific Training for improving performance of activities of daily living.	1	Hsu et al. (2019)
1b	Robot-assisted Group Therapy with Individual Arm Therapy may not have a difference in efficacy when compared to Individual arm therapy for improving performance of activities of daily living.	1	Hesse et al. (2014)
1b	Leg rehab training may produce greater improvements in performance of activities of daily living than Immobilization therapy with inflatable pressure splint (arm and leg with splints).	1	Kwakkel et al. (1999)
1b	Repetitive peripheral sensory stimulation with functional electrical stimulation and task specific training may not have a difference in efficacy when compared to Sham RPSS with functional electrical stimulation and TST for improving performance of activities of daily living.	1	Conforto et al. (2021)
1b	Forearm rotation orthosis with occupational therapy Task-Oriented (OTTO) may not have a difference in efficacy when compared to occupational therapy Task-Oriented (OTTO) for improving performance of activities of daily living.	1	Yu et al. (2021)
1b	Transcutaneous electrical nerve stimulation with Task oriented occupational therapy and conventional therapy may not have a difference in efficacy when compared to Sham transcutaneous electrical nerve stimulation with Task oriented occupational therapy and conventional therapy for improving performance of activities of daily living.	1	Moon et al. (2021)
2	There is conflicting evidence about the effect of Electromyography-driven Robot-assisted Hand Training when	1	Chen et al. (2022b)

	compared to Task-Oriented intervention for improving performance of activities of daily living.		
1b	Tenodesis-induced-group-exoskeleton robot (TIGER) training with Regular task-specific motor training may not have a difference in efficacy when compared to Conventional occupational therapy with Regular task-specific motor training for improving performance of activities of daily living.	1	Hsu et al. (2022a)
1b	Action observation with task-specific training may produce greater improvements in performance of activities of daily living than Sham observation with task-specific training.	1	Shamili et al. (2022)
1b	There is conflicting evidence about the effect of Exoskeleton training Armule with TST when compared to Conventional Rehab for improving performance of activities of daily living.	1	Chen et al. (2023a)
1b	Orthosis assistance TIGER with conventional rehab may not have a difference in efficacy when compared to Task specific training at home with conventional for improving performance of activities of daily living.	1	Kuo et al. (2023a)
1b	Bilateral robotic priming training with mirror training (R-mirr) may not have a difference in efficacy when compared to Bilateral robotic priming training with movement oriented training for improving performance of activities of daily living.	1	Li et al. (2023)
1b	Bilateral upper limb robot-assisted training with Conventional Therapy may produce greater improvements in performance of activities of daily living than Task-specific Therapy with Conventional Therapy.	1	Tang et al. (2023)
2	There is conflicting evidence about the effect of Virtual reality-based robot therapy with smart glove with task-oriented therapy when compared to Task-oriented therapy for improving performance of activities of daily living.	1	Choi & Cho (2024)
1b	Dynamic resistance training (POWER) may not have a difference in efficacy when compared to Functional Task Practice (FTP) for improving performance of activities of daily living.	1	Corti et al. (2012)
1b	Electrical stim with repetitive task practice may produce greater improvements in performance of activities of daily living than Sham electrical with repetitive task practice.	1	Gharib et al. (2015)
1b	Dual transcranial direct current stimulation with bimanual cooperative task training may not have a difference in efficacy when compared to sham dual tDCS with bimanual cooperative task training for improving performance of activities of daily living.	1	Doost et al. (2019)
1b	Dextrain Manipulandum exercises (dexterity specific exercises with real-time feedback) with Conventional therapy may not have a difference in efficacy when compared to Conventional therapy for improving performance of activities of daily living.	1	Teremetz et al. (2023)
2	Task-Oriented Training may not have a difference in efficacy when compared to Table-Top Activity Training for improving performance of activities of daily living.	1	Choi et al. (2022b)
1a	Task-specific training combined with other interventions may not have a difference in efficacy when compared to exercise and custom physiotherapy protocols for improving performance of activities of daily living.	2	Milot et al. (2019); Skubik-Peplaski et al. (2017)
2	There is conflicting evidence about the effect of Task-specific training combined with other interventions when compared to neurodevelopmental techniques (bobath approach) for improving performance of activities of daily living.	1	Jong-HoonMoon et al. (2018)

1b	Auditory imagery with task specific training may not have a difference in efficacy when compared to Cumulative imagery with task specific training for improving performance of activities of daily living.	1	Ahmad 2014 et al. (2014)
1b	Visual imagery with task specific training may not have a difference in efficacy when compared to Cumulative imagery with task specific training for improving performance of activities of daily living.	1	Ahmad 2014 et al. (2014)
2	Task specific training with action observation may produce greater improvements in performance of activities of daily living than No treatment.	1	Lee et al. (2013c)
2	Reach-To-Grasp with robot feedback with Conventional therapy may not have a difference in efficacy when compared to Conventional therapy for improving performance of activities of daily living.	1	Feingold-Polak et al. (2024)
2	Reach-To-Grasp with computer feedback with Conventional therapy may not have a difference in efficacy when compared to Conventional therapy for improving performance of activities of daily living.	1	Feingold-Polak et al. (2024)
2	Transcutaneous auricular vagus nerve stimulation with task-oriented training may produce greater improvements in performance of activities of daily living than Task-oriented training.	1	Wang M.-H. et al. (2024)
1b	Sensory Relearning with Task-Specific Training and home exercise may not have a difference in efficacy when compared to Task-Specific Training with strength training for improving performance of activities of daily living.	1	Carlsson et al. (2022)
1b	Robotic Therapy (Armeo Spring & Amadeo) with Task Oriented Training with Active Learning Program for Stroke (ALPS) may not have a difference in efficacy when compared to Robotic Therapy with Active Learning Program for Stroke (ALPS) for improving performance of activities of daily living.	1	Fasoli et al. (2019)
1b	Occupation-based bilateral upper extremity training may produce greater improvements in performance of activities of daily living than Task-based bilateral upper extremity training.	1	Kim et al. (2019b)
1b	Bilateral robotic priming (Bi-Manu-Track) with task oriented exercises may not have a difference in efficacy when compared to Task oriented exercises for improving performance of activities of daily living.	1	Hsieh et al. (2017)
1b	Action observation with task-specific training may produce greater improvements in performance of activities of daily living than Task-specific training.	1	Kim & Bang (2016)
1b	1 Hz rTMS with task oriented exercise may not have a difference in efficacy when compared to Sham rTMS with task oriented exercise for improving performance of activities of daily living.	1	Higgins et al. (2015)
1b	Taping with Task specific training may result in lesser improvements in performance of activities of daily living when compared to Task specific training.	1	Kim & Kim (2015b)
2	Robotic orthosis with Task-Specific training and Videogames (Unilateral) may not have a difference in efficacy when compared to Usual Physical Therapy for improving performance of activities of daily living.	1	Byl et al. (2013)
2	Robotic orthosis with Task-Specific Training and Videogames (Bilateral) may not have a difference in efficacy when compared to Usual Physical Therapy for improving performance of activities of daily living.	1	Byl et al. (2013)
2	Myomo brace (EMG triggered micro robot device) with repetitive task practice may not have a difference in efficacy when compared to	1	Page et al. (2013)

	Repetitive task practice for improving performance of activities of daily living.		
1b	FES with Task specific training may produce greater improvements in performance of activities of daily living than Sham with Task specific training.	1	Thorsen et al. (2013)
1b	FES with botulinum toxin-A and home based task-oriented exercise may not have a difference in efficacy when compared to Botulinum toxin-A with home-based exercise program for improving performance of activities of daily living.	1	Weber et al. (2010)
1b	Task-specific training with Peripheral Nerve Stimulation may not have a difference in efficacy when compared to Task-specific training with Sham Stimulation for improving performance of activities of daily living.	1	McDonnell et al. (2007)
2	Task specific training with action observation may produce greater improvements in performance of activities of daily living than Task specific training.	1	Lee et al. (2013c)
1b	ARMEO exoskeleton with conventional care may not have a difference in efficacy when compared to Tabletop assisted exercises with conventional therapy for improving performance of activities of daily living.	1	Esquenazi et al. (2021)

DEXTERITY			
LoE	**Conclusion Statement**	**RCTs**	**References**
1a	Task-specific training combined with other interventions may produce greater improvements in dexterity than task-specific training.	6	Wong et al. (2022); Hsu et al. (2020); Song et al. (2019); Alon et al. (2009); Michaelsen et al. (2006); Dean et al. (2000b)
2	Task-specific training may produce greater improvements in dexterity than conventional therapy.	2	Alsubiheen et al. (2022); Kumar & Goyal (2012)
2	Task-specific training combined with other interventions may produce greater improvements in dexterity than conventional therapy.	1	Khallaf et al. (2017)
1a	Task-specific training combined with other interventions may produce greater improvements in dexterity than task-specific training or sham.	3	Alwhaibi et al. (2021); Seo et al. (2019); Kim et al. (2013a)
1b	Unilateral and bilateral task oriented exercises may not have a difference in efficacy when compared to Walking tasks for improving dexterity.	1	Higgins et al. (2006)
2	Task-oriented training with conventional therapy may not have a difference in efficacy when compared to Progressive resistance exercise with conventional therapy for improving dexterity.	1	Chintamani R. (2024)
1b	Mirror therapy with Mesh glove (afferent stimulation, primarily neuromuscular electrical stimulation) may result in lesser improvements in dexterity when compared to task oriented exercise.	1	Lin et al. (2014a)
1b	Mirror therapy with Mesh glove (afferent stimulation, primarily neuromuscular electrical stimulation) may produce greater improvements in dexterity than Mirror therapy.	1	Lin et al. (2014a)
1b	Task-oriented training with non-immersive virtual reality with conventional rehabilitation may result in lesser improvements in dexterity when compared to task-oriented training with simple recreational activities with conventional rehabilitation.	1	Saposnik et al. (2016)
2	Functional electrical stimulation with Task-specific training may not have a difference in efficacy when compared to Task-specific training for improving dexterity.	1	Alon et al. (2008)

1b	Repetitive transcranial magnetic stimulation with Task Based occupational Therapy may not have a difference in efficacy when compared to Sham repetitive transcranial magnetic stimulation with Task Based Occupational Therapy for improving dexterity.	1	Kim et al. (2020a)
1b	High-dose electrical somatosensory stimulation with task oriented training may not have a difference in efficacy when compared to Sham (Low dose) with task oriented training for improving dexterity.	1	Ghaziani et al. (2018)
2	Contralaterally controlled functional electrical stimulation with Task specific training may produce greater improvements in dexterity than Cyclic neuromuscular electrical stimulation with Task specific training.	1	Knutson et al. (2012)
2	Three-Dimensional Printed Dynamic Hand Device with Task-Specific Training may not have a difference in efficacy when compared to Task-Specific Training for improving dexterity.	1	Huang et al. (2019a)
1b	Anodal transcranial direct current stimulation with visuomotor gripforce tracking task may not have a difference in efficacy when compared to Sham transcranial direct current stimulation with visuomotor gripforce tracking task for improving dexterity.	1	Pavlova et al. (2017)
2	Electromyography-Triggered Neuromuscular Stimulation with Task-Oriented Training may produce greater improvements in dexterity than electromyography-Triggered Neuromuscular Stimulation.	1	Kim et al. (2016d)
2	Home-based mirror therapy and task specific training may not have a difference in efficacy when compared to Clinic-based mirror therapy and task specific training for improving dexterity.	1	Hsieh et al. (2018a)
1b	Bilateral UE Training with Unilateral task-oriented training may not have a difference in efficacy when compared to Unilateral task-oriented Training (using a hand orthosis) for improving dexterity.	1	Waller et al. (2014)
1b	Constraint-induced movement therapy with bilateral arm training may not have a difference in efficacy when compared to Bimanual task-related training for improving dexterity.	1	Brunner et al. (2012)
1b	Joystim virtual reality with real instrumentation training may not have a difference in efficacy when compared to Conventional therapy for improving dexterity.	1	Oh et al. (2019)
1b	Robot-assisted Group Therapy with Individual Arm Therapy may not have a difference in efficacy when compared to Individual arm therapy for improving dexterity.	1	Hesse et al. (2014)
2	Anodal transcranial direct current stimulation with Repetitive Functional Task-Oriented Programme (RFTOP) may produce greater improvements in dexterity than Repetitive Functional Task Oriented Programme.	1	Adeagbo et al. (2021)
1b	Tenodesis-induced-group-exoskeleton robot (TIGER) training with Regular task-specific motor training may not have a difference in efficacy when compared to Conventional occupational therapy with Regular task-specific motor training for improving dexterity.	1	Hsu et al. (2022a)
1b	There is conflicting evidence about the effect of Low-frequency repetitive transcranial magnetic stimulation with motor task practice when compared to sham repetitive transcranial magnetic stimulation with motor task practice for improving dexterity.	1	Luk et al. (2022)
1b	Action observation with task-specific training may not have a difference in efficacy when compared to Sham observation with task-specific training for improving dexterity.	1	Shamili et al. (2022)
1b	CNMES with task oriented training and conventional rehab may not have a difference in efficacy when compared to electromyography-triggered neuromuscular electrical stimulation with task oriented training and conventional rehab for improving dexterity.	1	Schick et al. (2022)

1b	Orthosis assistance TIGER with conventional rehab may not have a difference in efficacy when compared to Task specific training at home with conventional for improving dexterity.	1	Kuo et al. (2023a)
1b	Motor Imagery with Audio Feedback and Task Specific Training may not have a difference in efficacy when compared to Task-specific Training for improving dexterity.	1	Stuerner et al. (2023)
1b	Motor Imagery with Audio Feedback and Task Specific Training may not have a difference in efficacy when compared to Motor imagery with TST for improving dexterity.	1	Stuerner et al. (2023)
1b	Robotic hand therapy (with objects) with Task-Oriented training and Conventional therapy may produce greater improvements in dexterity than Robotic hand therapy (without objects) with Conventional therapy.	1	Shi et al. (2024)
1b	Dextrain Manipulandum exercises (dexterity specific exercises with real-time feedback) with Conventional therapy may not have a difference in efficacy when compared to Conventional therapy for improving dexterity.	1	Terematz et al. (2023)
2	Saebo flex Orthotic splint with intensive training may produce greater improvements in dexterity than Orthotic splint.	1	Jeon et al. (2012)
1b	Sensory Relearning with Task-Specific Training and home exercise may not have a difference in efficacy when compared to Task-Specific Training with strength training for improving dexterity.	1	Carlsson et al. (2022)
1b	Bilateral robotic priming (Bi-Manu-Track) with task oriented exercises may not have a difference in efficacy when compared to Task oriented exercises for improving dexterity.	1	Hsieh et al. (2017)
1b	Action observation with task-specific training may produce greater improvements in dexterity than Task-specific training.	1	Kim & Bang (2016)
1b	1 Hz rTMS with task oriented exercise may not have a difference in efficacy when compared to Sham rTMS with task oriented exercise for improving dexterity.	1	Higgins et al. (2015)
2	Robotic orthosis with Task-Specific training and Videogames (Unilateral) may not have a difference in efficacy when compared to Usual Physical Therapy for improving dexterity.	1	Byl et al. (2013)
2	Robotic orthosis with Task-Specific Training and Videogames (Bilateral) may not have a difference in efficacy when compared to Usual Physical Therapy for improving dexterity.	1	Byl et al. (2013)
1b	Dynamic Wrist hand orthosis (wearing while doing reach and grasp practice) with home exercise may not have a difference in efficacy when compared to Manual-assisted reach and grasp training therapy with home exercise for improving dexterity.	1	Barry et al. (2012)
1b	PNES with Task Specific Training may not have a difference in efficacy when compared to Task-Specific Training for improving dexterity.	1	IkuNo et al. (2012)
2	FES with Standard task-specific training may produce greater improvements in dexterity than Standard task-specific training.	1	Alon et al. (2007)
2	Cable orthosis with Virtual Reality may not have a difference in efficacy when compared to Virtual Reality for improving dexterity.	1	Fischer et al. (2007)
2	Pneumatic orthosis with Virtual Reality may not have a difference in efficacy when compared to Virtual Reality for improving dexterity.	1	Fischer et al. (2007)
1b	Bilateral dexterity training with usual rehabilitation may not have a difference in efficacy when compared to Unilateral dexterity training with usual rehabilitation for improving dexterity.	1	Kumagai et al. (2022)

Key Points

- Task-related Training (Grasping or Retrieving Objects) may not be beneficial for improving motor function and spasticity after stroke when compared to Progressive Resistive Exercises.
- Task-specific training combined with other interventions may be beneficial for improving muscle strength, range of motion, proprioception, and dexterity, but not stroke severity, spasticity, and performance of activities of daily living, after stroke when compared to task-specific training; the literature is mixed regarding motor function.
- Task-specific training may be beneficial for improving dexterity, but not motor function, stroke severity, and performance of activities of daily living, after stroke when compared to conventional therapy.
- Structured, task-oriented upper extremity training (Accelerated Skill Acquisition Program) may not be beneficial for improving motor function after stroke when compared to Dose-equivalent usual occupational therapy.
- Impairment oriented training Arm BASIS with usual treatment may not be beneficial for improving motor function and spasticity after stroke when compared to usual treatment.
- Impairment oriented training Arm BASIS with usual treatment may not be beneficial for improving spasticity after stroke when compared to Bobath therapy with usual treatment; the literature is mixed regarding motor function.
- Group Circuit may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to high intensity physio or usual physiotherapy.
- Task-specific training combined with other interventions may be beneficial for improving motor function, stroke severity, spasticity, and dexterity, but not muscle strength, after stroke when compared to conventional therapy; the literature is mixed regarding performance of activities of daily living.
- Constraint induced movement therapy (constraint-induced movement therapy) with Conventional rehabilitation may be beneficial for improving motor function, performance of activities of daily living, and spasticity after stroke when compared to Upper limb task-oriented training with Conventional rehabilitation.
- Arm ability training with knowledge of results (feedback on their performance presented as charts to them) may not be beneficial for improving motor function after stroke when compared to arm ability training without knowledge of results.
- Task-specific training combined with other interventions may be beneficial for improving dexterity, but not spasticity, after stroke when compared to task-specific training or sham; the literature is mixed regarding motor function.
- Reaching task training in a 3D virtual environment may not be beneficial for improving motor function after stroke when compared to Reaching task training in physical environment (PE).
- Task-specific training may be beneficial for improving performance of activities of daily living, but not muscle strength and range of motion, after stroke when compared to no treatment; the literature is mixed regarding motor function.
- Task-Specific Circuit Training may not be beneficial for improving motor function and muscle strength after stroke when compared to Stretching with Memory exercises and Education.
- Task-specific training combined with other interventions may be beneficial for improving motor function after stroke when compared to sham or task-specific training.
- Task Specific Training may be beneficial for improving motor function and spasticity after stroke when compared to Proprioceptive Neuromuscular Facilitation.
- Unilateral and bilateral task oriented exercises may not be beneficial for improving motor function, dexterity, performance of activities of daily living, and muscle strength after stroke when compared to Walking tasks.
- Task-specific training may be beneficial for improving motor function and performance of activities of daily living after stroke when compared to training using the Bobath approach.
- Personalized reach training (active control-restricted range) with anodal transcranial direct current stimulation and Virtual reality games may not be beneficial for improving motor function and range of motion after stroke when compared to Personal reach training (active control-restricted range) with Sham transcranial direct current stimulation and video games.

- Autonomy support (training with more-affected arm and could actively adjust task difficulty) with Verbal feedback may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Training with more-affected arm with no opportunity to adjust difficulty with General verbal feedback.
- Task-oriented training with conventional therapy may be beneficial for improving performance of activities of daily living, but not dexterity, after stroke when compared to Progressive resistance exercise with conventional therapy; the literature is mixed regarding motor function.
- Dynamic resistance training (POWER) may not be beneficial for improving motor function, performance of activities of daily living, spasticity, range of motion, and stroke severity after stroke when compared to Functional Task Practice (FTP).
- Mirror therapy with Mesh glove (afferent stimulation, primarily neuromuscular electrical stimulation) may be beneficial for improving motor function, but not performance of activities of daily living, after stroke when compared to task oriented exercise.
- Mirror therapy with Mesh glove (afferent stimulation, primarily neuromuscular electrical stimulation) may be less beneficial than task oriented exercise for improving dexterity after stroke.
- Mirror therapy with Mesh glove (afferent stimulation, primarily neuromuscular electrical stimulation) may be beneficial for improving dexterity, but not motor function and performance of activities of daily living, after stroke when compared to Mirror therapy.
- Botulinum Toxin A with Task Specific Training may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Task-Specific Training.
- Whole-body vibration with Task Oriented Training and Conventional physical therapy may be beneficial for improving motor function and muscle strength after stroke when compared to Upper- and lower-Cycle group with Task Specific Training and Conventional physical therapy.
- Task-oriented training with non-immersive virtual reality with conventional rehabilitation may not be beneficial for improving motor function, performance of activities of daily living, and muscle strength after stroke when compared to task-oriented training with simple recreational activities with conventional rehabilitation.
- Task-oriented training with non-immersive virtual reality with conventional rehabilitation may be less beneficial than task-oriented training with simple recreational activities with conventional rehabilitation for improving dexterity after stroke.
- Impairment-oriented training may not be beneficial for improving motor function after stroke when compared to Conventional therapy.
- Task-oriented Robotic arm training (Haptic Master) may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Task oriented arm training.
- 120min electrical stimulation with repetitive task specific practice may be beneficial for improving motor function and performance of activities of daily living after stroke when compared to 60min electrical stimulation therapy with repetitive task specific practice or 30min electrical stimulation therapy and repetitive task specific practice.
- Repetitive motor task under vibratory feedback may be beneficial for improving motor function, but not range of motion, after stroke when compared to Repetitive motor task.
- Functional electrical stimulation with Task-specific training may not be beneficial for improving dexterity after stroke when compared to Task-specific training; the literature is mixed regarding motor function.
- Received modifed constraint-induced movement therapy with task-specific training 3hr may be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Traditional therapy.
- Received modifed constraint-induced movement therapy with task-specific training 3hr may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to constraint-induced movement therapy-received 300 repetitions of task specific training or constraint-induced movement therapy with 600 repetitions task specific training.
- Repetitive transcranial magnetic stimulation with Task Based occupational Therapy may not be beneficial for improving motor function, dexterity, performance of activities of daily living, spasticity, stroke severity, and muscle strength after stroke when compared to Sham repetitive transcranial magnetic stimulation with Task Based Occupational Therapy.

- High-dose electrical somatosensory stimulation with task oriented training may not be beneficial for improving motor function, dexterity, proprioception, stroke severity, and muscle strength after stroke when compared to Sham (Low dose) with task oriented training.
- Nintendo Wii virtual reality training with Usual Care (conventional occupational therapy) may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to dose matched task oriented therapy (as Conventional therapy) with Usual Care (conventional occupational therapy) or Usual Care (conventional occupational therapy).
- Low frequency repetitive transcranial magnetic stimulation with reach-to-grasp (RTG) training may be beneficial for improving motor function after stroke when compared to Sham stimulation with reach-to-grasp (RTG) training.
- Virtual reality keypad or glove (PneuGlove) may not be beneficial for improving motor function and muscle strength after stroke when compared to Task Specific Training Occupational Therapy.
- Contralaterally controlled functional electrical stimulation with Task specific training may be beneficial for improving motor function, dexterity, performance of activities of daily living, and range of motion after stroke when compared to Cyclic neuromuscular electrical stimulation with Task specific training.
- Functional task practice with repetitive transcranial magnetic stimulation may not be beneficial for improving motor function, performance of activities of daily living, spasticity, range of motion, and muscle strength after stroke when compared to Functional task practice with Sham repetitive transcranial magnetic stimulation.
- Mirror therapy with task-oriented functional practice may be beneficial for improving motor function, but not performance of activities of daily living and proprioception, after stroke when compared to task-oriented functional practice.
- Somatosensory (peripheral nerve) stimulation with task specific training may be beneficial for improving motor function, but not performance of activities of daily living, after stroke when compared to Sham stimulation with task specific training.
- Repetitive task exercise with sensory amplitude electrical stimulation (SES) may not be beneficial for improving motor function, proprioception, and performance of activities of daily living after stroke when compared to repetitive task exercise with Sham stimulation.
- Sensorimotor Training with conventional therapy may not be beneficial for improving motor function, proprioception, and performance of activities of daily living after stroke when compared to Motor Training (Task-specific Training ands table top games) with conventional therapy.
- Myoelectric Continuous Control of Functional Electrical Stimulation with Task Oriented Therapy may not be beneficial for improving motor function after stroke when compared to Task Oriented Therapy.
- Electrical Epidural Motor Cortex Stimulation (EECS) with Task specific Training may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Task-specific training.
- Anodal transcranial direct current stimulation with visuomotor gripforce tracking task may not be beneficial for improving motor function and dexterity after stroke when compared to Sham transcranial direct current stimulation with visuomotor gripforce tracking task.
- Electrically assisted movement therapy (functional electrical stimulation with task specific) may be beneficial for improving performance of activities of daily living, but not spasticity, after stroke when compared to care; the literature is mixed regarding motor function.
- Electromyography-Triggered Neuromuscular Stimulation with Task-Oriented Training may be beneficial for improving dexterity after stroke when compared to electromyography-Triggered Neuromuscular Stimulation; the literature is mixed regarding motor function.
- High Frequency repetitive transcranial magnetic stimulation with Motor Task Training may not be beneficial for improving motor function after stroke when compared to Sham repetitive transcranial magnetic stimulation with Motor Task Training.
- Home-based mirror therapy and task specific training may not be beneficial for improving motor function, dexterity, performance of activities of daily living, and proprioception after stroke when compared to Clinic-based mirror therapy and task specific training.

- Bilateral UE Training with Unilateral task-oriented training may not be beneficial for improving motor function, spasticity, and dexterity after stroke when compared to Unilateral task-oriented Training (using a hand orthosis).
- Constraint-induced movement therapy with bilateral arm training may not be beneficial for improving motor function, dexterity, and performance of activities of daily living after stroke when compared to Bimanual task-related training.
- Joystim virtual reality with real instrumentation training may not be beneficial for improving motor function, spasticity, and dexterity after stroke when compared to Conventional therapy; the literature is mixed regarding muscle strength.
- Myomo electromyography powered orthosis with repetitive task-specific practice (RTP) may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Repetitive task-specific practice.
- Robot-Assisted Therapy with Bilateral Practice with Task-Specific Training may be beneficial for improving motor function after stroke when compared to Conventional Care with Task-Specific Training; the literature is mixed regarding performance of activities of daily living.
- The literature is mixed regarding the effect of Robot therapy with task training (Inmotion) on improvement of motor function after stroke when compared to Robot therapy.
- Transcutaneous Electrical Nerve Stimulation and Task-Related Training may be beneficial for improving motor function, range of motion, and muscle strength after stroke when compared to Sham Transcutaneous Electrical Nerve Stimulation and Task-Related Training.
- Robot-assisted Group Therapy with Individual Arm Therapy may not be beneficial for improving dexterity, performance of activities of daily living, spasticity, and muscle strength after stroke when compared to Individual arm therapy; the literature is mixed regarding motor function.
- Leg rehab training may be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Immobilization therapy with inflatable pressure splint (arm and leg with splints).
- Low frequency repetitive transcranial magnetic stimulation with Motor Training may not be beneficial for improving motor function after stroke when compared to Sham repetitive transcranial magnetic stimulation with Motor Training.
- Task Specific training with Trunk restraint training may be beneficial for improving motor function and range of motion after stroke when compared to Task Specific Training without Trunk restraint.
- Repetitive peripheral sensory stimulation with functional electrical stimulation and task specific training may not be beneficial for improving motor function, performance of activities of daily living, spasticity, range of motion, and muscle strength after stroke when compared to Sham RPSS with functional electrical stimulation and TST.
- Rejoyce system with occupational therapy may not be beneficial for improving motor function and stroke severity after stroke when compared to task based exercises with occupational therapy.
- Forearm rotation orthosis with occupational therapy Task-Oriented (OTTO) may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to occupational therapy Task-Oriented (OTTO).
- Anodal transcranial direct current stimulation with Repetitive Functional Task-Oriented Programme (RFTOP) may be beneficial for improving dexterity, but not motor function, after stroke when compared to Repetitive Functional Task Oriented Programme.
- Transcutaneous electrical nerve stimulation with Task oriented occupational therapy and conventional therapy may not be beneficial for improving performance of activities of daily living and spasticity after stroke when compared to Sham transcutaneous electrical nerve stimulation with Task oriented occupational therapy and conventional therapy; the literature is mixed regarding motor function.
- Sensorimotor therapy with conventional therapy may not be beneficial for improving motor function and proprioception after stroke when compared to motor therapy with conventional rehab.
- Bi-transcutaneous electrical nerve stimulation with Task Oriented Training (TOT) may be beneficial for improving motor function after stroke when compared to No Treatment.

- Electromyography-driven Robot-assisted Hand Training may not be beneficial for improving motor function after stroke when compared to Task-Oriented intervention; the literature is mixed regarding performance of activities of daily living.
- Tenodesis-induced-group-exoskeleton robot (TIGER) training with Regular task-specific motor training may be beneficial for improving motor function, but not dexterity, performance of activities of daily living, and spasticity, after stroke when compared to Conventional occupational therapy with Regular task-specific motor training.
- Anodal transcranial direct current stimulation with motor imagery and upper-limb functional training may be beneficial for improving motor function after stroke when compared to sham tCDS with motor imagery and upper-limb functional training.
- Low-frequency repetitive transcranial magnetic stimulation with motor task practice may be beneficial for improving motor function, but not muscle strength, after stroke when compared to sham repetitive transcranial magnetic stimulation with motor task practice; the literature is mixed regarding dexterity.
- Action observation with task-specific training may be beneficial for improving performance of activities of daily living, but not motor function and dexterity, after stroke when compared to Sham observation with task-specific training.
- Virtual reality with task based training may be beneficial for improving motor function and muscle strength after stroke when compared to Task-specific Training.
- CNMES with task oriented training and conventional rehab may not be beneficial for improving motor function and dexterity after stroke when compared to electromyography-triggered neuromuscular electrical stimulation with task oriented training and conventional rehab.
- Exoskeleton training Armule with TST may be beneficial for improving motor function after stroke when compared to Conventional Rehab; the literature is mixed regarding performance of activities of daily living.
- Repetitive transcranial magnetic stimulation with TST may not be beneficial for improving motor function and stroke severity after stroke when compared to Sham repetitive transcranial magnetic stimulation with TST.
- The literature is mixed regarding the effect of Bilateral transcranial direct current stimulation with TST on improvement of motor function after stroke when compared to Sham transcranial direct current stimulation with TST.
- Orthosis assistance TIGER with conventional rehab may not be beneficial for improving motor function, spasticity, proprioception, performance of activities of daily living, and dexterity after stroke when compared to Task specific training at home with conventional; the literature is mixed regarding range of motion.
- Bilateral robotic priming training with mirror training (R-mirr) may be beneficial for improving motor function, but not performance of activities of daily living and muscle strength, after stroke when compared to Bilateral robotic priming training with movement oriented training.
- Bilateral upper limb robot-assisted training with Conventional Therapy may be beneficial for improving performance of activities of daily living, but not motor function, after stroke when compared to Task-specific Therapy with Conventional Therapy.
- Portable brain-computer interface-based hand robot system with Conventional therapy and neuromuscular electrical stimulation may be beneficial for improving motor function after stroke when compared to Task-specific training with Conventional therapy and neuromuscular electrical stimulation.
- Gamified training with ArmAble with Conventional therapy may not be beneficial for improving stroke severity and muscle strength after stroke when compared to UE task-based training with Conventional therapy; the literature is mixed regarding motor function.
- Virtual reality-based robot therapy with smart glove with task-oriented therapy may be beneficial for improving motor function after stroke when compared to Task-oriented therapy; the literature is mixed regarding performance of activities of daily living.
- Forced-rate exercise with Repetitive task practice may not be beneficial for improving motor function after stroke when compared to Repetitive task practice.

- Robotic hand therapy (with objects) with Task-Oriented training and Conventional therapy may be beneficial for improving motor function, dexterity, range of motion, and muscle strength, but not spasticity, after stroke when compared to Robotic hand therapy (without objects) with Conventional therapy.
- Transcutaneous electrical nerve stimulation with wrist extensor taping and Tast-related training may be beneficial for improving motor function and spasticity, but not muscle strength, after stroke when compared to transcutaneous electrical nerve stimulation with task-related training.
- Bilateral repetitive transcranial magnetic stimulation (high-frequency repetitive transcranial magnetic stimulation with low-frequency repetitive transcranial magnetic stimulation) and Task-oriented therapy may be beneficial for improving motor function, but not spasticity, after stroke when compared to Sham high-frequency repetitive transcranial magnetic stimulation with Sham low-frequency repetitive transcranial magnetic stimulation and Task-oriented therapy.
- Bilateral repetitive transcranial magnetic stimulation (high-frequency repetitive transcranial magnetic stimulation with low-frequency repetitive transcranial magnetic stimulation) and Task-oriented therapy may not be beneficial for improving motor function and spasticity after stroke when compared to Excitatory repetitive transcranial magnetic stimulation (high-frequency repetitive transcranial magnetic stimulation with sham low-frequency repetitive transcranial magnetic stimulation) and Task-oriented therapy.
- Bilateral repetitive transcranial magnetic stimulation (high-frequency repetitive transcranial magnetic stimulation with low-frequency repetitive transcranial magnetic stimulation) and Task-oriented therapy may not be beneficial for improving motor function and spasticity after stroke when compared to Inhibitory repetitive transcranial magnetic stimulation (sham high-frequency repetitive transcranial magnetic stimulation with low-frequency repetitive transcranial magnetic stimulation) and Task-oriented therapy.
- Excitatory repetitive transcranial magnetic stimulation (high-frequency repetitive transcranial magnetic stimulation with sham low-frequency repetitive transcranial magnetic stimulation) and Task-oriented therapy may not be beneficial for improving motor function and spasticity after stroke when compared to Inhibitory repetitive transcranial magnetic stimulation (sham high-frequency repetitive transcranial magnetic stimulation with low-frequency repetitive transcranial magnetic stimulation) and Task-oriented therapy.
- Three-Dimensional Printed Dynamic Hand Device with Task-Specific Training may not be beneficial for improving dexterity and muscle strength after stroke when compared to Task-Specific Training.
- Motor Imagery with Audio Feedback and Task Specific Training may not be beneficial for improving dexterity after stroke when compared to Task-specific Training.
- Motor Imagery with Audio Feedback and Task Specific Training may not be beneficial for improving dexterity after stroke when compared to Motor imagery with TST.
- Functional integrative rehabilitation approache may not be beneficial for improving performance of activities of daily living after stroke when compared to sensorimotor integrative rehabilitation approache.
- Electrical stim with repetitive task practice may be beneficial for improving performance of activities of daily living after stroke when compared to Sham electrical with repetitive task practice.
- Dual transcranial direct current stimulation with bimanual cooperative task training may not be beneficial for improving performance of activities of daily living after stroke when compared to sham dual tDCS with bimanual cooperative task training.
- Electromyography biofeedback with task practice may not be beneficial for improving range of motion after stroke when compared to Sham biofeedback with task practice.
- Low frequency repetitive transcranial magnetic stimulation with pinch motor training (a metronome-paced pinch of their index finger and thumb of the affected hand as fast as possible) may be beneficial for improving muscle strength after stroke when compared to pinch motor training with sham repetitive transcranial magnetic stimulation.
- Progressive unsupported reaching tasks may not be beneficial for improving muscle strength after stroke when compared to Supported reaching tasks.
- Dextrain Manipulandum exercises (dexterity specific exercises with real-time feedback) with Conventional therapy may not be beneficial for improving muscle strength, proprioception, performance of activities of daily living, and dexterity after stroke when compared to Conventional therapy; the literature is mixed regarding motor function.

- Task-Oriented Training may be beneficial for improving motor function, but not performance of activities of daily living, after stroke when compared to Table-Top Activity Training.
- The literature is mixed regarding the effect of Forced aerobic exercise with Repetitive task practice(RTP) on motor function after stroke when compared to Voluntary exercise with RTP.
- Auditory imagery with task specific training may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Cumulative imagery with task specific training.
- Visual imagery with task specific training may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Cumulative imagery with task specific training.
- Task specific training with action observation may be beneficial for improving performance of activities of daily living after stroke when compared to No treatment.
- Saebo flex Orthotic splint with intensive training may be beneficial for improving dexterity after stroke when compared to Orthotic splint; the literature is mixed regarding motor function.
- Task-specific training combined with other interventions may not be beneficial for improving motor function, muscle strength, spasticity, and performance of activities of daily living after stroke when compared to exercise and custom physiotherapy protocols.
- Task-specific training combined with other interventions may not be beneficial for improving motor function after stroke when compared to neurodevelopmental techniques (bobath approach); the literature is mixed regarding performance of activities of daily living.
- Reach-To-Grasp with robot feedback with Conventional therapy may be beneficial for improving motor function, but not performance of activities of daily living, after stroke when compared to Conventional therapy.
- Reach-To-Grasp with computer feedback with Conventional therapy may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Conventional therapy.
- Reach-To-Grasp with robot feedback with Conventional therapy may not be beneficial for improving motor function after stroke when compared to Reach-To-Grasp with computer feedback with Conventional therapy.
- Transcutaneous auricular vagus nerve stimulation with task-oriented training may be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Task-oriented training.
- EMG paired taVNS with TST may not be beneficial for improving motor function after stroke when compared to Active unpaired taVNS with TST.
- Sensory Relearning with Task-Specific Training and home exercise may not be beneficial for improving motor function, performance of activities of daily living, and dexterity after stroke when compared to Task-Specific Training with strength training; the literature is mixed regarding proprioception.
- Robotic Therapy (Armeo Spring & Amadeo) with Task Oriented Training with Active Learning Program for Stroke (ALPS) may not be beneficial for improving spasticity and performance of activities of daily living after stroke when compared to Robotic Therapy with Active Learning Program for Stroke (ALPS); the literature is mixed regarding motor function.
- Kinesiotaping with stretching & task specific trainings and conventional rehab may not be beneficial for improving stroke severity and spasticity after stroke when compared to stretching & task specific trainings with conventional rehab and Conventional Therapy; the literature is mixed regarding motor function.
- Occupation-based bilateral upper extremity training may be beneficial for improving performance of activities of daily living after stroke when compared to Task-based bilateral upper extremity training.
- Bilateral robotic priming (Bi-Manu-Track) with task oriented exercises may not be beneficial for improving motor function, stroke severity, muscle strength, performance of activities of daily living, and dexterity after stroke when compared to Task oriented exercises.
- Atomoxetine with Task Oriented Upper Extremity Training may not be beneficial for improving motor function after stroke when compared to Placebo with Task Oriented Upper Extremity Training.

- Action observation with task-specific training may be beneficial for improving motor function, performance of activities of daily living, and dexterity, but not spasticity, after stroke when compared to Task-specific training.
- 1 Hz rTMS with task oriented exercise may not be beneficial for improving motor function, performance of activities of daily living, and dexterity after stroke when compared to Sham rTMS with task oriented exercise.
- Taping with Task specific training may not be beneficial for improving motor function and stroke severity after stroke when compared to Task specific training.
- High frequency (10Hz) rTMS with task-oriented training may be beneficial for improving motor function after stroke when compared to Sham rTMS with task-oriented training.
- Robotic orthosis with Task-Specific training and Videogames (Unilateral) may not be beneficial for improving motor function, muscle strength, spasticity, performance of activities of daily living, and dexterity after stroke when compared to Usual Physical Therapy.
- Robotic orthosis with Task-Specific Training and Videogames (Bilateral) may not be beneficial for improving motor function, muscle strength, spasticity, performance of activities of daily living, and dexterity after stroke when compared to Usual Physical Therapy.
- Myomo brace (EMG triggered micro robot device) with repetitive task practice may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Repetitive task practice.
- FES with Task specific training may be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Sham with Task specific training.
- Dynamic Wrist hand orthosis (wearing while doing reach and grasp practice) with home exercise may not be beneficial for improving motor function, muscle strength, and dexterity after stroke when compared to Manual-assisted reach and grasp training therapy with home exercise.
- PNES with Task Specific Training may not be beneficial for improving motor function, muscle strength, and dexterity after stroke when compared to Task-Specific Training.
- FES with botulinum toxin-A and home based task-oriented exercise may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Botulinum toxin-A with home-based exercise program.
- FES with Standard task-specific training may be beneficial for improving motor function and dexterity after stroke when compared to Standard task-specific training.
- Cable orthosis with Virtual Reality may not be beneficial for improving motor function, muscle strength, spasticity, range of motion, and dexterity after stroke when compared to Virtual Reality.
- Pneumatic orthosis with Virtual Reality may not be beneficial for improving motor function, muscle strength, spasticity, range of motion, and dexterity after stroke when compared to Virtual Reality.
- Task-specific training with Peripheral Nerve Stimulation may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Task-specific training with Sham Stimulation; the literature is mixed regarding muscle strength.
- Active-assistive reaching exercise using a robotic device (Arm Guide) may not be beneficial for improving stroke severity after stroke when compared to Task-matched amount of reaching without assistance.
- Bilateral dexterity training with usual rehabilitation may not be beneficial for improving dexterity after stroke when compared to Unilateral dexterity training with usual rehabilitation.
- NMES with repetitive facilitative exercise may not be beneficial for improving motor function, spasticity, and range of motion after stroke when compared to Conventional Therapy.
- Repetitive facilitative exercise may be beneficial for improving motor function, but not spasticity and range of motion, after stroke when compared to Conventional Therapy.
- Different approaches to task-specific training combined with other interventions may not have a difference in efficacy when compared with one another for improving motor function, muscle strength, and range of motion.
- Different approaches to task-specific training may not have a difference in efficacy when compared with one another for improving motor function, muscle strength, and performance of activities of daily living.

- Taping with Task specific training may be less beneficial than Task specific training for improving performance of activities of daily living after stroke.
- Whole-Body Vibration (5-15 Hz) may not be beneficial for improving muscle strength and spasticity after stroke when compared to Conventional Physical Therapy; the literature is mixed regarding motor function.
- Whole-Body Vibration with Task-Related Training may be beneficial for improving motor function, muscle strength, and spasticity after stroke when compared to Conventional Physical Therapy.
- Task specific training with action observation may be beneficial for improving performance of activities of daily living after stroke when compared to Task specific training.
- ARMEO exoskeleton with conventional care may be beneficial for improving range of motion, but not motor function, spasticity, and performance of activities of daily living, after stroke when compared to Tabletop assisted exercises with conventional therapy.

Summary of Key Points: Task-Specific Training

Intervention	Control(s)	Function domain(s)	Effect
Task-related Training (Grasping or Retrieving Objects)	Progressive Resistive Exercises	Motor function, spasticity	−
Task-specific training combined with other interventions	task-specific training	Muscle strength, range of motion, proprioception, dexterity	+
Task-specific training combined with other interventions	task-specific training	Stroke severity, spasticity, performance of activities of daily living	−
Task-specific training combined with other interventions	task-specific training	Motor function	=
Task-specific training	conventional therapy	Dexterity	+
Task-specific training	conventional therapy	Motor function, stroke severity, performance of activities of daily living	−
Structured, task-oriented upper extremity training (Accelerated Skill Acquisition Program)	Dose-equivalent usual occupational therapy	Motor function	−
Impairment oriented training Arm BASIS with usual treatment	usual treatment	Motor function, spasticity	−
Impairment oriented training Arm BASIS with usual treatment	Bobath therapy with usual treatment	Spasticity	−
Impairment oriented training Arm BASIS with usual treatment	Bobath therapy with usual treatment	Motor function	=
Group Circuit	high intensity physio or usual physiotherapy	Motor function, performance of activities of daily living	−
Task-specific training combined with other interventions	One another (different approaches compared)	Motor function, range of motion, muscle strength	−
Task-specific training	One another (different approaches compared)	Motor function, performance of activities of daily living, muscle strength	−
Task-specific training combined with other interventions	conventional therapy	Motor function, stroke severity, spasticity, dexterity	+
Task-specific training combined with other interventions	conventional therapy	Muscle strength	−
Constraint induced movement therapy (constraint-induced movement therapy) with Conventional rehabilitation	Upper limb task-oriented training with Conventional rehabilitation	Motor function, performance of activities of daily living, spasticity	+

Arm ability training with knowledge of results (feedback on their performance presented as charts to them)	arm ability training without knowledge of results	Motor function	−
Task-specific training combined with other interventions	task-specific training or sham	Dexterity	+
Task-specific training combined with other interventions	task-specific training or sham	Spasticity	−
Task-specific training combined with other interventions	task-specific training or sham	Motor function	=
Reaching task training in a 3D virtual environment	Reaching task training in physical environment (PE)	Motor function	−
Task-specific training	no treatment	Performance of activities of daily living	+
Task-specific training	no treatment	Muscle strength, range of motion	−
Task-specific training	no treatment	Motor function	=
Task-Specific Circuit Training	Stretching with Memory exercises and Education	Motor function, muscle strength	−
Task-specific training combined with other interventions	sham or task-specific training	Motor function	+
Task Specific Training	Proprioceptive Neuromuscular Facilitation	Motor function, spasticity	+
Unilateral and bilateral task oriented exercises	Walking tasks	Motor function, dexterity, performance of activities of daily living, muscle strength	−
Task-specific training	training using the Bobath approach	Motor function, performance of activities of daily living	+
Personalized reach training (active control-restricted range) with anodal transcranial direct current stimulation and Virtual reality games	Personal reach training (active control-restricted range) with Sham transcranial direct current stimulation and video games	Motor function, range of motion	−
Autonomy support (training with more-affected arm and could actively adjust task difficulty) with Verbal feedback	Training with more-affected arm with no opportunity to adjust difficulty with General verbal feedback	Motor function, performance of activities of daily living	−
Task-oriented training with conventional therapy	Progressive resistance exercise with conventional therapy	Performance of activities of daily living	+
Task-oriented training with conventional therapy	Progressive resistance exercise with conventional therapy	Dexterity	−
Task-oriented training with conventional therapy	Progressive resistance exercise with conventional therapy	Motor function	=
Dynamic resistance training (POWER)	Functional Task Practice (FTP)	Motor function, performance of activities of daily living, spasticity, range of motion, stroke severity	−
Mirror therapy with Mesh glove (afferent stimulation, primarily neuromuscular electrical stimulation)	task oriented exercise	Motor function	+
Mirror therapy with Mesh glove (afferent stimulation, primarily neuromuscular electrical stimulation)	task oriented exercise	Dexterity, performance of activities of daily living	−

Mirror therapy with Mesh glove (afferent stimulation, primarily neuromuscular electrical stimulation)	Mirror therapy	Dexterity	+
Mirror therapy with Mesh glove (afferent stimulation, primarily neuromuscular electrical stimulation)	Mirror therapy	Motor function, performance of activities of daily living	–
Botulinum Toxin A with Task Specific Training	Task-Specific Training	Motor function, performance of activities of daily living	–
Whole-body vibration with Task Oriented Training and Conventional physical therapy	Upper- and lower-Cycle group with Task Specific Training and Conventional physical therapy	Motor function, muscle strength	+
Task-oriented training with non-immersive virtual reality with conventional rehabilitation	task-oriented training with simple recreational activities with conventional rehabilitation	Motor function, dexterity, performance of activities of daily living, muscle strength	–
Impairment-oriented training	Conventional therapy	Motor function	–
Task-oriented Robotic arm training (Haptic Master)	Task oriented arm training	Motor function, performance of activities of daily living	–
120min electrical stimulation with repetitive task specific practice	60min electrical stimulation therapy with repetitive task specific practice or 30min electrical stimulation therapy and repetitive task specific practice	Motor function, performance of activities of daily living	+
Repetitive motor task under vibratory feedback	Repetitive motor task	Motor function	+
Repetitive motor task under vibratory feedback	Repetitive motor task	Range of motion	–
Functional electrical stimulation with Task-specific training	Task-specific training	Dexterity	–
Functional electrical stimulation with Task-specific training	Task-specific training	Motor function	=
Received modifed constraint-induced movement therapy with task-specific training 3hr	Traditional therapy	Motor function, performance of activities of daily living	+
Received modifed constraint-induced movement therapy with task-specific training 3hr	constraint-induced movement therapy-received 300 repetitions of task specific training or constraint-induced movement therapy with 600 repetitions task specific training	Motor function, performance of activities of daily living	–
Repetitive transcranial magnetic stimulation with Task Based occupational Therapy	Sham repetitive transcranial magnetic stimulation with Task Based Occupational Therapy	Motor function, dexterity, performance of activities of daily living, spasticity, stroke severity, muscle strength	–
High-dose electrical somatosensory stimulation with task oriented training	Sham (Low dose) with task oriented training	Motor function, dexterity, proprioception, stroke severity, muscle strength	–
Nintendo Wii virtual reality training with Usual Care (conventional occupational therapy)	dose matched task oriented therapy (as Conventional therapy) with Usual Care (conventional occupational therapy) or Usual Care (conventional occupational therapy)	Motor function, performance of activities of daily living	–

Low frequency repetitive transcranial magnetic stimulation with reach-to-grasp (RTG) training	Sham stimulation with reach-to-grasp (RTG) training	Motor function	+
Virtual reality keypad or glove (PneuGlove)	Task Specific Training Occupational Therapy	Motor function, muscle strength	–
Contralaterally controlled functional electrical stimulation with Task specific training	Cyclic neuromuscular electrical stimulation with Task specific training	Motor function, dexterity, performance of activities of daily living, range of motion	+
Functional task practice with repetitive transcranial magnetic stimulation	Functional task practice with Sham repetitive transcranial magnetic stimulation	Motor function, performance of activities of daily living, spasticity, range of motion, muscle strength	–
Mirror therapy with task-oriented functional practice	task-oriented functional practice	Motor function	+
Mirror therapy with task-oriented functional practice	task-oriented functional practice	Performance of activities of daily living, proprioception	–
Somatosensory (peripheral nerve) stimulation with task specific training	Sham stimulation with task specific training	Motor function	+
Somatosensory (peripheral nerve) stimulation with task specific training	Sham stimulation with task specific training	Performance of activities of daily living	–
Repetitive task exercise with sensory amplitude electrical stimulation (SES)	repetitive task exercise with Sham stimulation	Motor function, proprioception, performance of activities of daily living	–
Sensorimotor Training with conventional therapy	Motor Training (Task-specific Training ands table top games) with conventional therapy	Motor function, proprioception, performance of activities of daily living	–
Myoelectric Continuous Control of Functional Electrical Stimulation with Task Oriented Therapy	Task Oriented Therapy	Motor function	–
Electrical Epidural Motor Cortex Stimulation (EECS) with Task specific Training	Task-specific training	Motor function, performance of activities of daily living	–
Anodal transcranial direct current stimulation with visuomotor gripforce tracking task	Sham transcranial direct current stimulation with visuomotor gripforce tracking task	Motor function, dexterity	–
Electrically assisted movement therapy (functional electrical stimulation with task specific)	care	Performance of activities of daily living	+
Electrically assisted movement therapy (functional electrical stimulation with task specific)	care	Spasticity	–
Electrically assisted movement therapy (functional electrical stimulation with task specific)	care	Motor function	=
Electromyography-Triggered Neuromuscular Stimulation with Task-Oriented Training	electromyography-Triggered Neuromuscular Stimulation	Dexterity	+
Electromyography-Triggered Neuromuscular Stimulation with Task-Oriented Training	electromyography-Triggered Neuromuscular Stimulation	Motor function	=
High Frequency repetitive transcranial magnetic stimulation with Motor Task Training	Sham repetitive transcranial magnetic stimulation with Motor Task Training	Motor function	–

Home-based mirror therapy and task specific training	Clinic-based mirror therapy and task specific training	Motor function, dexterity, performance of activities of daily living, proprioception	–
Bilateral UE Training with Unilateral task-oriented training	Unilateral task-oriented Training (using a hand orthosis)	Motor function, spasticity, dexterity	–
Constraint-induced movement therapy with bilateral arm training	Bimanual task-related training	Motor function, dexterity, performance of activities of daily living	–
Joystim virtual reality with real instrumentation training	Conventional therapy	Motor function, spasticity, dexterity	–
Joystim virtual reality with real instrumentation training	Conventional therapy	Muscle strength	=
Myomo electromyography powered orthosis with repetitive task-specific practice (RTP)	Repetitive task-specific practice	Motor function, performance of activities of daily living	–
Robot-Assisted Therapy with Bilateral Practice with Task-Specific Training	Conventional Care with Task-Specific Training	Motor function	+
Robot-Assisted Therapy with Bilateral Practice with Task-Specific Training	Conventional Care with Task-Specific Training	Performance of activities of daily living	=
Robot therapy with task training (Inmotion)	Robot therapy	Motor function	=
Transcutaneous Electrical Nerve Stimulation and Task-Related Training	Sham Transcutaneous Electrical Nerve Stimulation and Task-Related Training	Motor function, range of motion, muscle strength	+
Robot-assisted Group Therapy with Individual Arm Therapy	Individual arm therapy	Dexterity, performance of activities of daily living, spasticity, muscle strength	–
Robot-assisted Group Therapy with Individual Arm Therapy	Individual arm therapy	Motor function	=
Leg rehab training	Immobilization therapy with inflatable pressure splint (arm and leg with splints)	Motor function, performance of activities of daily living	+
Low frequency repetitive transcranial magnetic stimulation with Motor Training	Sham repetitive transcranial magnetic stimulation with Motor Training	Motor function	–
Task Specific training with Trunk restraint training	Task Specific Training without Trunk restraint	Motor function, range of motion	+
Repetitive peripheral sensory stimulation with functional electrical stimulation and task specific training	Sham RPSS with functional electrical stimulation and TST	Motor function, performance of activities of daily living, spasticity, range of motion, muscle strength	–
Rejoyce system with occupational therapy	task based exercises with occupational therapy	Motor function, stroke severity	–
Forearm rotation orthosis with occupational therapy Task-Oriented (OTTO)	occupational therapy Task-Oriented (OTTO)	Motor function, performance of activities of daily living	–
Anodal transcranial direct current stimulation with Repetitive Functional Task-Oriented Programme (RFTOP)	Repetitive Functional Task Oriented Programme	Dexterity	+
Anodal transcranial direct current stimulation with Repetitive Functional Task-Oriented Programme (RFTOP)	Repetitive Functional Task Oriented Programme	Motor function	–
Transcutaneous electrical nerve stimulation with Task oriented	Sham transcutaneous electrical nerve stimulation with Task	Performance of activities of daily living, spasticity	–

occupational therapy and conventional therapy	oriented occupational therapy and conventional therapy		
Transcutaneous electrical nerve stimulation with Task oriented occupational therapy and conventional therapy	Sham transcutaneous electrical nerve stimulation with Task oriented occupational therapy and conventional therapy	Motor function	=
Sensorimotor therapy with conventional therapy	motor therapy with conventional rehab	Motor function, proprioception	–
Bi-transcutaneous electrical nerve stimulation with Task Oriented Training (TOT)	No Treatment	Motor function	+
Electromyography-driven Robot-assisted Hand Training	Task-Oriented intervention	Motor function	–
Electromyography-driven Robot-assisted Hand Training	Task-Oriented intervention	Performance of activities of daily living	=
Tenodesis-induced-group-exoskeleton robot (TIGER) training with Regular task-specific motor training	Conventional occupational therapy with Regular task-specific motor training	Motor function	+
Tenodesis-induced-group-exoskeleton robot (TIGER) training with Regular task-specific motor training	Conventional occupational therapy with Regular task-specific motor training	Dexterity, performance of activities of daily living, spasticity	–
Anodal transcranial direct current stimulation with motor imagery and upper-limb functional training	sham tCDS with motor imagery and upper-limb functional training	Motor function	+
Low-frequency repetitive transcranial magnetic stimulation with motor task practice	sham repetitive transcranial magnetic stimulation with motor task practice	Motor function	+
Low-frequency repetitive transcranial magnetic stimulation with motor task practice	sham repetitive transcranial magnetic stimulation with motor task practice	Muscle strength	–
Low-frequency repetitive transcranial magnetic stimulation with motor task practice	sham repetitive transcranial magnetic stimulation with motor task practice	Dexterity	=
Action observation with task-specific training	Sham observation with task-specific training	Performance of activities of daily living	+
Action observation with task-specific training	Sham observation with task-specific training	Motor function, dexterity	–
Virtual reality with task based training	Task-specific Training	Motor function, muscle strength	+
CNMES with task oriented training and conventional rehab	electromyography-triggered neuromuscular electrical stimulation with task oriented training and conventional rehab	Motor function, dexterity	–
Exoskeleton training Armule with TST	Conventional Rehab	Motor function	+
Exoskeleton training Armule with TST	Conventional Rehab	Performance of activities of daily living	=
Repetitive transcranial magnetic stimulation with TST	Sham repetitive transcranial magnetic stimulation with TST	Motor function, stroke severity	–
Bilateral transcranial direct current stimulation with TST	Sham transcranial direct current stimulation with TST	Motor function	=

Orthosis assistance TIGER with conventional rehab	Task specific training at home with conventional	Motor function, spasticity, proprioception, performance of activities of daily living, dexterity	–
Orthosis assistance TIGER with conventional rehab	Task specific training at home with conventional	Range of motion	=
Bilateral robotic priming training with mirror training (R-mirr)	Bilateral robotic priming training with movement oriented training	Motor function	+
Bilateral robotic priming training with mirror training (R-mirr)	Bilateral robotic priming training with movement oriented training	Performance of activities of daily living, muscle strength	–
Bilateral upper limb robot-assisted training with Conventional Therapy	Task-specific Therapy with Conventional Therapy	Performance of activities of daily living	+
Bilateral upper limb robot-assisted training with Conventional Therapy	Task-specific Therapy with Conventional Therapy	Motor function	–
Portable brain-computer interface-based hand robot system with Conventional therapy and neuromuscular electrical stimulation	Task-specific training with Conventional therapy and neuromuscular electrical stimulation	Motor function	+
Gamified training with ArmAble with Conventional therapy	UE task-based training with Conventional therapy	Stroke severity, muscle strength	–
Gamified training with ArmAble with Conventional therapy	UE task-based training with Conventional therapy	Motor function	=
Virtual reality-based robot therapy with smart glove with task-oriented therapy	Task-oriented therapy	Motor function	+
Virtual reality-based robot therapy with smart glove with task-oriented therapy	Task-oriented therapy	Performance of activities of daily living	=
Forced-rate exercise with Repetitive task practice	Repetitive task practice	Motor function	–
Robotic hand therapy (with objects) with Task-Oriented training and Conventional therapy	Robotic hand therapy (without objects) with Conventional therapy	Motor function, dexterity, range of motion, muscle strength	+
Robotic hand therapy (with objects) with Task-Oriented training and Conventional therapy	Robotic hand therapy (without objects) with Conventional therapy	Spasticity	–
Transcutaneous electrical nerve stimulation with wrist extensor taping and Tast-related training	transcutaneous electrical nerve stimulation with task-related training	Motor function, spasticity	+
Transcutaneous electrical nerve stimulation with wrist extensor taping and Tast-related training	transcutaneous electrical nerve stimulation with task-related training	Muscle strength	–
Bilateral repetitive transcranial magnetic stimulation (high-frequency repetitive transcranial magnetic stimulation with low-frequency repetitive transcranial magnetic stimulation) and Task-oriented therapy	Sham high-frequency repetitive transcranial magnetic stimulation with Sham low-frequency repetitive transcranial magnetic stimulation and Task-oriented therapy	Motor function	+
Bilateral repetitive transcranial magnetic stimulation (high-frequency repetitive transcranial magnetic stimulation with low-frequency repetitive transcranial magnetic stimulation) and Task-oriented therapy	Sham high-frequency repetitive transcranial magnetic stimulation with Sham low-frequency repetitive transcranial magnetic stimulation and Task-oriented therapy	Spasticity	–
Bilateral repetitive transcranial magnetic stimulation (high-frequency	Excitatory repetitive transcranial magnetic stimulation (high-	Motor function, spasticity	–

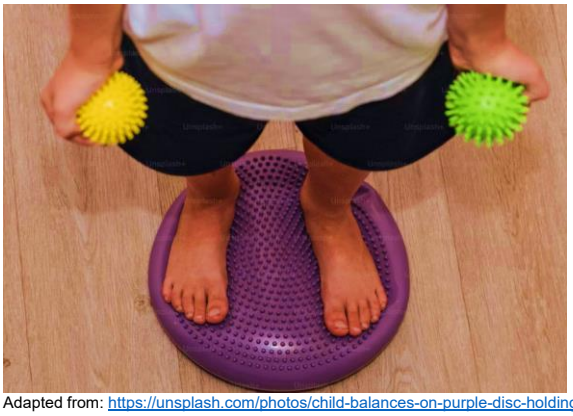
repetitive transcranial magnetic stimulation with low-frequency repetitive transcranial magnetic stimulation) and Task-oriented therapy	frequency repetitive transcranial magnetic stimulation with sham low-frequency repetitive transcranial magnetic stimulation) and Task-oriented therapy		
Bilateral repetitive transcranial magnetic stimulation (high-frequency repetitive transcranial magnetic stimulation with low-frequency repetitive transcranial magnetic stimulation) and Task-oriented therapy	Inhibitory repetitive transcranial magnetic stimulation (sham high-frequency repetitive transcranial magnetic stimulation with low-frequency repetitive transcranial magnetic stimulation) and Task-oriented therapy	Motor function, spasticity	–
Excitatory repetitive transcranial magnetic stimulation (high-frequency repetitive transcranial magnetic stimulation with sham low-frequency repetitive transcranial magnetic stimulation) and Task-oriented therapy	Inhibitory repetitive transcranial magnetic stimulation (sham high-frequency repetitive transcranial magnetic stimulation with low-frequency repetitive transcranial magnetic stimulation) and Task-oriented therapy	Motor function, spasticity	–
Three-Dimensional Printed Dynamic Hand Device with Task-Specific Training	Task-Specific Training	Dexterity, muscle strength	–
Motor Imagery with Audio Feedback and Task Specific Training	Task-specific Training	Dexterity	–
Motor Imagery with Audio Feedback and Task Specific Training	Motor imagery with TST	Dexterity	–
Functional integrative rehabilitation approache	sensorimotor integrative rehabilitation approache	Performance of activities of daily living	–
Electrical stim with repetitive task practice	Sham electrical with repetitive task practice	Performance of activities of daily living	+
Dual transcranial direct current stimulation with bimanual cooperative task training	sham dual tDCS with bimanual cooperative task training	Performance of activities of daily living	–
Electromyography biofeedback with task practice	Sham biofeedback with task practice	Range of motion	–
Low frequency repetitive transcranial magnetic stimulation with pinch motor training (a metronome-paced pinch of their index finger and thumb of the affected hand as fast as possible)	pinch motor training with sham repetitive transcranial magnetic stimulation	Muscle strength	+
Progressive unsupported reaching tasks	Supported reaching tasks	Muscle strength	–
Dextrain Manipulandum exercises (dexterity specific exercises with real-time feedback) with Conventional therapy	Conventional therapy	Muscle strength, proprioception, performance of activities of daily living, dexterity	–
Dextrain Manipulandum exercises (dexterity specific exercises with real-time feedback) with Conventional therapy	Conventional therapy	Motor function	=
Task-Oriented Training	Table-Top Activity Training	Motor function	+
Task-Oriented Training	Table-Top Activity Training	Performance of activities of daily living	–

Forced aerobic exercise with Repetitive task practice(RTP)	Voluntary exercise with RTP	Motor function	=
Auditory imagery with task specific training	Cumulative imagery with task specific training	Motor function, performance of activities of daily living	–
Visual imagery with task specific training	Cumulative imagery with task specific training	Motor function, performance of activities of daily living	–
Task specific training with action observation	No treatment	Performance of activities of daily living	+
Saebo flex Orthotic splint with intensive training	Orthotic splint	Dexterity	+
Saebo flex Orthotic splint with intensive training	Orthotic splint	Motor function	=
Task-specific training combined with other interventions	conventional therapy	Performance of activities of daily living	=
Task-specific training combined with other interventions	exercise and custom physiotherapy protocols	Motor function, muscle strength, spasticity, performance of activities of daily living	–
Task-specific training combined with other interventions	neurodevelopmental techniques (bobath approach)	Motor function	–
Task-specific training combined with other interventions	neurodevelopmental techniques (bobath approach)	Performance of activities of daily living	=
Reach-To-Grasp with robot feedback with Conventional therapy	Conventional therapy	Motor function	+
Reach-To-Grasp with robot feedback with Conventional therapy	Conventional therapy	Performance of activities of daily living	–
Reach-To-Grasp with computer feedback with Conventional therapy	Conventional therapy	Motor function, performance of activities of daily living	–
Reach-To-Grasp with robot feedback with Conventional therapy	Reach-To-Grasp with computer feedback with Conventional therapy	Motor function	–
Transcutaneous auricular vagus nerve stimulation with task-oriented training	Task-oriented training	Motor function, performance of activities of daily living	+
EMG paired taVNS with TST	Active unpaired taVNS with TST	Motor function	–
Sensory Relearning with Task-Specific Training and home exercise	Task-Specific Training with strength training	Motor function, performance of activities of daily living, dexterity	–
Sensory Relearning with Task-Specific Training and home exercise	Task-Specific Training with strength training	Proprioception	=
Robotic Therapy (Armeo Spring & Amadeo) with Task Oriented Training with Active Learning Program for Stroke (ALPS)	Robotic Therapy with Active Learning Program for Stroke (ALPS)	Spasticity, performance of activities of daily living	–
Robotic Therapy (Armeo Spring & Amadeo) with Task Oriented Training with Active Learning Program for Stroke (ALPS)	Robotic Therapy with Active Learning Program for Stroke (ALPS)	Motor function	=
Kinesiotaping with stretching & task specific trainings and conventional rehab	stretching & task specific trainings with conventional rehab and Conventional Therapy	Stroke severity, spasticity	–

Kinesiotaping with stretching & task specific trainings and conventional rehab	stretching & task specific trainings with conventional rehab and Conventional Therapy	Motor function	=
Occupation-based bilateral upper extremity training	Task-based bilateral upper extremity training	Performance of activities of daily living	+
Bilateral robotic priming (Bi-Manu-Track) with task oriented exercises	Task oriented exercises	Motor function, stroke severity, muscle strength, performance of activities of daily living, dexterity	–
Atomoxetine with Task Oriented Upper Extremity Training	Placebo with Task Oriented Upper Extremity Training	Motor function	–
Action observation with task-specific training	Task-specific training	Motor function, performance of activities of daily living, dexterity	+
Action observation with task-specific training	Task-specific training	Spasticity	–
1 Hz rTMS with task oriented exercise	Sham rTMS with task oriented exercise	Motor function, performance of activities of daily living, dexterity	–
Taping with Task specific training	Task specific training	Motor function, stroke severity, performance of activities of daily living	–
High frequency (10Hz) rTMS with task-oriented training	Sham rTMS with task-oriented training	Motor function	+
Robotic orthosis with Task-Specific training and Videogames (Unilateral)	Usual Physical Therapy	Motor function, muscle strength, spasticity, performance of activities of daily living, dexterity	–
Robotic orthosis with Task-Specific Training and Videogames (Bilateral)	Usual Physical Therapy	Motor function, muscle strength, spasticity, performance of activities of daily living, dexterity	–
Myomo brace (EMG triggered micro robot device) with repetitive task practice	Repetitive task practice	Motor function, performance of activities of daily living	–
FES with Task specific training	Sham with Task specific training	Motor function, performance of activities of daily living	+
Dynamic Wrist hand orthosis (wearing while doing reach and grasp practice) with home exercise	Manual-assisted reach and grasp training therapy with home exercise	Motor function, muscle strength, dexterity	–
PNES with Task Specific Training	Task-Specific Training	Motor function, muscle strength, dexterity	–
FES with botulinum toxin-A and home based task-oriented exercise	Botulinum toxin-A with home-based exercise program	Motor function, performance of activities of daily living	–
FES with Standard task-specific training	Standard task-specific training	Motor function, dexterity	+
Cable orthosis with Virtual Reality	Virtual Reality	Motor function, muscle strength, spasticity, range of motion, dexterity	–
Pneumatic orthosis with Virtual Reality	Virtual Reality	Motor function, muscle strength, spasticity, range of motion, dexterity	–
Task-specific training with Peripheral Nerve Stimulation	Task-specific training with Sham Stimulation	Motor function, performance of activities of daily living	–
Task-specific training with Peripheral Nerve Stimulation	Task-specific training with Sham Stimulation	Muscle strength	=
Active-assistive reaching exercise using a robotic device (Arm Guide)	Task-matched amount of reaching without assistance	Stroke severity	–

Bilateral dexterity training with usual rehabilitation	Unilateral dexterity training with usual rehabilitation	Dexterity	−
NMES with repetitive facilitative exercise	Conventional Therapy	Motor function, spasticity, range of motion	−
Repetitive facilitative exercise	Conventional Therapy	Motor function	+
Repetitive facilitative exercise	Conventional Therapy	Spasticity, range of motion	−
Whole-Body Vibration (5-15 Hz)	Conventional Physical Therapy	Muscle strength, spasticity	−
Whole-Body Vibration (5-15 Hz)	Conventional Physical Therapy	Motor function	=
Whole-Body Vibration with Task-Related Training	Conventional Physical Therapy	Motor function, muscle strength, spasticity	+
Task specific training with action observation	Task specific training	Performance of activities of daily living	+
ARMEO exoskeleton with conventional care	Tabletop assisted exercises with conventional therapy	Range of motion	+
ARMEO exoskeleton with conventional care	Tabletop assisted exercises with conventional therapy	Motor function, spasticity, performance of activities of daily living	−

Sensorimotor Training



Adapted from: https://unsplash.com/photos/child-balances-on-purple-disc-holding-spiky-balls-I7wP3hCnkNQ

Sensorimotor training approaches focus on the integration of sensory input with active motor practice; they include structured sensorimotor training programmes, Perfetti's cognitive sensory motor training, and proprioceptive training.

A total of eleven RCTs were found that evaluated sensorimotor training for upper extremity motor rehabilitation. Three RCTs compared sensorimotor training with conventional therapy (deDiego et al. (2013); Chanubol et al. (2012); Feys et al. (1998)). Two RCTs compared sensorimotor training combined with other interventions with task-specific training (De Bruyn et al. (2021); De Bruyn et al. (2020)). One RCT compared sensorimotor training combined with other interventions with motor relearning programmes (Byl et al. (2003)). One RCT compared sensorimotor training combined with other interventions with cimt (Samaei et al. (2016)). One RCT compared different approaches to visual deprivation training (Pulimoot R.S. et al. (2024)). One RCT compared sensorimotor training combined with other interventions with task-specific training or strength training (Carlsson et al. (2022)). One RCT compared proprioceptive training with non electrical somatosensory stimulations (He et al. (2022)). One RCT compared sensorimotor training with sham (Stein et al. (2010)).

In addition, 6 RCTs in which sensorimotor training formed part of a combined or comparative intervention are cross-referenced at the end of Table 5; their primary listings appear in other tables.

The methodological details and results of all eleven RCTs are presented in Table 5.

Table 5. RCTs Evaluating Sensorimotor Training for Upper Extremity Motor Rehabilitation

Authors (Year) **Study Design (PEDro Score)** **Sample Size start** **Sample Size end** **Time post stroke category** **Study design**	**Interventions** **Duration: Session length, frequency per week for total number of weeks**	**Outcome Measures** **Result (direction of effect)**
Sensorimotor training compared to conventional therapy		
deDiego et al. (2013) Pilot RCT (6) NStart=21 NEnd=21 TPS=Chronic A vs 0	E: sensory motor training (Sensory stimulation and functional activity training) C: Standard rehabilitation Duration: E: 1hr/d, 2d/wk, 8wk + ADL training 30min/d, 8wk	E vs C: Fugl-Meyer Assessment Upper extremity (-) Discrimintation of motion Elbow (no stats) Wrist (no stats) Thumb (no stats) Metacarpophalangeal (no stats) Stroke Impact Scale (+exp) Motor Activity Log (+exp)
Chanubol et al. (2012) RCT (8) NStart=47 NEnd=40 TPS=Acute A vs 0	E: Perfetti's Cognitive Sensory Motor Training Therapy C: Conventional Occupational Therapy Duration: 30min/d, 5d/wk, 4wks	E vs C: Action Research Arm Test (-) extended Barthel Index (-) Box and Block Test (-)
Feys et al. (1998) RCT (5) NStart=108 NEnd=100 TPS=Acute A vs 0	E: Sensorimotor training + Conventional therapy C: Conventional therapy Duration: 30min/d, 5d/wk, 6wk	E vs C: Brunnstrom FM test (+exp) ARAT (-) Barthel Index (-)
Sensorimotor training combined with other interventions compared to task-specific training		
De Bruyn et al. (2021) RCT (7) NStart=30 NEnd=28 TPS=Subacute A vs B *Also in Table 4 (Task-Specific Training)*	E: sensorimotor therapy + conventional therapy C: motor therapy+ conventional rehab Duration: 1hr/d, 4d/wk, 4wks	E vs C: FMA-UE (-) ARAT (-) SULCS (-) Em-NSA (-) Perceptual threshold of touch (PTT) (-) Texture Discrimination Tests (-) Wrist Position Sense Test (-) fTORT (-)
De Bruyn et al. (2020) RCT (7) NStart=40 NEnd=36 TPS=Subacute A vs B *Also in Table 4 (Task-Specific Training)*	E: Sensorimotor Training + conventional therapy C: Motor Training (Task-specific Training ands table top games) + conventional therapy Duration: 60min, 4x/wk, 4wks	E vs C: Action Research Arm Test (-) Fugl-Meyer Assessment (+con) Stroke Upper Limb Capacity Scale (-) ABILHAND (-) Erasmus Modified Nottingham Sensory Assessment (-) Perceptual Touch Threshold (-) Texture Discrimination Test (-) Wrist Position Sense Test (-) Functional Tactile Object Recognition Test (-)

Sensorimotor training combined with other interventions compared to motor relearning programmes		
Byl et al. (2003) RCT Crossover (4) NStart=21 NEnd=18 TPS=Chronic A vs B *Also in Table 1 (Neurodevelopmental Techniques)*	E: Sensory Training (the description is alighned with sensorimotor training) C: Motor Training (it is like a combination of motor learning concenpt and task specific) Duration: 1.5h/d, 1d/wk, 4wks -No washout	E vs C: Graphesthesia (No stats given) Kinesthesia (No stats given) Byl-Cheney-Boczai Test (No stats given) Digital Reaction Time (No stats given) Purdue Test (No stats given) Manual Muscle Test (No stats given) ROM (No stats given) WMFT (No stats given) California Functional Evaluation 40 (No stats given) Walking Velocity (No stats given)
Sensorimotor training combined with other interventions compared to cimt		
Samaei et al. (2016) RCT (6) NStart=36 NEnd=36 TPS=Chronic A vs B *Also in Table 6 (Constraint-Induced Movement Therapy (CIMT))*	E: Sensorimotor Training Program C: Constraint Induced Movement Therapy Duration: 90min/d, 5d/wk, for 2wks sensorimotor training, 5d/wk for 6h over 2wks CIMT	E vs C: Nine Hole Peg Test (no stats) Wolf Motor Function Test (no stats) Haptic Object Recognition Test (no stats) Two Point Differentiation (no stats)
Different approaches to visual deprivation training compared against one another		
Pulimoot R.S. et al. (2024) RCT (6) NStart=36 NEnd=33 TPS=Chronic A1 vs A2	E1: Visual Deprivation Training (2sessions/wk) E2: 3 sessions E3: 5 sessions Duration: E1: 40min/d, 2d/wk, 4wks; E2: 40min/d, 3d/wk, 4wks; E3: 40min/d, 5d/wk, 4wks	E3 vs E1/E2: WMFT Time (+exp3) Functional ability (+exp3) E1 vs E2: WMFT Time (-) Functional ability (+exp2)
Sensorimotor training combined with other interventions compared to task-specific training or strength training		
Carlsson et al. (2022) Pilot RCT (7) NStart=27 NEnd=27 TPS=Chronic A + B vs A + C *Also in Table 4 (Task-Specific Training); Table 3 (Exercise and Strength Training)*	E: Sensory Relearning + Task-Specific Training + home exercise C: Task-Specific Training + strength training Duration: 2.5hr/d, 2d/wk, 5wks	E vs C: SWM (+exp) STI (-) FMA-UE (-): light touch (-) proprioception (-) mSHFT (-) BBT (-) MAL (-) COPM (-) SIS (-)
Proprioceptive training compared to non electrical somatosensory stimulations		
He et al. (2022) Pilot RCT (8) NStart=40 NEnd=40 TPS=Subacute A vs B *Also in Table 27 (Additional Afferent and Peripheral Stimulation Methods)*	E: Proprioceptive Training (involving passive and active movements with visual feedback) C: Nonspecific sensory stimulation Duration: 30min/d, 5d/wk, 4wks	E vs C: FMA; - UE-M (+exp) UE-S (+exp) BBT (-) TLT (+exp) BI (-)

Sensorimotor training compared to sham		
Stein et al. (2010) Pilot RCT (10) NStart=30 NEnd=29 TPS=Chronic A vs 0	E: Stochastic resonance stimulation (subthreshold electrical + vibration stimulations) + Conventional occupational therapy C: Sham stimulation + Conventional occupational therapy Duration: 1hr, 3d/wk, 4wks	E vs C: Fugl-Meyer Assessment (-) Motor Activity Log (-) Action Research Arm Test (-) Wolf Motor Function Test (-) Stroke Impact Scale (-) Reaching Performance Scale (-) Proprioception (-) Vibration (-) Pinprick (-) Semmes-Weinstein Monofilament Testing (-)
Cross-Referenced RCTs: Combined or Comparative Interventions Involving Sensorimotor Training (results included in this table's levels of evidence)		
Li et al. (2024c) RCT (6) NStart=52 NEnd=52 TPS=Subacute A + B vs A/B *Primary listing: Table 31 (Transcranial Direct Current Stimulation (tDCS))*	E: Dual tDCS + Sensorimotor training C: Sham tDCS + Sensorimotor training Duration: 60min/d(40min motor training, 20min tDCS), 5d/wk for 4wks	E vs C: FMA-UE (+exp) ARAT (+exp) BBT (+exp) Erasmus-MC revised Nottingham sensory assessment scale light touch (+exp) proprioception (+exp) stereognosis (+exp) current perception threshold 2K Hz (+exp) 250Hz (+exp) 5Hz (+exp) BI (+exp) HADS (+exp) fNIRS (+exp)
Alaca & Öcal (2022) RCT (6) NStart=45 NEnd=40 TPS=Chronic A vs B vs 0 *Primary listing: Table 6 (Constraint-Induced Movement Therapy (CIMT))*	E1: Proprioception Training + Conventional Therapy E2: Modified Constraint-Induced Movement Therapy + Conventional Therapy C: Conventional Therapy Duration: 1hr/d, 5x/wk for 6wk	E1/E2 vs C: Fugl-Meyer Upper Extremity Scale (FMA) (+exp) Action Research Arm Test (ARAT) (+exp) Modified Ashworth Scale (mAS) (+exp) Thumb Localization Test (TLT) (+exp) Upper Extremity Motor Activity Log-28 (MAL-28) (-)
Hsu et al. (2020) Pilot RCT (6) NStart=20 NEnd=19 TPS=Chronic A + B vs A/B *Primary listing: Table 4 (Task-Specific Training)*	E: Perturbation-Based Pinch Task-Specific Training + Sensorimotor Stimulation training C: Upper Extremity Task-Specific Training + Sensorimotor Stimulation Training Duration: 20min/d task training & 10min/d sensorimotor stimulation, 2d/wk for 6wks	E vs C: Semmes-Weinstein MoNofilament Test-Thumb (+exp) Fugl-Meyer Assessment (-) Shoulder/Elbow/Forearm (-) Wrist (-) Hand (-) Coordination (-) Motor Activity Log (-) Amount of Use (-) Quantity of Movement (-) Box and Block Test (+exp) Modified Ashworth Scale Elbow (-) Wrist (-)

		Fingers (-)
Hunter et al. (2018) RCT (6) NStart=288 NEnd=245 TPS=Acute A vs B *Primary listing: Table 3 (Exercise and Strength Training)*	E1: Functional strength training E2: Movement performance therapy Duration: 90min/d, 5d/wk, 6wks	E1 vs E2: ARAT (-) WMFT (-) Grip and pinch force (-)
Volpe et al. (2008) RCT (6) NStart=21 NEnd=21 TPS=Chronic A vs B *Primary listing: Table 16 (Robotics)*	E: Intensive Sensorimotor Arm Training Mediated by robot (InMotion2 robot) C: Intensive Sensorimotor Arm Training Mediated by Therapist Duration: 1hr/d, 3d/wk, 6wks	E vs C: Fugl-Meyer Assessment (-) Motor Power Scale (-) Modified Ashworth Scale (-) Joint Stability Scale (-) Beck Depression Inventory (-) Action Research Arm Test (-) Stroke Impact Scale (-)
Jongbloed et al. (1989) RCT (7) NStart=90 NEnd=90 TPS=Not Reported A vs B *Primary listing: Table 4 (Task-Specific Training)*	E1: functional integrative rehabilitation approache E2: sensorimotor integrative rehabilitation approache	E1 vs E2: Barthel index (-)

Abbreviations and table notes: C=control group; D=days; E=experimental group; H=hours; Min=minutes; RCT=randomized controlled trial; TPS=time post stroke category (Acute: less than 30 days, Subacute: more than 1 month but less than 6 months, Chronic: over 6 months); Wk=weeks.

+exp indicates a statistically significant between groups difference at α=0.05 in favour of the experimental group

+exp1/+exp2/+exp3 indicates a statistically significant between groups difference at α=0.05 in favour of the first, second or third experimental group

+con indicates a statistically significant between groups difference at α=0.05 in favour of the control group

- indicates no statistically significant between groups differences at α=0.05

1. Body Functions and Structures

MOTOR FUNCTION			
LoE	**Conclusion Statement**	**RCTs**	**References**
1a	Sensorimotor training may not have a difference in efficacy when compared to conventional therapy for improving motor function.	3	deDiego et al. (2013); Chanubol et al. (2012); Feys et al. (1998)
1a	Sensorimotor training combined with other interventions may not have a difference in efficacy when compared to task-specific training for improving motor function.	2	De Bruyn et al. (2021); De Bruyn et al. (2020)
1b	5 sessions may produce greater improvements in motor function than Visual Deprivation Training or 3 sessions.	1	Pulimoot R.S. et al. (2024)
1b	Visual Deprivation Training may result in lesser improvements in motor function when compared to 3 sessions.	1	Pulimoot R.S. et al. (2024)
1b	Functional strength training may not have a difference in efficacy when compared to Movement performance therapy for improving motor function.	1	Hunter et al. (2018)
1b	Intensive Sensorimotor Arm Training Mediated by robot may not have a difference in efficacy when compared to Intensive	1	Volpe et al. (2008)

	Sensorimotor Arm Training Mediated by Therapist for improving motor function.		
1b	Proprioception Training with Conventional Therapy may produce greater improvements in motor function than Conventional Therapy.	1	Alaca & Öcal (2022)
1b	Dual transcranial direct current stimulation with Sensorimotor training may produce greater improvements in motor function than Sham transcranial direct current stimulation with Sensorimotor training.	1	Li et al. (2024c)
1b	Sensory Relearning with Task-Specific Training and home exercise may not have a difference in efficacy when compared to Task-Specific Training with strength training for improving motor function.	1	Carlsson et al. (2022)
1b	Proprioceptive Training (involving passive and active movements with visual feedback) may produce greater improvements in motor function than Nonspecific sensory stimulation.	1	He et al. (2022)
1b	Stochastic resonance stimulation (subthreshold electrical with vibration stimulations) and Conventional occupational therapy may not have a difference in efficacy when compared to Sham stimulation with Conventional occupational therapy for improving motor function.	1	Stein et al. (2010)
1b	Perturbation-Based Pinch Task-Specific Training with Sensorimotor Stimulation training may not have a difference in efficacy when compared to Upper Extremity Task-Specific Training with Sensorimotor Stimulation Training for improving motor function.	1	Hsu et al. (2020)

STROKE SEVERITY			
LoE	**Conclusion Statement**	**RCTs**	**References**
2	Sensorimotor training with conventional therapy may produce greater improvements in stroke severity than conventional therapy alone.	1	Feys et al. (1998)

MUSCLE STRENGTH			
LoE	**Conclusion Statement**	**RCTs**	**References**
1b	Functional strength training may not have a difference in efficacy when compared to Movement performance therapy for improving muscle strength.	1	Hunter et al. (2018)

SPASTICITY			
LoE	**Conclusion Statement**	**RCTs**	**References**
1b	Intensive Sensorimotor Arm Training Mediated by robot may not have a difference in efficacy when compared to Intensive Sensorimotor Arm Training Mediated by Therapist for improving spasticity.	1	Volpe et al. (2008)
1b	Proprioception Training with Conventional Therapy may produce greater improvements in spasticity than Conventional Therapy.	1	Alaca & Öcal (2022)
1b	Perturbation-Based Pinch Task-Specific Training with Sensorimotor Stimulation training may not have a difference in efficacy when compared to Upper Extremity Task-Specific Training with Sensorimotor Stimulation Training for improving spasticity.	1	Hsu et al. (2020)

PROPRIOCEPTION			
LoE	**Conclusion Statement**	**RCTs**	**References**
1a	Sensorimotor training combined with other interventions may not have a difference in efficacy when compared to task-specific training for improving proprioception.	2	De Bruyn et al. (2021); De Bruyn et al. (2020)
1b	Proprioception Training with Conventional Therapy may produce greater improvements in proprioception than Conventional Therapy.	1	Alaca & Öcal (2022)
1b	Dual transcranial direct current stimulation with Sensorimotor training may produce greater improvements in proprioception than Sham transcranial direct current stimulation with Sensorimotor training.	1	Li et al. (2024c)
1b	There is conflicting evidence about the effect of Sensory Relearning with Task-Specific Training and home exercise when compared to Task-Specific Training with strength training for improving proprioception.	1	Carlsson et al. (2022)
1b	Proprioceptive Training (involving passive and active movements with visual feedback) may produce greater improvements in proprioception than Nonspecific sensory stimulation.	1	He et al. (2022)
1b	Stochastic resonance stimulation (subthreshold electrical with vibration stimulations) and Conventional occupational therapy may not have a difference in efficacy when compared to Sham stimulation with Conventional occupational therapy for improving proprioception.	1	Stein et al. (2010)
1b	Perturbation-Based Pinch Task-Specific Training with Sensorimotor Stimulation training may produce greater improvements in proprioception than Upper Extremity Task-Specific Training with Sensorimotor Stimulation Training.	1	Hsu et al. (2020)

2. Activities

ACTIVITIES OF DAILY LIVING			
LoE	**Conclusion Statement**	**RCTs**	**References**
1a	Sensorimotor training may not have a difference in efficacy when compared to conventional therapy for improving performance of activities of daily living.	3	deDiego et al. (2013); Chanubol et al. (2012); Feys et al. (1998)
1b	Sensorimotor training combined with other interventions may not have a difference in efficacy when compared to task-specific training for improving performance of activities of daily living.	1	De Bruyn et al. (2020)
1b	Functional integrative rehabilitation approache may not have a difference in efficacy when compared to sensorimotor integrative rehabilitation approache for improving performance of activities of daily living.	1	Jongbloed et al. (1989)
1b	Proprioception Training with Conventional Therapy may not have a difference in efficacy when compared to Conventional Therapy for improving performance of activities of daily living.	1	Alaca & Öcal (2022)
1b	Dual transcranial direct current stimulation with Sensorimotor training may produce greater improvements in performance of activities of daily living than Sham transcranial direct current stimulation with Sensorimotor training.	1	Li et al. (2024c)
1b	Sensory Relearning with Task-Specific Training and home exercise may not have a difference in efficacy when compared to Task-Specific Training with strength training for improving performance of activities of daily living.	1	Carlsson et al. (2022)

1b	Proprioceptive Training (involving passive and active movements with visual feedback) may not have a difference in efficacy when compared to Nonspecific sensory stimulation for improving performance of activities of daily living.	1	He et al. (2022)
1b	Stochastic resonance stimulation (subthreshold electrical with vibration stimulations) and Conventional occupational therapy may not have a difference in efficacy when compared to Sham stimulation with Conventional occupational therapy for improving performance of activities of daily living.	1	Stein et al. (2010)
1b	Perturbation-Based Pinch Task-Specific Training with Sensorimotor Stimulation training may not have a difference in efficacy when compared to Upper Extremity Task-Specific Training with Sensorimotor Stimulation Training for improving performance of activities of daily living.	1	Hsu et al. (2020)

DEXTERITY			
LoE	**Conclusion Statement**	**RCTs**	**References**
1b	Sensorimotor training may not have a difference in efficacy when compared to conventional therapy for improving dexterity.	1	Chanubol et al. (2012)
1b	Dual transcranial direct current stimulation with Sensorimotor training may produce greater improvements in dexterity than Sham transcranial direct current stimulation with Sensorimotor training.	1	Li et al. (2024c)
1b	Sensory Relearning with Task-Specific Training and home exercise may not have a difference in efficacy when compared to Task-Specific Training with strength training for improving dexterity.	1	Carlsson et al. (2022)
1b	Proprioceptive Training (involving passive and active movements with visual feedback) may not have a difference in efficacy when compared to Nonspecific sensory stimulation for improving dexterity.	1	He et al. (2022)
1b	Perturbation-Based Pinch Task-Specific Training with Sensorimotor Stimulation training may produce greater improvements in dexterity than Upper Extremity Task-Specific Training with Sensorimotor Stimulation Training.	1	Hsu et al. (2020)

Key Points

- Sensorimotor training may not be beneficial for improving motor function, performance of activities of daily living, and dexterity after stroke when compared to conventional therapy.
- Sensorimotor training combined with other interventions may not be beneficial for improving motor function, performance of activities of daily living, and proprioception after stroke when compared to task-specific training.
- 5 sessions may be beneficial for improving motor function after stroke when compared to Visual Deprivation Training or 3 sessions.
- Visual Deprivation Training may be less beneficial than 3 sessions for improving motor function after stroke.
- Functional strength training may not be beneficial for improving motor function and muscle strength after stroke when compared to Movement performance therapy.
- Intensive Sensorimotor Arm Training Mediated by robot may not be beneficial for improving motor function and spasticity after stroke when compared to Intensive Sensorimotor Arm Training Mediated by Therapist.
- Proprioception Training with Conventional Therapy may be beneficial for improving motor function, spasticity, and proprioception, but not performance of activities of daily living, after stroke when compared to Conventional Therapy.

- Dual transcranial direct current stimulation with Sensorimotor training may be beneficial for improving motor function, dexterity, performance of activities of daily living, and proprioception after stroke when compared to Sham transcranial direct current stimulation with Sensorimotor training.
- Functional integrative rehabilitation approache may not be beneficial for improving performance of activities of daily living after stroke when compared to sensorimotor integrative rehabilitation approache.
- Sensorimotor training with conventional therapy may be beneficial for improving stroke severity after stroke when compared to conventional therapy alone.
- Sensory Relearning with Task-Specific Training and home exercise may not be beneficial for improving motor function, performance of activities of daily living, and dexterity after stroke when compared to Task-Specific Training with strength training; the literature is mixed regarding proprioception.
- Proprioceptive Training (involving passive and active movements with visual feedback) may be beneficial for improving motor function and proprioception, but not performance of activities of daily living and dexterity, after stroke when compared to Nonspecific sensory stimulation.
- Stochastic resonance stimulation (subthreshold electrical with vibration stimulations) and Conventional occupational therapy may not be beneficial for improving motor function, proprioception, and performance of activities of daily living after stroke when compared to Sham stimulation with Conventional occupational therapy.
- Perturbation-Based Pinch Task-Specific Training with Sensorimotor Stimulation training may be beneficial for improving proprioception and dexterity, but not motor function, spasticity, and performance of activities of daily living, after stroke when compared to Upper Extremity Task-Specific Training with Sensorimotor Stimulation Training.

Summary of Key Points: Sensorimotor Training

Intervention	Control(s)	Function domain(s)	Effect
Sensorimotor training	conventional therapy	Motor function, performance of activities of daily living, dexterity	−
Sensorimotor training combined with other interventions	task-specific training	Motor function, performance of activities of daily living, proprioception	−
5 sessions	Visual Deprivation Training or 3 sessions	Motor function	+
Visual Deprivation Training	3 sessions	Motor function	−
Functional strength training	Movement performance therapy	Motor function, muscle strength	−
Intensive Sensorimotor Arm Training Mediated by robot	Intensive Sensorimotor Arm Training Mediated by Therapist	Motor function, spasticity	−
Proprioception Training with Conventional Therapy	Conventional Therapy	Motor function, spasticity, proprioception	+
Proprioception Training with Conventional Therapy	Conventional Therapy	Performance of activities of daily living	−
Dual transcranial direct current stimulation with Sensorimotor training	Sham transcranial direct current stimulation with Sensorimotor training	Motor function, dexterity, performance of activities of daily living, proprioception	+
Functional integrative rehabilitation approache	sensorimotor integrative rehabilitation approache	Performance of activities of daily living	−
Sensorimotor training with conventional therapy	conventional therapy alone	Stroke severity	+
Sensory Relearning with Task-Specific Training and home exercise	Task-Specific Training with strength training	Motor function, performance of activities of daily living, dexterity	−
Sensory Relearning with Task-Specific Training and home exercise	Task-Specific Training with strength training	Proprioception	=

Proprioceptive Training (involving passive and active movements with visual feedback)	Nonspecific sensory stimulation	Motor function, proprioception	+
Proprioceptive Training (involving passive and active movements with visual feedback)	Nonspecific sensory stimulation	Performance of activities of daily living, dexterity	–
Stochastic resonance stimulation (subthreshold electrical with vibration stimulations) and Conventional occupational therapy	Sham stimulation with Conventional occupational therapy	Motor function, proprioception, performance of activities of daily living	–
Perturbation-Based Pinch Task-Specific Training with Sensorimotor Stimulation training	Upper Extremity Task-Specific Training with Sensorimotor Stimulation Training	Proprioception, dexterity	+
Perturbation-Based Pinch Task-Specific Training with Sensorimotor Stimulation training	Upper Extremity Task-Specific Training with Sensorimotor Stimulation Training	Motor function, spasticity, performance of activities of daily living	–

Constraint-Induced Movement Therapy (CIMT)



Adapted from: https://neenahsatellite.com/15429/student-life/creative-writing/magazines/effectiveness-of-cimt/

A total of 91 RCTs were found that evaluated Constraint-Induced movement therapy (CIMT) for upper extremity motor rehabilitation. Eleven RCTs compared different approaches to CIMT (Abdullahi et al. (2018); Kaura et al. (2018); Doussoulin et al. (2017); Souza et al. (2015); Rickards et al. (2014); Krawczyk et al. (2012); Brogardh et al. (2009); Gauthier et al. (2008); Sawaki et al. (2008); Brogardh & Sjolund (2006); Sterr et al. (2002)). Three RCTs compared CIMT combined with other interventions with bilateral arm training (Kale et al. (2019); Suputtitada et al. (2004); van der Lee et al. (1999)). 36 RCTs compared CIMT with conventional therapy (Ceylan et al. (2023); Tariq et al. (2023); Gauthier L.V. et al. (2022); Bhardwaj et al. (2021); Rocha et al. (2021); Waris et al. (2021); Baldwin et al. (2018); Stock et al. (2018); Yu et al. (2017); Liu et al. (2016a); Yadav et al. (2016); Barzel et al. (2015); Thrane et al. (2015); El-Helow et al. (2014); Singh et al. (2013); Smania et al. (2012); Treger et al. (2012); Lin et al. (2010a); Tariah et al. (2010); Dromerick et al. (2009); Hammer et al. (2009); Dahl et al. (2008); Lin et al. (2008); Myint et al. (2008); Boake et al. (2007); Lin et al. (2007); Wu et al. (2007a); Wu et al. (2007b); Wu et al. (2007c); Wolf et al. (2006); Page et al. (2005b); Yen et al. (2005); Ploughman et al. (2004); Wittenberg et al. (2003); Dromerick et al. (2000); Taub et al. (1993)). Eight RCTs compared CIMT combined with other interventions with cimt (Kolbasi et al. (2024); Bang et al. (2018); Kim et al. (2018a); Bang et al. (2016); Bang et al. (2015); Yoon et al. (2014); Page et al. (2009); Woodbury et al. (2009)). Five RCTs compared CIMT combined with other interventions with cimt or sham (Andrade et al. (2017); Figlewski et al. (2017); Carrico et al. (2016a); Cunningham et al. (2015); Bolognini et al. (2011)). Four RCTs compared CIMT with conventional therapy or no treatment (Demers et al. (2022); Page et al. (2008); Atteya et al. (2004); Page et al. (2001b)). One RCT evaluated CIMT combined with other interventions (Hayner et al. (2010)). Ten RCTs compared CIMT combined with other interventions with conventional therapy

(Alaca & Öcal (2022); Takebayashi et al. (2022); Anjum A.F. et al. (2021); Kwakkel et al. (2016); Seok et al. (2016); van Delden et al. (2013); Wu et al. (2012b); Wu et al. (2012c); Khan et al. (2011); Wang et al. (2011)). Two RCTs compared CIMT combined with other interventions with motor relearning programmes (Shah et al. (2016); Batool et al. (2015)). Two RCTs compared CIMT with no treatment or conventional therapy (Page et al. (2004); Page et al. (2002)). One RCT compared CIMT with no treatment (Kim et al. (2008)). One RCT compared CIMT with conventional therapy or sham (Uswatte et al. (2018)). One RCT compared CIMT combined with other interventions with neurodevelopmental techniques (bobath approach) (Hüseyinsinoğlu et al. (2012)). One RCT compared CIMT combined with other interventions with sham or cimt (Nadeau et al. (2004)). One RCT compared CIMT combined with other interventions with mental practice (Park et al. (2015a)). One RCT compared CIMT combined with other interventions with acupuncture or conventional therapy (Song et al. (2016)). One RCT compared CIMT combined with other interventions with bilateral arm training or task-specific training (Brunner et al. (2012)). One RCT compared CIMT combined with other interventions with orthotics (Lin et al. (2009a)). One RCT compared CIMT with proprioceptive neuromuscular facilitation (PNF) (Dhanalakshmi et al. (2022)).

In addition, 30 RCTs in which Constraint-Induced movement therapy (CIMT) formed part of a combined or comparative intervention are cross-referenced at the end of Table 6; their primary listings appear in other tables.

The methodological details and results of all 91 RCTs are presented in Table 6.

Table 6. RCTs Evaluating Constraint-Induced Movement Therapy (CIMT) for Upper Extremity Motor Rehabilitation

Authors (Year) **Study Design (PEDro Score)** **Sample Size start** **Sample Size end** **Time post stroke category** **Study design**	**Interventions** **Duration: Session length, frequency per week for total number of weeks**	**Outcome Measures** **Result (direction of effect)**
Different approaches to CIMT compared against one another		
Abdullahi et al. (2018) RCT (8) NStart=48 NEnd=48 TPS=Acute A + B1 vs A + B2 vs 0 *Also in Table 4 (Task-Specific Training)*	E1: Received modifed CIMT + task-specific training 3hr E2: CIMT-received 300 repetitions of task specific training E3: CIMT + 600 repetitions task specific training C: Traditional therapy Duration: 5x/wk, 4wk.	E1/E2/E3 vs C: Fugl-Meyer assessment (+exp1, +exp2, +exp3) Motor Activity Log (+exp1, +exp2, +exp3) Wolf Motor Function (+exp1, +exp2, +exp3) UPSET (no stats) E1 vs E2 vs E3: Fugl-Meyer assessment (-) Motor Activity Log (-) Wolf Motor Function (-) UPSET (no stats)
Kaura et al. (2018) RCT (5) NStart=20 NEnd=20 TPS=Chronic A1 vs A2	E1: Voluntary mCIMT E2: mCIMT Duration: 1hr/d, 5d/wk for 4wks hand function training; 3hr/d, 5d/wk for 4 weeks constraint technique	E1 vs E2: WMFT time(-) and functionality (-) Motor actiity log QoM (-) AoU (-)
Doussoulin et al. (2017) RCT (6) NStart=36 NEnd=36 TPS=Chronic A1 vs A2	E: Collective Modified CIMT C: Individual Modified CIMT Duration: 3h/d for 10d	E vs C: FIM Scale (+exp) motor (+con) cognitive (+exp) Motor activity log (+exp) ARAT (+exp)
Souza et al. (2015) Pilot RCT (6) NStart=24	E: high-intensity CIMT (3h) C: low-intensity CIMT (1.5h) + home exercises (1.5h)	E vs C: Fugl-Meyer Assessment (-) Stroke Specific Quality of life Scale (-)

NEnd=19 TPS=Chronic A1 vs A2	Duration: 3hr/d, 3-4d/wk, 10x total over 22d	Motor Activity Log AOU (-) QOM (-)
Rickards et al. (2014) RCT (4) NStart=20 NEnd=16 TPS=Chronic A1 vs A2	E: Constraint-Induced Movement Therapy with Transfer Package C: Constraint-Induced Training with No transfer Package and No At Home Use Duration: 3.5hrs/d, 5d/wk for 2wks CIMT with transfer pachage + restraint for 90% waking hours (experimental group only); 3hrs/d, 5d/wk for 2 weeks control group	E vs C: Motor Activity Log (+exp) Wolf Motor Function Test (-)
Krawczyk et al. (2012) RCT (6) NStart=47 NEnd=38 TPS=Subacute A1 vs A2	E1: Sling CIMT E2: Voluntary CIMT Duration: 5hr/d for 15ds	E1 vs E2: Rivermead motor assessment arm scale (-) Motor activity log Quality of movement (-)
Brogardh et al. (2009) RCT (6) NStart=24 NEnd=24 TPS=Subacute A1 vs A2	E: CIMT with mitt + Gait/balance training as needed C: CIMT without mitt + Gait/balance training as needed Duration: 3hr/d, 5d/wk, 2wks CIMT, 15-30min/d Gait/balance training	E vs C: Modified Motor Assessment Scale (-) Motor Activity Log (-) Sollerman Hand Function test (-) 2-Point Discrimination test (-)
Gauthier et al. (2008) RCT (4) NStart=49 NEnd=36 TPS=Chronic A1 vs A2	E: Constraint-induced movement therapy C: Comparison Therapy Duration: 3hr/d/ 10d;	E vs C: Motor activity log (+exp) Wolf Motor Function Test (-)
Sawaki et al. (2008) RCT (5) NStart=30 NEnd=30 TPS=Not Reported A1 vs A2	E: Early CIMT (right after baseline evaluation) C: Delayed CIMT (4mo after baseline evaluation) Duration: CIMT regimen: 10d intensive upper extremity therapy; wearing a padded mitt for %90 of a day for 14d	E vs C: Wolf Motor Function Test (-) Grip strength (+exp) TMS measures thresholds (-), - map size location (-) recruitment curve (-) silent period (-) motor map (+exp) COGs (-)
Brogardh & Sjolund (2006) Pilot RCT (8) NStart=16 NEnd=16 TPS=Chronic A1 vs A2	E: CIMT (2 wks) followed by Extended Mitt Use (3 months) C: CIMT (2 wks) followed by No Treatment during the next 3 months Duration: 6h/d, 5d/wk, for 2wks CIMT group therapy, 90% of waking hours, 21d within 3mo Mitt use	E vs C: Motor Assessment Scale (-) Motor Activity Log (-) Sollerman Hand Function test (-) Two-point discrimination test (-)
Sterr et al. (2002) RCT (4) NStart=18 NEnd=15 TPS=Chronic A1 vs A2	E: high intensity CIMT (6hr) C: low intensity CIMT (3hr) Duration: 3 or 6 hr/d, 5d/wk, 2wks	E vs C: Wolf Motor Function Test (-) Motor Activity Log AOU (+exp) QOM (+exp)

CIMT combined with other interventions compared to bilateral arm training		
Kale et al. (2019) RCT (4) NStart=30 NEnd=30 TPS=Not Reported A vs B *Also in Table 2 (Bilateral Arm Training)*	E: Constraint Induced Movement Therapy C: Bilateral Arm Training Duration: 3hr/d, 5d/wk, 4wks CIMT, 1hr/d, 5d/wk, 4wks BAT	E vs C: Action Research Arm Test (-) Nine Hole Peg Test (-)
Suputtitada et al. (2004) RCT (6) NStart=69 NEnd=69 TPS=Chronic A vs B *Also in Table 2 (Bilateral Arm Training)*	E: CIMT C: Conservative treatment (bimanual-upper-extremity training by conservative neurodevelopmental technique) Duration: 6hr, 5d/wk, 2wk	E vs C: Action Research Arm Test (+exp) Dynamometer Pinch test (+exp) Dynamometer Hand grip strength (-)
van der Lee et al. (1999) RCT (7) NStart=66 NEnd=66 TPS=Chronic A vs B *Also in Table 2 (Bilateral Arm Training)* *Also in Table 1 (Neurodevelopmental Techniques)*	E: Forced use therapy using splint C: Bimanual training based on neuro-developmental treatment Duration: 6hr, 5d/wk for 2wk	E vs C: Action Research Arm Test (+exp) Motor Activity Log (+exp) Fugl-Meyer Assessment (-) Rehabilitation Activities Profile
CIMT compared to conventional therapy		
Ceylan et al. (2023) RCT (5) NStart=40 NEnd=39 TPS=Chronic A vs 0	E1: Left-Modified Constraint Induced Movement Therapy + Conventional therapy E2: Right-Modified Constraint Induced Movement Therapy + Conventional therapy C: Conventional Therapy Duration: 4.5 h/d (4 hours of CIMT and 30 mins of conventional physiotherapy), 5d/wk, 2wks	E1 vs C: FMA-UE (+exp1) SIS strength (+exp1) memory (-) mood (-) communication (-) ADLs (+exp1) mobility (-) hand function (+exp1) participation (-) stroke recovery (+exp1) Motor activity log amount of use (+exp1) quality of use (+exp1) BBT (+exp1) stacking cube (+exp1) turning card (+exp1) grasping objects (+exp1) carrying a glass of water (+exp1) E2 vs C: FMA-UE (-) SIS -strength (-) memory (-) mood (-) communication (-) ADLs (+exp2) mobility (-)

		hand function (+exp2) participation (-) stroke recovery (+exp2) Motor activity log amount of use (+exp2) quality of use (+exp2) BBT (+exp2) stacking cube (+exp2) turning card (+exp2) grasping objects (+exp2) carrying a glass of water (+exp2) E1 vs E2: FMA-UE (-) SIS -strength (-) memory (-) mood (-) communication (-) ADLs (-) mobility (-) hand function (-) participation (-) stroke recovery (-) Motor activity log amount of use (-) quality of use (-) BBT (-) stacking cube (-) turning card (-) grasping objects (-) carrying a glass of water (-)
Tariq et al. (2023) RCT (4) NStart=29 NEnd=29 TPS=Subacute A vs 0	E: CIMT + Traditional rehabilitation C: Traditional rehabilitation Duration: C: 3d/wk for 6wks, E: 60min/d for 6wks	E vs C: Wolf Motor Function Test (+exp) FMA-UE (+exp)
Gauthier L.V. et al. (2022) RCT (8) NStart=193 NEnd=150 TPS=Chronic A1 vs A2 vs 0	E1: self gaming CIMT E2: telegaming CIMT E3: intensive CIMT C: conventional rehab Duration: E1: 25hrs(5h in clinic behaviour focus CIMT, 15hr video games, +5hr task practice) E2: 25hrs(5hr in clinic behaviour focus, 15hr video games, 2.6hrs telerehab, +5h task practice) E3: 40hrs(35hrs in clinic behaviour and motor focus, +5h task practice) C: 10hrs(5hrs motor focus, +5hrs task practice) ALL: Took place over span of 3 weeks	E1 vs E2 vs E3 vs C: (E1+E2) V E3: MAL (+exp1, -exp2) WMFT (-) NeuroQOL (-) 9HPT (-) Semmes-Weinstein (no stat) MoCA (no stat) (E1+E2) V C: MAL (+exp1, +exp2) WMFT (-) NeuroQOL (-) 9HPT (-) Semmes-Weinstein (no stat) MoCA (no stat) Accelerometry (-)

Bhardwaj et al. (2021) RCT (6) NStart=44 NEnd=44 TPS=Not Reported A1 vs A2 vs 0	E1: Modified Constrained Induced Movement Therapy (mCIMT) without interval E2: Modified Constrained Induced Movement Therapy (mCIMT) with interval C: No Constraint Exercises Duration: 6d/wk for 2wk	E1/E2 vs C: Box and Block Test (BBT) (+exp) Patient Rated Wrist Hand Evaluation Score (PRWHE) (+exp)
Rocha et al. (2021) RCT (6) NStart=30 NEnd=30 TPS=Chronic A vs 0	E: Constraint Induced Movement Therapy C: Conventional physiotherapy Duration: 60min/d, 3d/wk, 8wks (24session)	E vs C: E: FMA (+exp) Modified Ashworth (+exp) Stroke Specific Quality Of Life (+exp) Functional Reach Test (+exp)
Waris et al. (2021) RCT (3) NStart=18 NEnd=18 TPS=Not Reported A vs 0	E: Constraint Induced Movement Therapy C: Conventional physiotherapy Duration: 12hrs/d, 4d/wk, 2-3mo	E vs C: MAL (no stats) WMFT (no stats)
Stock et al. (2018) RCT Crossover (6) NStart=47 NEnd=43 TPS=Acute A vs 0	E: CIMT C: standard rehabilitation Duration: 3hr/d, 10d	E vs C: Wolf Motor Function Test (-) functional ability (-) arm strength (-) grip strength (-) Nine-Hole Peg Test (-) Fugl-Meyer Assessment- UE (-) Modified Rankin Scale (-)
Baldwin et al. (2018) Pilot RCT (7) NStart=19 NEnd=17 TPS=Chronic A vs 0	E: Modified Constraint-Induced Movement Therapy + Occupational therapy C: Conventional + Occupational therapy Duration: 60min 5x/wk for 4wk	E vs C: Motor Assessment Scale (-) Wolf Motor Function Test (-)
Yu et al. (2017) RCT (5) NStart=29 NEnd=29 TPS=Acute A vs 0	E: mCIMT + Conventional therapy C: Conventional therapy Duration: 3h/d, 10d (consecutive)	E vs C: WMFT score (+exp) time (-) Motor Activity Log Amount of Usage: (+exp) Quality of Movement (-) MEP ipsilesional SP (-) ipsilesional CMCT (-) contralesional SP (-) Contralesional CMCT (-)
Liu et al. (2016a) RCT (7) NStart=90 NEnd=86 TPS=Acute A1 vs A2 vs 0	E1: mCIMT+ daily physical therapy E2: self-regulated CIMT+ daily physical therapy C: Conventional therapy+ daily physical therapy Duration: 1hr/d, 5d/wk for 2wks; non-hemiplegic arm was restrained for 4hr/d	E1 vs C: ARAT (+exp1) grip (+exp1) pinch (+exp1) grasp (-) gross movement (-)

		FMA (+exp1) upper arm motor function (-) wrist motor function (-) hand motor function (-) coordination (-) Lawton IADL (-) MAL AOU (+exp1) QOM (+exp1) E1 vs E2: ARAT (-) FMA (+exp2) Lawton Instrumental Activities of Daily Living (+exp2) MAL (+exp2) E2 vs C: ARAT (+exp2) pinch (+exp2) grasp (-) grip (-) gross movement (-) FMA (+exp2) upper arm motor function (+exp2) wrist motor function (+exp2) hand motor function (+exp2) coordination (+exp2) Lawton IADL (+exp2) MAL AOU (+exp2) QOM (+exp2) E1 vs E2: ARAT (-) FMA (+exp2) upper limb coordination (+exp2) upper arm motor function (-) wrist motor function (-) hand motor function (-) Lawton IADL (+exp2) MAL AOU (+exp2) QOM (-)
Yadav et al. (2016) RCT (5) NStart=65 NEnd=60 TPS=Chronic A vs 0	E: mCIMT C: Conventional rehabilitation Duration: 3h, 3d/wk, 4wk	E vs C: Fugl-Meyer Assessment (+exp) Motor Activity Log Amount of Use (+exp) score and Quality of Use QOU score (+exp)
Barzel et al. (2015) RCT (7) NStart=156 NEnd=153 TPS=Chronic A vs 0	E: Home based CIMT C: Standard therapy Duration: 5hr/4wk	E vs C: MAL (+exp) WMFT (-) nine hole peg test (-) Barthel Index (-) IADL (-)

		SIS hand function (-)
Thrane et al. (2015) RCT (7) NStart=47 NEnd=44 TPS=Acute A vs 0	E: CIMT C: Usual care Duration: 3h/d for 10d	E vs C: Wolf Motor Function Test log time (+exp) functional ability (-) arm strength (-) grip strength (-) Stroke Impact Scale (-) Fugl-Meyer Assessment (-) Nine-hole peg test (+exp) arm use ratio (-) Arm use ratio in ADL (-)
El-Helow et al. (2014) RCT (7) NStart=60 NEnd=60 TPS=Acute A vs 0	E: mCIMT C: Conventional therapy Duration: 6h/d, 2wk	E vs C: FMA(+exp) ARAT(+exp) MEP parameters
Singh et al. (2013) RCT (4) NStart=40 NEnd=40 TPS=Acute A vs 0	E: m-CIMT C: conventional rehabilitation Duration: 2hr, 2x/wk, 2wk + 10h/d mitt wearing	E vs C: Wolf Motor Function Test (no stats) Fugl-Meyer Assessment (no stats)
Smania et al. (2012) RCT (8) NStart=66 NEnd=59 TPS=Chronic A vs 0	E: mCIMT C: Conventional therapy Duration: 2h, 5d/wk, 2wk	E vs C: Wolf Motor Function Test ability scale (+exp) time (-) Motor Activity Log AUO (+exp) QOM (-) Ashworth Scale (-)
Treger et al. (2012) RCT (8) NStart=28 NEnd=28 TPS=Subacute A vs 0	E: mCIMT C: Traditional rehabilitation Duration: 4h, 2d/wk for 2wk	E vs C: Functional Independence Measure (-) Manual Function Test (-) National Institute of Health Stroke Scale (-)
Lin et al. (2010a) RCT (4) NStart=13 NEnd=13 TPS=Chronic A vs 0	E: Distributed CIMT C: Routine Therapy Duration: 2h, 5d/wk for 3wk	E vs C: Fugl-Meyer Assessment (+exp) Motor Activity Log (+exp) fMRI measures
Tariah et al. (2010) RCT (6) NStart=20 NEnd=18 TPS=Chronic A vs 0	E: CIMT C: Conventional neurodevelopmental treatment Duration: 2hrs/d, 2mo	E vs C: Wolf Motor Function Test (-) Time (-) Score (-) Motor Activity Log (-) Amount of use (-) Quality of use (-)

		Fugl-Meyer Assessment (-) Joint motion (-) Pain score (-) Sensation (-) Motor function (-)
Dromerick et al. (2009) RCT (7) NStart=52 NEnd=50 TPS=Acute A1 vs A2 vs 0	E1: Very Early Constraint-Induced movement E2: Traditional High Intensity Constraint-Induced Movement Therapy C: Traditional Occupational Therapy Duration: 2-3h, 5d/wk for 2wk	E1/E2 vs C: Action Research Arm Test (+exp2) Functional Independence Measure (-) Stroke impact Scale-Hand Function (-) Wong-Baker Faces Scale (-) Geriatric Depression-15 Scale (-)
Hammer et al. (2009) Pilot RCT (7) NStart=30 NEnd=28 TPS=Subacute A vs 0	E: Restraining sling + standard rehabilitation C: Standard rehabilitation Duration: 6h/d sling + 3h/d task-oriented rehab, 5d/wk, 2wk	E vs C: FMA (-) ARAT (-) MAS (-) 16HPT (-) grippit isometric grip strength (-) mAS (-) MAL (-)
Lin et al. (2008) RCT (6) NStart=22 NEnd=22 TPS=Chronic A vs 0	E: Constraint-induced Movement Therapy C: Traditional therapy Duration: 120min/d, 5d/wk, 3wk	E vs C: Fugl-Meyer Assessment (+exp) Functional Independence Measure (+exp) Motor Activity Log (-) Nottingham Extended Activities of Daily Living Scale - Mobility (+exp) Kitchen (-) Living affairs (-) Leisure (-)
Myint et al. (2008) RCT (7) NStart=48 NEnd=37 TPS=Subacute A vs 0	E: mCIMT C: Traditional rehabilitation Duration: 4h/d for 10d	E vs C: Action Research Arm Test (+exp) Motor Activity Log (+exp) + Functional test for hemiparetic UE + modified barthel index + 9HPT
Dahl et al. (2008) Pilot RCT (8) NStart=30 NEnd=30 TPS=Chronic A vs 0	E: Constraint-Induced Movement Therapy C: Community-based Rehabilitation Duration: 6h, 5d/wk for 2wk	E vs C: Wolf Motor Funtion Test (+exp) Motor Activity Log (-) Functional Independence Measure (-) Stroke Impact Scale (-)
Boake et al. (2007) RCT (5) NStart=23 NEnd=16 TPS=Subacute A vs 0	E: CIMT C: Traditional therapy Duration: 3h/d, 6d/wk, for 2wk	E vs C: FMA (+exp) Grooved pegboard test (-) MAL (-)
Lin et al. (2007) RCT (6) NStart=32 NEnd=32 TPS=Chronic A vs 0	E: mCIMT C: Traditional rehab Duration: 6h, 5d/wk for 3wk	E vs C: Motor Activity Log (+exp) Functional Independence Measure (+exp) Amount of use, Quality of movement and Kinematic variables Reaction time, normalized movement time, percentage of

		movement time with peak velocity, normalized movement unit, max grip aperture, percentage of movement time where max grip aperture occurs
Wu et al. (2007a) RCT (7) NStart=30 NEnd=30 TPS=Chronic A vs 0	E: mCIMT + conventional rehab C: Conventional rehab Duration: 2h/d, 5d/wk, 3wk	E vs C: Motor Activity Log (+exp) Functional Independence Measure (+exp) Kinematic movement time + Kinematic displacement
Wu et al. (2007b) RCT (6) NStart=47 NEnd=47 TPS=Chronic A vs 0	E: CIMT + Routine therapy C: Routine therapy Duration: 2h/d, 5d/wk, 3wk	E vs C: Fugl-Meyer Assessment (+exp) Motor Activity Log (+exp) Kinematic variables
Wu et al. (2007c) RCT (6) NStart=26 NEnd=26 TPS=Chronic A vs 0	E: mCIMT with restraining mitt + intensive therapy C: Conventional Therapy Duration: E: 2h/d, 5d/wk, for 3wks intensive therapy & 6 hours of restraint mitt on unaffected hand; C: 2h/d, 5d/wk, for 3wks intensive therapy	E vs C: FMA (+exp) FIM (+exp) Motor activity log (+exp) SIS (+exp)
Wolf et al. (2006) RCT (6) NStart=222 NEnd=222 TPS=Not Reported A1 vs A2 vs 0	First phase: E: CIMT early (3-9 months post stroke); Second phase (#1859): Late CIMT (15-21 months post stroke). First phase: C: Usual care; Second phase (#1859): usual care to those who recieved CIMt earlier in 3-9 months post stroke Duration: 6h, 5d/wk, 2wk	E vs C: Wolf Motor Function Test (+exp) Motor Activity Log (+exp) SIS Hand function domain (+exp)
Yen et al. (2005) RCT (6) NStart=30 NEnd=30 TPS=Chronic A vs 0	E: mCIMT C: Conventional therapy Duration: 6hr/d, 2wk	E vs C: Wolf Motor Function Test items Extend elbow (weight): (+exp) Lift pencil: (+exp) Stack checkers: (+exp) Flip cards: (+exp) Turn key in lock: (+exp) Lift basket: (+exp) Forearm to table (side): (-) Forearm to box (side): (-) Extend elbow (side): (-) Hand to table (front): (-) Hand to box (front): (-) Reach and retrieve: (-) Lift can: (-) Lift paper clip: (-) Fold towel: (-)
Page et al. (2005b) Pilot RCT (5) NStart=10 NEnd=10 TPS=Acute	E: mCIT C: Traditional rehabilitation Duration: 30min, 3d/wk for 10wk	E vs C: Fugl-Meyer Assessment (+exp) Action Research Arm Test (+exp) Motor Activity Log (-)

A vs 0		
Ploughman et al. (2004) RCT (5) NStart=27 NEnd=23 TPS=Subacute A vs 0	E: Forced-use therapy constraint w/o shaping C: Standard rehabilitation Duration: 1-6h (incremental increase), 5d/wk for 2wk	E vs C: ARAT (-) FIM (-) CHedoke McM Impairement Inventory Arm (-) Hand (-) Postural control (+exp) Shoulder pain (-) grip strength
Wittenberg et al. (2003) RCT (6) NStart=16 NEnd=16 TPS=Chronic A vs 0	E: CIMT C: Control therapy Duration: E: 6hr/d, for 8d and 4hr/d for 2d; C: 3h, for 8d	E vs C: Wolf Motor Function Test (-) Motor Activity Log (+exp) the Assessment of Motor and Process Skills (-)
Dromerick et al. (2000) Pilot RCT (5) NStart=23 NEnd=20 TPS=Acute A vs 0	E: CIM therapy C: Conventional occupational therapy Duration: 2h/d, 5d/wk, 2wks	E vs C: ARAT (+exp) BI (-) FIM: UE dressing (+exp); LE dressing (-); eating (-); grooming (-); bathing (-); dressing (-)
Taub et al. (1993) RCT (5) NStart=9 NEnd=9 TPS=Chronic A vs B	E: CIMT C: Upper Limb Training (attention training on the involved UE Upper Limb) Duration: 14d	E vs C: Wolf Motor Function Test (+exp) Arm Motor Activity Test (+exp) Motor Activity Log (+exp) Passive Range of Motion (-)
CIMT combined with other interventions compared to cimt		
Kolbasi et al. (2024) Pilot RCT (6) NStart=15 NEnd=11 TPS=Chronic A + B vs A/B *Also in Table 30 (Theta Burst Stimulation (TBS))*	E1: Modified Constraint-induced movement therapy (mCIMT) + iTBS E2: mCIMT + sham iTBS C: mCIMT Duration: 60min/d, 3d/wk for 5wks mCIMT + 5min/d iTBS	E1/E2 vs C: FMA-UE motor (-) sensation (-) PROM (-) pain (-) EMG measures resting motor threshold (-) MEPs (-) intracortical facilitation (+exp) short intracortical inhibition (-) Wolf Motor Function Test functional ability scale (-) performance time (-) impaired arm strength (-) impaired handgrip strength (-) non impaired handgrip strength (-) Motor Activity Log-28 amount of use scale (-) how well scale (-) FIM-self care (-)
Kim et al. (2018a)	E: Mental practice + modified constraint-induced movement (mCIMT) therapy	E vs C:

RCT (6) NStart=16 NEnd=14 TPS=Chronic A + B vs A/B *Also in Table 11 (Mental Practice)*	C: mCIMT therapy Duration: 6hr plus 10 min for experimental group, 5x/wk for 2wks	3D motion analysis for movement quality Speed: (-) Time: (-) Smoothness: (-) Jebsen –Taylor Hand Function Test Writing: (+exp) Page turning: (+exp) Small objects: (-) Feeding: (-) Stacking: (-) Large lightweight objects: (-) Large heavy objects: (-) Motor activity log Amount of Use: (+exp) Quality of Movement: (+exp) MEP latency and amplitude
Bang et al. (2018) Pilot RCT (8) NStart=24 NEnd=24 TPS=Acute A + B vs A/B *Also in Table 7 (Trunk Restraint)*	E: mCIMT+ trunk restraint C: mCIMT alone Duration: 20sessions, 60min/d, 5d/wk, for 4wks	E vs C: ARAT (+exp) FMA UE (+exp) Modified Barthel Index (+exp) Motor activity logs (+exp) Maximal elbow extension angle during reach (+exp)
Bang et al. (2016) Pilot RCT (7) NStart=20 NEnd=20 TPS=Subacute A + B vs A/B *Also in Table 20 (Feedback-Based Training)*	E: mCIMT + auditory feedback C: mCIMT alone Duration: 60min/d, 5d/wk, 4wks	E vs C: ARAT (+exp) FMA UE (+exp) modified Barthel Index (+exp) Motor activity logs (+exp) modified Ashworth Scale (-)
Bang et al. (2015) RCT (8) NStart=18 NEnd=18 TPS=Subacute A + B vs A/B *Also in Table 7 (Trunk Restraint)*	E: mCIMT with trunk restraint C: mCIMT Duration: 1hr/d, 5ds/wk for 4wks	E vs C: Action Research Arm Test (+exp) Fugl-Meyer Assessment (+exp) Modified Barthel Index (+exp) Motor Activity Log (+exp) Maximum Elbow Extension Angle During Reaching (+exp)
Yoon et al. (2014) RCT Crossover (5) NStart=26 NEnd=26 TPS=Acute A + B vs A/B vs 0	E1: CIMT+ mirror therapy; E2: CIMT C: Conventional Therapy Duration: 5d/wk for 2wk	E1 vs E2: Box and block test (+exp1) Nine-hole pegboard test (+exp1) Grip strength (+exp1) Brunnstrom Recovery Stages (-) Wolf motor function test (-) Fugl-Meyer Assessment (-) Korean Modified Barthel Index (-) E1 vs C: Box and block test (+exp) Nine-hole pegboard test (+exp) Grip strength (+exp) Brunnstrom Recovery Stages (-) Wolf motor function test (+exp) Fugl-Meyer Assessment (-)

		Korean Modified Barthel Index (+exp) E2 vs C: Box and block test (+exp2) Nine-hole pegboard test (-) mGrip strength (+exp2) Brunnstrom Recovery Stages (-) Wolf motor function test (+exp2) Fugl-Meyer Assessment (-) Korean Modified Barthel Index (+exp2)
Page et al. (2009) RCT (5) NStart=10 NEnd=10 TPS=Chronic A + B vs A/B *Also in Table 11 (Mental Practice)*	E: Mental practice + Modified Constraint Induced Movement Therapy C: Modified Constraint Induced Movement Therapy Duration: CIMT 30 min/d,3d/wk,10wks	E vs C: Fugl-Meyer Assessment (+exp) Action Research Arm Test (+exp)
Woodbury et al. (2009) Pilot RCT (5) NStart=12 NEnd=11 TPS=Chronic A + B vs A/B *Also in Table 7 (Trunk Restraint)*	E: modified Constraint Induced Movement Therapy (mCIMT) + Trunk Restraint C: modified constraint Induced Movement Therapy (mCIMT) Duration: 6h/d, for 10d	E vs C: Hand path trajectories (+exp) Wolf Motor Function Test (-) Motor Activity Log (-) Fugl-Meyer Assessment Upper-Extremity (-) Reach Kinematics; Temporal Segmentation (-) Spatial Segmentation (-) Shoulder-elbow active range of motion (+exp) Trunk Displacement (+exp) shoulder-elbow interjoint coordination (-)
CIMT combined with other interventions compared to cimt or sham		
Figlewski et al. (2017) RCT (9) NStart=44 NEnd=40 TPS=Chronic A + B vs A/B *Also in Table 31 (Transcranial Direct Current Stimulation (tDCS))*	E: Anodal tDCS + CIMT C: Sham tDCS + CIMT Duration: 6hr/d for 9d CIMT, 30min/d tDCS during CIMT	E vs C: WMFT-FAS (+exp) WMFT TIME (-) Grip strength (-) Arm strength (-)
Andrade et al. (2017) Pilot RCT (8) NStart=60 NEnd=60 TPS=Subacute A + B1 vs A + B2 vs A *Also in Table 31 (Transcranial Direct Current Stimulation (tDCS))*	E1: Anodal tDCS Ipsilesional M1 + CIMT E2: Anodal tDCS Ipsilesional PMC + CIMT C: Sham Stimulation + cMIT Duration: 30min/d, 5d/wk for 6wk	E vs C: E2 v E1/C: Fugl-Meyer Assessment (+exp2) Modified Ashworth Scale (+exp2) Box and Block Test (+exp2) Medical Research Council Scale (+exp2) E1 vs C: Barthel Index (+exp1) E2 vs C: Barthel Index (+exp2) E1 vs E2: Barthel Index (+exp2)
Carrico et al. (2016a) RCT (7) NStart=21 NEnd=19 TPS=Chronic	E: Peripheral nerve stimulation + mCIMT C: Sham PNS + mCIMT Duration: 2hrs PNS or sham then 4hrs of mCIMT 5d/wk for 2wks	E vs C: Fugl Meyer Assessment Upper Extremity: (+exp) Wolf Motor Function Test (+exp) Action Research Arm Test: (+exp)

A + B vs A/B *Also in Table 27 (Additional Afferent and Peripheral Stimulation Methods)*		
Cunningham et al. (2015) Pilot RCT (7) NStart=12 NEnd=12 TPS=Chronic A + B vs A/B *Also in Table 31 (Transcranial Direct Current Stimulation (tDCS))*	E: Anodal tDCS + CIMT C: Sham tDCS + CIMT Duration: 30min/d, 3d/wk for 10wk	E vs C: Nine Hole Peg Test (-) Motor Activity Log (-) Fugl-Meyer Assessment (-) MEP
Bolognini et al. (2011) Pilot RCT (7) NStart=14 NEnd=14 TPS=Chronic A + B vs A/B *Also in Table 31 (Transcranial Direct Current Stimulation (tDCS))*	E: Bilateral tDCS and CIMT C: Sham tDCS with CIMT Duration: 90% waking hours, 7d/wk, 2 wks CIMT, 40min/d, 3d over 2wls tDCS or sham	E vs C: Jebsen Taylor Hand Function Test (+exp) Hand grip strength (-) Fugl-Meyer Upper Extremity (-) Motor activity log Amount of use (-) Quality of movement (-) MEP amplitude
CIMT compared to conventional therapy or no treatment		
Demers et al. (2022) Pilot RCT (6) NStart=14 NEnd=14 TPS=Chronic A vs 0	E: Constraint-induced movement therapy (CIMT) C: N/A(did not recieve any treatment) Duration: 6h/d, 5d/wk, 2wks	E vs C: WMFT (no stat) MAL (no stat) fMRI (+exp)
Page et al. (2008) RCT (5) NStart=35 NEnd=35 TPS=Chronic A vs 0	E1: mCIMT + physical and occupational therapy E2: Traditional rehab C: No therapy Duration: 5h, 5d/wk for 10 wk	E1 vs E2 vs C: Fugl-Meyer Assessment (-) Action Research Arm Test (+exp)
Atteya et al. (2004) RCT (1) NStart=6 NEnd=6 TPS=Subacute A vs 0	E: Modified CIMT C1: Conventional care C2: No treatment Duration: 60min/d, 3d/wk, 10wk	E vs C: Fugl-Meyer Assessment (No stats) Action Research Arm Test (No stats) Wolf Motor Function Test (No stats) Motor Activity Log (No stats)
Page et al. (2001b) Pilot RCT (4) NStart=6 NEnd=6 TPS=Subacute A vs 0	E: Modified CIMT C1: Traditional rehabilitation C2: No treatment Duration: 60min conventional (30min PT + 30min OT) for both traditional rehab group and modified CIMT group, Arm restraint in CIMT was 5hours/day, 60min/d, 3d/wk, 10 wks CT + 5hr/d,5d/wk, 10wks mCIMT	E vs C: Fugl-Meyer Assessment (no stats) Action Research Arm Test (no stats) Wolf Motor Function Test (no stats) Motor Activity Log (no stats)
CIMT combined with other interventions compared to control		
Hayner et al. (2010) RCT (4) NStart=13 NEnd=12	E1: mCIMT E2: Bilateral training Duration: 6h/d, 10d	E1 vs E2: WMFT (-) Canadian occupational performance measure (-)

TPS=Chronic A vs B *Also in Table 2 (Bilateral Arm Training)*		
CIMT combined with other interventions compared to conventional therapy		
Alaca & Öcal (2022) RCT (6) NStart=45 NEnd=40 TPS=Chronic A vs B vs 0 *Also in Table 5 (Sensorimotor Training)*	E1: Proprioception Training + Conventional Therapy E2: Modified Constraint-Induced Movement Therapy + Conventional Therapy C: Conventional Therapy Duration: 1hr/d, 5x/wk for 6wk	E1/E2 vs C: Fugl-Meyer Upper Extremity Scale (FMA) (+exp) Action Research Arm Test (ARAT) (+exp) Modified Ashworth Scale (mAS) (+exp) Thumb Localization Test (TLT) (+exp) Upper Extremity Motor Activity Log-28 (MAL-28) (-)
Takebayashi et al. (2022) RCT (7) NStart=129 NEnd=121 TPS=Chronic A + B vs A/B vs 0 *Also in Table 16 (Robotics)*	E1: Robotic self training + CIMT E2: Robotic self training + conventional care C: Conventional self training + conventional care Duration: 1h/d, 3d/wk, 10wks	E1/E2 vs C: FMA-UE (-) Shoulder/elbow/forearm (-) MAL (+exp1) ARAT (no stat) Motricity Index (no stat) Modified Ashworth Scale (no stat) AROM (no stat) Stroke Impact Scale (no stat) E1 vs E2: FMA (-) Shoulder/elbow/forearm (-) MAL (-) ARAT (no stat) Motricity Index (no stat) Modified Ashworth Scale (no stat) AROM (no stat) Stroke Impact Scale (no stat)
Anjum A.F. et al. (2021) RCT (3) NStart=40 NEnd=40 TPS=Subacute A + B vs 0 *Also in Table 17 (Virtual Reality)*	E: CIMT using augmented reality "Nintendo Wii" C: Conventional physiotherapy Duration: 20min/d, 4d/wk, 4wks	E vs C: BI feeding (+exp) grooming (+exp)
Kwakkel et al. (2016) RCT (7) NStart=159 NEnd=159 TPS=Subacute A vs B vs 0 *Also in Table 22 (Neuromuscular Electrical Stimulation (NMES))*	E1: mCIMT E2: EMG-NMES C: Usual care Duration: E1: 60min/session, 3hrs/d, 5wks; E2: 60min/session for 3wks; C: 30min/d for 2months	E1 vs C: ARAT (+exp1) FMA-UE (-) MI-UE (-) Erasmus modified Nottingham Sensory Assessment (-) SIS-hand (+exp) WMFT (-) Frenchay Arm Test (-) MAL (-) NHPT (-) E2 vs C: ARAT (-) FMA-UE (-) MI-UE (-)

		Erasmus modified Nottingham Sensory Assessment (-) SIS-hand (-) WMFT (-) Frenchay Arm Test (-) MAL (-) NHPT (-)
Seok et al. (2016) RCT (5) NStart=32 NEnd=30 TPS=Subacute A + B vs A/B vs 0	E1: CIMT with Visual Biofeedback E2: Visual Biofeedback C: Conventional Occupational Therapy Duration: 1h, 5d/wk for 2wk	E1 vs C: Purdue Pegboard Test (-) Grasp Strength (+exp1) Pinch Strength (+exp1) Wolf Motor Function Test (+exp1) Fugl-Meyer Assessment (+exp1) Motricity Index (-) Modified Barthel Index (-) E2 vs C: Purdue Pegboard Test (-) Grasp Strength (-) Pinch Strength (-) Wolf Motor Function Test (+exp2) Fugl-Meyer Assessment (+exp2) Motricity Index (-) Modified Barthel Index (-) E1 vs E2: Purdue Pegboard Test (-) Grasp Strength (-) Pinch Strength (-) Wolf Motor Function Test (-) Fugl-Meyer Assessment (-) Motricity Index (-) Modified Barthel Index (-)
van Delden et al. (2013) RCT (6) NStart=60 NEnd=55 TPS=Subacute A vs B vs 0 *Also in Table 14 (Music Therapy and Rhythmic Auditory Stimulation)* *Also in Table 2 (Bilateral Arm Training)*	E1: Modified CIMT E2: Rythmic auditory cueing bilateral training C: Dose-matched conventional treatment Duration: 1h, 3d/wk for 6wk	E1/E2 vs C: Action Research Arm Test (-) Nine Hole Peg Test (-) Motricity Index (-) Fugl-Meyer Assessment (-) Motor Activity Log (-) Stroke Impact Scale (-) Erasmus Modification of the Nottingham Sensory Assessment (-)
Wu et al. (2012b) RCT (6) NStart=57 NEnd=57 TPS=Chronic A + B vs A/B vs 0 *Also in Table 7 (Trunk Restraint)*	E1: Distributed Constraint-Induced Movement Therapy with Trunk Restraint E2: Distributed Constraint-Induced Movement Therapy C: Conventional Therapy Duration: 2hrs, 5d/wk, 3wks	E1/E2 vs C: Action Research Arm Test (+exp1) +exp2 Grasp (-) Grip (+exp1) Pinch (+exp1) Gross Movement (+exp1,+exp2) Motor Activity Log Amount (+exp2) Quality (+exp1,+exp2) Frenchay Activities Index (+exp1) +exp2 Chores (-)

		Leisure/work (-) Outdoor Activities (+exp1) Stroke Impact Scale Strength (+exp2) ADLs (-) Mobility (-) Hand Function (+exp1,+exp2) E1 vs E2: Action Research Arm Test (-) Grasp (-) Grip (+exp1) Pinch (-) Gross Movement (-) Motor Activity Log Amount (-) Quality (-) Frenchay Activities Index (-) Chores (-) Leisure/work (-) Outdoor Activities (-) Stroke Impact Scale Strength (+exp2) ADLs (-) Mobility (-) Hand Function (-)
Wu et al. (2012c) Pilot RCT (7) NStart=45 NEnd=45 TPS=Chronic A + B vs A/B vs 0 *Also in Table 7 (Trunk Restraint)*	E1: Distributed constraint-induced therapy (dCIT) + trunk restraint E2: dCIT C: Conventional Therapy Duration: 2hr, 3d/wk, 3 wk	E1/E2 vs C: Motor Activity Log (+exp1, +exp2) Fugl-Meyer Assessment (+exp1) Kinematic tasks at 90% arm length maximum grip aperture (+exp1, +exp2) percentage of time to maximum grip aperture (-) joint range - normalized shoulder flexion (+exp1, +exp2) trunk contribution slope start (+exp) trunk contribution slope middle (-) trunk contribution slope end (-) Kinematic tasks at 125% arm length; - maximum grip aperture (+exp1, +exp2)
Wang et al. (2011) RCT (5) NStart=30 NEnd=30 TPS=Subacute A vs B vs 0 *Also in Table 3 (Exercise and Strength Training)*	E1: mCIMT E2: Intensive conventional therapy C: Conventional rehabilitation Duration: C: 45 mins/d, 5ds/wk, 4wks; E2/E2: 180 mins/d, 5ds/wk, 4wk	E1/E2 vs C: Wolf Motor Function Test (+exp)
Khan et al. (2011) Pilot RCT (8) NStart=44 NEnd=42 TPS=Chronic A vs B vs 0	E1: CIMT E2: Therapeutic Climbing C: Conventional neurological therapy Duration: 15-20h/wk for 4wk	E1 vs E2: Wolf Motor Function Test : time (+E1); functional ability scale (-) Motor Activity Log (-) Isometric Strength (-) Active Range of Motion (-)

Also in Table 3 (Exercise and Strength Training)		Chedoke McMaster Impairment Inventory subscale Shoulder pain (+E1) E1 vs C: Wolf Motor Function Test: time (-) functional ability scale (-) Motor Activity Log (-) Isometric Strength (-) Active Range of Motion (-) Chedoke McMaster Impairment Inventory subscale Shoulder pain (-) E2 vs C: Wolf Motor Function Test: time (-); functional ability scale (-) Motor Activity Log (-) Isometric Strength (-) Active Range of Motion (-) Chedoke McMaster Impairment Inventory subscale Shoulder pain (-)
CIMT combined with other interventions compared to motor relearning programmes		
Shah et al. (2016) RCT (6) NStart=45 NEnd=40 TPS=Subacute A vs B *Also in Table 1 (Neurodevelopmental Techniques)*	E1: CIMT E2: Motor relearning program Duration: CIMT for Unaffected UE: 80% of working hr; CIMT for affected UE: 3hr/d; motor relearning 30min/d, 14d ; all for 14d	E1 vs E2: Motor Activity Log (+exp) Nine Hole Peg Test (-) Fugl-Meyer Assessment (-)
Batool et al. (2015) RCT (6) NStart=42 NEnd=42 TPS=Subacute A vs B *Also in Table 1 (Neurodevelopmental Techniques)*	E: CIMT C: Motor learning programme Duration: 2h/d, 6d/wk for 3wks CIMT or motor learning programme	E vs C: MAS (+exp) FIM (+exp)
CIMT compared to no treatment or conventional therapy		
Page et al. (2004) RCT (6) NStart=17 NEnd=17 TPS=Chronic A vs 0	E: mCIMT C1: Traditional Rehabilitation C2: No Therapy Duration: 5h, 5d/wk for 10wk	E vs C1: Fugl-Meyer Assessment (+exp) Action Research Arm Test (-) E vs C2: Fugl-Meyer Assessment (+exp) Action Research Arm Test (+exp) C1 vs C2: Fugl-Meyer Assessment (-) Action Research Arm Test (+con1) Motor Activity Log (no stats)
Page et al. (2002) RCT (4) NStart=14 NEnd=14 TPS=Subacute A vs 0	E1: mCIMT group therapy E2: Traditional rehab C: No therapy Duration: 30 min, 3d/wk for 10wk	E1 vs E2 vs C: Fugl-Meyer Assessment (+exp) Action Research Arm Test (+exp) Motor Activity Log (no stats)

CIMT compared to no treatment		
Kim et al. (2008) RCT (4) NStart=21 NEnd=17 TPS=Chronic A vs 0	E: Constraint-Induced Movement Therapy (Modified Opposition Restriction Orhosis) C: Control Group Duration: wear orthotic for 5hrs/d, 7d/wk, 8wks	E vs C: Manual Function Test (No stats) Purdue Pegboard Test (No stats) Motor Activity Log (No stats)
CIMT compared to conventional therapy or sham		
Uswatte et al. (2018) RCT Crossover (6) NStart=21 NEnd=20 TPS=Chronic A vs 0	E: Expanded CIMT C1: usual care C2: placebo treatment Duration: 6hr, 1x/d, 15d CIMT & placebo tratment	E vs C1 vs C2: Motor Activity Log- Arm Use scale (+exp) Canadian Occupational Performance Measure performance scale (+exp) satisfaction scale (-) Wolf Motor Function Test- Performance Rate (+exp) Fugl-Meyer Motor Assessment- upper-extremity motor score (-)
CIMT combined with other interventions compared to neurodevelopmental techniques (bobath approach)		
Hüseyinsinoğlu et al. (2012) RCT (6) NStart=24 NEnd=22 TPS=Chronic A vs B *Also in Table 1 (Neurodevelopmental Techniques)*	E: CIMT C: Bobath therapy Duration: 1h/d Bobath training & 3h/d CIMT, 10d	E vs C: WMFT (-) FIM (-) Motor Activity Log (+exp) Motor Evaluation Scale for Arm in Stroke Patients (-)
CIMT combined with other interventions compared to sham or cimt		
Nadeau et al. (2004) RCT (5) NStart=24 NEnd=20 TPS=Chronic A + B vs A/B *Also in Table 43 (Other Pharmacological and Medical Interventions)*	E: Donepezil + CIMT C: Placebo + CIMT Duration: 5mg/d, 2wk + 10mg/d 4wk	E vs C: Wolf Motor Function Test (-) Motor Activity Log (-) Fugl-Meyers Upper Extremity (-) Stoke Impact Scale Item 8 (Participation) Item 9 (-) Geriatric Depression Scale (-) Actual Amount of Use Test (-) Caregiver Strain Index: (-) Finger-Tapping (-) WMFT (+exp) BBT (-)
CIMT combined with other interventions compared to mental practice		
Park et al. (2015a) RCT (5) NStart=26 NEnd=26 TPS=Chronic A + B vs A/B *Also in Table 11 (Mental Practice)*	E: Mental practice + mCIMT C: mCIMT Duration: 30min/d, 5d/wk for 6wk	E vs C: FMA (+exp) ARAT (+exp) mBI (+exp)

CIMT combined with other interventions compared to acupuncture or conventional therapy		
Song et al. (2016) RCT (4) NStart=30 NEnd=30 TPS=Acute A + B vs A/B *Also in Table 44 (Acupuncture)*	E: Scalp cluster acupuncture + constraint-induced movement therapy C: Body acupuncture + traditional rehabilitation Duration: 6hr/d, (needles twisted 2- 3x), 6d/wk for 2wk	E vs C: Fugl-Meyer Assessment (+exp) blood oxygenation level-dependent functional magnetic resonance imaging (BOLD-fMRI) (+exp)
CIMT combined with other interventions compared to bilateral arm training or task-specific training		
Brunner et al. (2012) RCT (8) NStart=30 NEnd=28 TPS=Subacute A + B vs A + C *Also in Table 2 (Bilateral Arm Training); Table 4 (Task-Specific Training)*	E: CIMT + Task-specific training C: Bimanual training + Task-specific training Duration: 4h/d, 7d/wk for 4wks	E vs C: Action research arm test (-) Nine hole peg test (-) MAL amount of use (-) quality of use (-)
CIMT combined with other interventions compared to orthotics		
Lin et al. (2009a) RCT (7) NStart=32 NEnd=32 TPS=Chronic A + B vs A/B *Also in Table 9 (Orthotics and Taping)*	E: CIMT + Conventional therapy + Hand mitt C: Conventional therapy + Hand mitt Duration: 2 hrs/d, 5 d/wk for 3 wk	E vs C: Fugl-Meyer Assessment (+exp) Stroke Impact Scale (+exp) Nottingham Extended Activities of Daily Living (+exp) Motor Activity Log (+exp) FIM (+exp)
CIMT compared to proprioceptive neuromuscular facilitation (PNF)		
Dhanalakshmi et al. (2022) RCT (2) NStart=30 NEnd=30 TPS=Chronic A vs B	E1: Constraint induced movement therapy E2: Proprioceptive Neuromuscular Facilitation Duration: E1: 2d/wk, 6 wks; E2: 30min 2x/d 5d/wk, 6 wks	E1 vs E2: FMA-UE (no stat)
Cross-Referenced RCTs: Combined or Comparative Interventions Involving Constraint-Induced Movement Therapy (CIMT) (results included in this table's levels of evidence)		
Shamweel & Gupta (2024) RCT (7) NStart=30 NEnd=30 TPS=Chronic A1 vs A2 *Primary listing: Table 15 (Telerehabilitation and Education)*	E: Constraint-induced movement therapy in-person C: Constraint-induced movement therapy via telerehabilitation Duration: 40min/d, 3d/wk, 4wks	E vs C: FMA - UE (-) WMFT (-) MAL Amount of use (-) Quality of movement (-)
Saygili et al. (2024) RCT (6) NStart=18 NEnd=18 TPS=Chronic A + B vs A/B *Primary listing: Table 15 (Telerehabilitation and Education)*	E: Modified Constraint-Induced Movement Therapy + Exercise/custom physiotherapy (Telerehabilitation) C: Home exercise program Duration: 90 mins/d, 5ds/wk, 3wks (Modified CIMT and Home exercise program); CIMT group also has 5hs/d of wearing a mitt on less affected hand	E vs C: STREAM Upper extremity (+exp) Lower extremity (+exp) Basic mobility (-) total score (+exp) FMA-UE (+exp) WMFT Functional ability (+exp)

		performance time (+exp) 9HPT (+exp) Grip strength (+exp) Pinch strength; -bipod pinch (+exp) tripod pinch (+exp) lateral pinch (+exp) MAL-28 Amount of use (+exp) Quality of use (+exp) FIM (+exp)
Garrido et al. (2023) RCT (9) NStart=70 NEnd=56 TPS=Acute A + B vs A/B *Primary listing: Table 31 (Transcranial Direct Current Stimulation (tDCS))*	E: Bilateral tDCS + mCIMT + conventional rehab C: Sham tDCS + mCIMT + conventional rehab Duration: 8hrs/d(8hrs mCIMT, 20min tDCS overlapped), 7d/wk, 1wk	E vs C: FMA (+exp) WMFT (+exp) FIM (+exp)
Unger et al. (2023) RCT (7) NStart=25 NEnd=17 TPS=Chronic A + B vs A/B *Primary listing: Table 31 (Transcranial Direct Current Stimulation (tDCS))*	E: Anodal tDCS +CIMT C: Sham tDCS + CIMT Duration: 60min/d, 3d/wk, 5wks	E vs C: FMA-UE (-) Functional Connectivity Findings (no stat)
Wang et al. (2023f) RCT (6) NStart=84 NEnd=75 TPS=Subacute A vs B vs 0 *Primary listing: Table 4 (Task-Specific Training)*	E1: Constraint induced movement therapy (CIMT) + Conventional rehabilitation E2: Upper limb task-oriented training + Conventional rehabilitation C: Conventional rehabilitation Duration: C: 30min/d, 5d/wk for 3wks, E1: 60min/d, 5d/wk for 3wks CIMT + 30min/d, 5d/wk for 3wks conventional, E2: 30min/d, 5d/wk for 3wks UE training + 30min/d, 5d/wk for 3wks conventional	E1/E2 vs C: FMA-UE (+exp1) Barthel Index (+exp1) modified Ashworth scale (+exp1) Self-Rating Depression Scale (+exp1/2) E1 vs E2: FMA-UE (+exp1) Barthel Index (+exp1) modified Ashworth scale (+exp1) Self-Rating Depression Scale (+exp2)
Uswatte et al. (2021) RCT (5) NStart=24 NEnd=20 TPS=Chronic A1 vs A2 *Primary listing: Table 15 (Telerehabilitation and Education)*	E: Tele-Health CIMT C: In-Lab CIMT Duration: 3.5hr/d, 5d/wk, 2wks	E vs C: MAL (-) WMFT (-)
Terranova T.T. et al. (2021) RCT (5) NStart=51 NEnd=38 TPS=Chronic A vs B *Primary listing: Table 16 (Robotics)*	E: Robot-assisted Therapy + conventional rehab C: Constraint induced movement therapy + conventional rehab Duration: RT: 60min/d, 3d/wk, 12wks CIMT: 6hr/d, 5d/wk, 2wks(after 10wks of rehab)	E vs C: WMFT (-) FMA-UE (-) AMAT (-) MAS (-) FIM (-) SIS (-)
Preetha et al. (2021) RCT (2)	E: Task-Based Mirror Therapy (TMBT)	E vs C: FMA (no stat)

NStart=30 NEnd=30 TPS=Not Reported A vs B *Primary listing: Table 10 (Mirror Therapy)*	C: Constraint Induced Movement Therapy (CIMT) Duration: E: 15min/d, 4d/wk, 4wk, C: 6hr/d, 4d/wk, 4wk	
Kaviraja et al. (2021) RCT (4) NStart=30 NEnd=30 TPS=Not Reported A vs B *Primary listing: Table 10 (Mirror Therapy)*	E: Mirror Therapy C: modified CIMT Duration: 30min, 5d/wk, 4wk	E vs C: Upper Extremity Functional Index Scale (+exp) FMA-UE (+exp)
Huang et al. (2021b) Pilot RCT (7) NStart=40 NEnd=35 TPS=Subacute A + B vs A/B *Primary listing: Table 9 (Orthotics and Taping)*	E1: Kinesiotape + mCIMT E2: Kinesiotape C: Sham Kinesiotape + mCIMT Duration: 2hr/d, 5d/wk, for 3 wks mCIMT & 5d/wk for 3 wks KT or Sham taping & 20min hand training with KT 2x/d, 5d/wk for 3 weeks	E1 vs E2 vs C: Modified Tardieu scale (-) Brunnstrom Stage (-) Box and Block test (-) Fugl-Meyer assessment Upper Extremity (-) Stroke Impact Scale (-)
Kim et al. (2021) Pilot RCT (7) NStart=30 NEnd=30 TPS=Chronic A + B vs A/B *Primary listing: Table 31 (Transcranial Direct Current Stimulation (tDCS))*	E: Dual tDCS + mCIMT+ conventional rehabilitation C: Sham Dual tDCS + mCIMT + conventional rehabilitation Duration: 20min/d tDCS + 30min/d MCT, 5d/week, 4wks CR:1hr/day, 4wks	E vs C: FMA-UE (-) MAL AOU (+exp) QOL (-) Accelerometer Usage of unaffected side (+exp) Usage of affected side (-)
Nasb et al. (2019) RCT (6) NStart=64 NEnd=54 TPS=Subacute A + B vs A/B *Primary listing: Table 33 (Botulinum Toxin)*	E: Botox + mCIMT C: Botox + Conventional therapy (high dose) Duration: 1hr, 6x/wk, 4wks rehab (glove 3hr total for mCIMT)	E vs C: Modified Ashworth Scale (-) Barthel Index (+exp) Fugl-Meyers Upper Extremity (+exp)
Hung et al. (2019b) RCT (5) NStart=30 NEnd=30 TPS=Chronic A + B vs A + C vs A *Primary listing: Table 16 (Robotics)*	E1: Unilateral robot assisted therapy + mCIMT E2: Bilateral robot assisted therapy + bilateral arm training C: Robot assist therapy Duration: 40-45min robot + 45min BAT/mCIMT 3x/wk, for 6 wks 3x/wk for 6wk	E1 vs C: FMA (-) Chedoke arm and hand activity inventory (-) Goal attainment scale (+exp1) E2 vs C: FMA (-) Chedoke arm and hand activity inventory (-) Goal attainment scale (+exp2) E1 vs E2: FMA (-) Chedoke arm and hand activity inventory (-) Goal attainment scale (+exp2) MAS
Hung et al. (2019d) RCT (8)	E1: Unilateral robot assisted therapy + CIMT (unilateral arm)	E1 vs C: FMA (-)

NStart=45 NEnd=44 TPS=Chronic A + B vs A + C vs A *Primary listing: Table 16 (Robotics)*	E2: Bilateral robot assisted therapy + BAT (Bimanual tracking) C: Robot assisted therapy alone (both modes) Duration: 45min robot, 45min BAT/CIMT, 3x/wk, 6wk	SIS (-) WMFT (-) NEADL (-) Kitchen (-) Living affairs (-) Leisure (-) Mobility (-) E2 vs C: FMA (-) SIS (-) WMFT (time, functial ability scale) (-) NEADL (-) Kitchen (-) Living affairs (-) Leisure (-) mobility (+con) E1 vs E2: FMA (+exp2) SIS (-) WMFT (time, functional ability scale) (-) NEADL (-) kitchen (-) living affairs (-) Leisure (-) Mobility (-)
Takebayashi et al. (2017) Pilot RCT (6) NStart=20 NEnd=19 TPS=Chronic A + B + C vs A/A + B *Primary listing: Table 31 (Transcranial Direct Current Stimulation (tDCS))*	E: dual-tDCS combined with PNMES + CIMT C: CIMT Duration: 2hr CIMT & 20min tDCS & 10min PNMES , 2x/d, 5d/wk, 2wk	E vs C: Fugl-Meyer Assessment-UE (+exp) Motor Activity Log AOU (+exp) QOM (-)
Hsieh et al. (2016) RCT (7) NStart=34 NEnd=34 TPS=Chronic A + B vs A/B *Primary listing: Table 16 (Robotics)*	E: Robot-Assisted Therapy + Modified Constraint-Induced Therapy C: Robot-Assisted Therapy Duration: 90-105 min/d, 5d/wk, 4wks	E vs C: Wolf Motor Function Test Time (-) Functional Ability Scale (+exp) Nottingham Extended Activities of Daily Living (+exp) Functional Independence Measure (-) Kinematics Reach Out Data- Index Movement Time (-) Distance (-) Peak Velocity (+exp) Percentage of Movement Time- Peak Velocity (-) Maximal Angle of Shoulder Flexion (-) Maximal Angle of Shoulder Abduction (+exp) Maximal Angle of Elbow Extension (+exp) Kinematics Reach Out Data- Trunk Movement Time (-) Distance (+exp) Peak Velocity (+exp) Maximal Angle of Trunk Flexion (+exp)

Samaei et al. (2016) RCT (6) NStart=36 NEnd=36 TPS=Chronic A vs B *Primary listing: Table 5 (Sensorimotor Training)*	E: Sensorimotor Training Program C: Constraint Induced Movement Therapy Duration: 90min/d, 5d/wk, for 2wks sensorimotor training, 5d/wk for 6h over 2wks CIMT	E vs C: Nine Hole Peg Test (no stats) Wolf Motor Function Test (no stats) Haptic Object Recognition Test (no stats) Two Point Differentiation (no stats)
Rocha et al. (2016) Pilot RCT (9) NStart=21 NEnd=21 TPS=Chronic A + B1 vs A + B2 vs A *Primary listing: Table 31 (Transcranial Direct Current Stimulation (tDCS))*	E1: Anodal tDCS + Modified CIMT E2: Cathodal tDCS + Modified CIMT C: Sham tDCS + CIMT Duration: 1hr/d, 3d/wk for 4wks tDCS or sham + intensive training; 6hr/d, 7d/wk for 4wks immobilization of paretic upper limb	E1 vs C: Fugl-Meyer Assessment (+exp) Motor Acivity Log (-) Grip Strength (-) E2 vs C: Fugl-Meyer Assessment (-) Motor Acivity Log (-) Grip Strength (-)
Bellay et al. (2015) RCT (5) NStart=40 NEnd=40 TPS=Subacute A vs B *Primary listing: Table 2 (Bilateral Arm Training)*	E1: mCIMT + conventional physical therapy E2: HABIT (hand arm bimanual intensive training) + conventional physical therapy Duration: 30min/d, 6wk	E1 vs E2: Action Research Arm Test (+exp) Fugl-Meyer Upper Extremity (+exp)
McNulty et al. (2014) RCT (7) NStart=41 NEnd=40 TPS=Chronic A vs B *Primary listing: Table 17 (Virtual Reality)*	E: Nintendo Wii-based movement therapy C: Modified constraint-induced movement therapy Duration: 60min/d, 5d/wk for 2wk	E vs C: Wolf Motor Function Test sub max strength (-) max strength (-) timed tasks (-) Motor Activity Log (+exp) Fugl-Meyer Assessment (-) Modified Ashworth Scale (-) Box and Block Test (-) Grooved Pegboard Test (-) Active Range of motion (-) Passive ROM (-)
Hsieh et al. (2014) RCT (8) NStart=48 NEnd=48 TPS=Chronic A + B vs A/B vs 0 *Primary listing: Table 16 (Robotics)*	E1: Robot therapy + distributed constraint induced therapy E2: robot therapy alone C: Conventional Therapy Duration: 90-105min/d, 5d/wk, 4wk	E1 vs C: Fugl-Meyer Assessment Total (+exp1) Distal (+exp1) Proximal (-) Wolf Motor Function Test Functional ability scale (+exp1) time (-) Motor Activity Log (-) E1 vs E2: Fugl-Meyer Assessment Total (+exp1) Distal (-) Proximal (-) Wolf Motor Function Test Functional ability scale (+exp1) time (-)

		Motor Activity Log (-) E2 vs C: Fugl-Meyer Assessment Total (+exp2) Distal (-) Proximal (+exp2) Wolf Motor Function Test Functional ability scale (-) time (-) Motor Activity Log (-) accelerometry
Abo et al. (2014) RCT (6) NStart=66 NEnd=66 TPS=Chronic A vs B *Primary listing: Table 29 (Repetitive Transcranial Magnetic Stimulation (rTMS))*	E: Low frequency (1Hz) rTMS + OT training C: CIMT Duration: 20min rTMS & 120min OT/session, 2x/d, 22 session; 6Hr/session, 1x/d, 11 session CIMT	E vs C: Fugl-Meyer Assessment (+exp) Wolf Motor Function Test (+exp)
Lima et al. (2014) Pilot RCT (7) NStart=22 NEnd=21 TPS=Chronic A + B vs A/B *Primary listing: Table 7 (Trunk Restraint)*	E: Trunk training + mCIMT C: mCIMT Duration: 3hrs/d, 5d/wk for 2wks	E vs C: WMFT (-) Global strength (-) Motor activity log (-) Bilateral Activity Assessment Scale (-) handgrip strength pinch strength stroke specific QOL trunk displacement peak velocity elbow ROM
Nadeau et al. (2014) Pilot RCT (7) NStart=24 NEnd=22 TPS=Chronic A + B1 vs A + B2 vs A *Primary listing: Table 41 (Central Nervous System Stimulants)*	E1: CIMT-6hr + cycloserine E2: CIMT-2hr + cycloserine C1: CIMT-6hr + placebo C2: CIMT-2hr + placebo Duration: 2/6h, 3-5d/wk for 10wk	E vs C: Fugl-Meyer Assessment (-) Wolf Motor Function Test (-) Motor Activity Log (-) Grip strength SIS scale geriatric depression scale
Taub et al. (2013) RCT (5) NStart=45 NEnd=40 TPS=Chronic A + B vs A + C vs A *Primary listing: Table 3 (Exercise and Strength Training)*	E1: Shaping training + CIMT transfer package (TP) E2: Repetitive task practice + TP E3: Repetitive task practice C: Shaping training Duration: 3.5hr/d, 10d	E1/E2/E3 vs C: E1/E2 vs E3/C: Motor Activity Log (-) Wolf Motor Function Test (-)
Wu et al. (2011) RCT (6) NStart=66 NEnd=64 TPS=Chronic A vs B vs 0	E1: distributed constraint-induced therapy (dCIT) E2: Bilateral arm training C: control treatment Duration: 2h, 5d/wk, 3wk	E1 vs C: Wolf motor function test (+exp) Motor Activity Log (+exp) reaching kinematic variables in unilateral and bilateral tasks (+exp) E1 vs E2: Wolf motor function test (-)

Primary listing: Table 2 (Bilateral Arm Training)		Motor Activity Log (+exp) E2 vs C: Wolf motor function test (-) Motor Activity Log (-) reaching kinematic variables in unilateral and bilateral tasks (+exp)
Sun et al. (2010) RCT (7) NStart=32 NEnd=29 TPS=Chronic A + B vs A/B *Primary listing: Table 33 (Botulinum Toxin)*	E: BtxA (Dysport) + mCIMT C: BtxA (Dysport) + conventional rehabilitation Duration: 1000 units botox & 2hr, 3d/wk, 3mo mCIMT and conventional therapy	E vs C: Modified Ashworth Scale (-) Motor Activity Log AOU (+exp) QOM (+exp) Action Research Arm Test (+exp)
Wu et al. (2010a) RCT (2) NStart=6 NEnd=6 TPS=Chronic A vs B *Primary listing: Table 2 (Bilateral Arm Training)*	E1: Bilateral Arm Training E2: Constraint-Induced Therapy Duration: 2h/d, 5d/wk, 3wks	E1 vs E2: Fugl-Meyer Assessment (No stats) Action Research Arm Test (No stats) Motor Activity Log (No stats) fMRI (no stats)
Lin et al. (2009b) RCT (8) NStart=60 NEnd=60 TPS=Chronic A vs B vs 0 *Primary listing: Table 2 (Bilateral Arm Training)*	E1: Distributed Constraint-Induced Therapy E2: Bilateral Arm Training C: conventional care Duration: 2hr/d, 5d/wk, for 3wk	E1 vs C: Fugl-Meyer Assessment (+exp1) Proximal (-) Distal (+exp1) Functional Independence Measure (-) Self-care (-) Sphincter (-) Transfer Locomotion (+exp1) Communication (-) Social cognition (-) Motor Activity Log Amount of Use (+exp1) Quality of Movement (+exp1) Stroke Impact Scale (+exp1) Strength (-) Memory (-) Emotion (-) Communication (-) ADLs/IADLs (+exp1) Mobility (-) Hand function (+exp1) Participation E2 vs C: Fugl-Meyer Assessment (+exp2) Proximal (-) Distal (+exp2) Functional Independence Measure (-) Self-care (-) Sphincter (-) Transfer (-) Locomotion (-)

		Communication (-) Social cognition (-) Motor Activity Log Amount of Use (-) Quality of Movement (-) Stroke Impact Scale (-) Strength (-) Memory (-) Emotion (-) Communication (-) ADLs/IADLs (-) Mobility (-) Hand function (-) Participation (-) E1 vs E2: Fugl-Meyer Assessment (-) Proximal (-) Distal (-) Functional Independence Measure (-) Self-care (-) Sphincter (-) Transfer (-) Locomotion (+exp1) Communication (-) Social cognition (-) Motor Activity Log Amount of Use (+exp1) Quality of Movement (+exp1) Stroke Impact Scale (+exp1) Strength (-) Memory (-) Emotion (-) Communication (-) ADLs/IADLs (+exp1) Mobility (-) Hand function (-) Participation (+exp1)
Malcolm et al. (2007) RCT (7) NStart=20 NEnd=19 TPS=Chronic A + B vs A/B *Primary listing: Table 29 (Repetitive Transcranial Magnetic Stimulation (rTMS))*	E: High frequency rTMS + CIMT C: Sham rTMS + CIMT Duration: 40min/d, 6d/wk for 5wk	E vs C: WMFT (-) MAL (-) box and blocks test motor threshold

Abbreviations and table notes: C=control group; D=days; E=experimental group; H=hours; Min=minutes; RCT=randomized controlled trial; TPS=time post stroke category (Acute: less than 30 days, Subacute: more than 1 month but less than 6 months, Chronic: over 6 months); Wk=weeks.

+exp indicates a statistically significant between groups difference at α=0.05 in favour of the experimental group

+exp1/+exp2/+exp3 indicates a statistically significant between groups difference at α=0.05 in favour of the first, second or third experimental group

+con indicates a statistically significant between groups difference at α=0.05 in favour of the control group

- indicates no statistically significant between groups differences at α=0.05

1. Body Functions and Structures

MOTOR FUNCTION			
LoE	**Conclusion Statement**	**RCTs**	**References**
1a	Different approaches to constraint-induced movement therapy may not have a difference in efficacy when compared with one another for improving motor function.	11	Abdullahi et al. (2018); Kaura et al. (2018); Doussoulin et al. (2017); Souza et al. (2015); Rickards et al. (2014); Krawczyk et al. (2012); Brogardh et al. (2009); Gauthier et al. (2008); Sawaki et al. (2008); Brogardh & Sjolund (2006); Sterr et al. (2002)
1b	Received modifed constraint-induced movement therapy with task-specific training 3hr may not have a difference in efficacy when compared to constraint-induced movement therapy-received 300 repetitions of task specific training or constraint-induced movement therapy with 600 repetitions task specific training for improving motor function.	1	Abdullahi et al. (2018)
1a	There is conflicting evidence about the effect of Constraint-induced movement therapy combined with other interventions when compared to bilateral arm training for improving motor function.	3	Kale et al. (2019); Suputtitada et al. (2004); van der Lee et al. (1999)
1a	Constraint-induced movement therapy may not have a difference in efficacy when compared to conventional therapy for improving motor function.	32	Ceylan et al. (2023); Tariq et al. (2023); Gauthier L.V. et al. (2022); Rocha et al. (2021); Baldwin et al. (2018); Stock et al. (2018); Yu et al. (2017); Liu et al. (2016a); Yadav et al. (2016); Barzel et al. (2015); Thrane et al. (2015); El-Helow et al. (2014); Smania et al. (2012); Treger et al. (2012); Lin et al. (2010a); Tariah et al. (2010); Dromerick et al. (2009); Hammer et al. (2009); Dahl et al. (2008); Lin et al. (2008); Myint et al. (2008); Boake et al. (2007); Lin et al. (2007); Wu et al. (2007b); Wu et al. (2007c); Wolf et al. (2006); Page et al. (2005b); Yen et al. (2005); Ploughman et al. (2004); Wittenberg et al. (2003); Dromerick et al. (2000); Taub et al. (1993)
2	Left-Modified Constraint Induced Movement Therapy with Conventional therapy may not have a difference in efficacy when compared to Right-Modified Constraint Induced Movement Therapy with Conventional therapy for improving motor function.	1	Ceylan et al. (2023)
1b	Modified constraint-induced movement therapy with daily physical therapy may not have a difference in efficacy when compared to self-regulated constraint-induced movement therapy with daily physical therapy for improving motor function.	1	Liu et al. (2016a)
1a	Constraint-induced movement therapy combined with other interventions may produce greater improvements in motor function than constraint-induced movement therapy.	8	Kolbasi et al. (2024); Bang et al. (2018); Kim et al. (2018a); Bang et al. (2016); Bang et al. (2015); Yoon et al. (2014); Page et al. (2009); Woodbury et al. (2009)
1a	There is conflicting evidence about the effect of Constraint-induced movement therapy combined with other interventions when	5	Andrade et al. (2017); Figlewski et al. (2017); Carrico et al.

	compared to constraint-induced movement therapy or sham for improving motor function.		(2016a); Cunningham et al. (2015); Bolognini et al. (2011)
2	There is conflicting evidence about the effect of Constraint-induced movement therapy when compared to conventional therapy or no treatment for improving motor function.	1	Page et al. (2008)
2	Modified constraint-induced movement therapy may not have a difference in efficacy when compared to Bilateral training for improving motor function.	1	Hayner et al. (2010)
1a	There is conflicting evidence about the effect of Constraint-induced movement therapy combined with other interventions when compared to conventional therapy for improving motor function.	9	Alaca & Öcal (2022); Takebayashi et al. (2022); Kwakkel et al. (2016); Seok et al. (2016); van Delden et al. (2013); Wu et al. (2012b); Wu et al. (2012c); Khan et al. (2011); Wang et al. (2011)
1b	Robotic self training with constraint-induced movement therapy may not have a difference in efficacy when compared to Robotic self training with conventional care for improving motor function.	1	Takebayashi et al. (2022)
1b	Distributed Constraint-Induced Movement Therapy with Trunk Restraint may not have a difference in efficacy when compared to Distributed Constraint-Induced Movement Therapy for improving motor function.	1	Wu et al. (2012b)
1b	Constraint-induced movement therapy combined with other interventions may not have a difference in efficacy when compared to motor relearning programmes for improving motor function.	1	Shah et al. (2016)
1b	Constraint-induced movement therapy may produce greater improvements in motor function than no treatment or conventional therapy.	2	Page et al. (2004); Page et al. (2002)
1b	There is conflicting evidence about the effect of Expanded constraint-induced movement therapy when compared to usual care or placebo treatment for improving motor function.	1	Uswatte et al. (2018)
1b	Constraint-induced movement therapy may not have a difference in efficacy when compared to Bobath therapy for improving motor function.	1	Hüseyinsinoğlu et al. (2012)
2	Donepezil with constraint-induced movement therapy may not have a difference in efficacy when compared to Placebo with constraint-induced movement therapy for improving motor function.	1	Nadeau et al. (2004)
2	Mental practice with modified constraint-induced movement therapy may produce greater improvements in motor function than modified constraint-induced movement therapy.	1	Park et al. (2015a)
2	Scalp cluster acupuncture with constraint-induced movement therapy may produce greater improvements in motor function than Body acupuncture with traditional rehabilitation.	1	Song et al. (2016)
1b	Constraint-induced movement therapy with bilateral arm training may not have a difference in efficacy when compared to Bimanual task-related training for improving motor function.	1	Brunner et al. (2012)
1b	Constraint-induced movement therapy with Conventional therapy and Hand mitt may produce greater improvements in motor function than Conventional therapy with Hand mitt.	1	Lin et al. (2009a)
2	Modified constraint-induced movement therapy with conventional physical therapy may produce greater improvements in motor function than HABIT (hand arm bimanual intensive training) with conventional physical therapy.	1	Bellay et al. (2015)

1b	BtxA (Dysport) with modified constraint-induced movement therapy may produce greater improvements in motor function than BtxA (Dysport) with conventional rehabilitation.	1	Sun et al. (2010)
1b	Botox with modified constraint-induced movement therapy may produce greater improvements in motor function than Botox with Conventional therapy (high dose).	1	Nasb et al. (2019)
1b	High frequency repetitive transcranial magnetic stimulation with constraint-induced movement therapy may not have a difference in efficacy when compared to Sham repetitive transcranial magnetic stimulation with constraint-induced movement therapy for improving motor function.	1	Malcolm et al. (2007)
2	Unilateral robot assisted therapy with modified constraint-induced movement therapy may not have a difference in efficacy when compared to Robot assist therapy for improving motor function.	1	Hung et al. (2019b)
2	Unilateral robot assisted therapy with modified constraint-induced movement therapy may not have a difference in efficacy when compared to Bilateral robot assisted therapy with bilateral arm training for improving motor function.	1	Hung et al. (2019b)
1b	There is conflicting evidence about the effect of Robot-Assisted Therapy with Modified Constraint-Induced Therapy when compared to Robot-Assisted Therapy for improving motor function.	1	Hsieh et al. (2016)
1b	Nintendo Wii-based movement therapy may not have a difference in efficacy when compared to Modified constraint-induced movement therapy for improving motor function.	1	McNulty et al. (2014)
1b	Unilateral robot assisted therapy with constraint-induced movement therapy (unilateral arm) may not have a difference in efficacy when compared to Robot assisted therapy alone (both modes) for improving motor function.	1	Hung et al. (2019d)
1b	Unilateral robot assisted therapy with constraint-induced movement therapy (unilateral arm) may result in lesser improvements in motor function when compared to Bilateral robot assisted therapy with BAT (Bimanual tracking).	1	Hung et al. (2019d)
2	Shaping training with constraint-induced movement therapy transfer package (TP) may not have a difference in efficacy when compared to Shaping training for improving motor function.	1	Taub et al. (2013)
1b	There is conflicting evidence about the effect of Robot therapy with distributed constraint induced therapy when compared to Conventional Therapy for improving motor function.	1	Hsieh et al. (2014)
1b	Robot therapy with distributed constraint induced therapy may not have a difference in efficacy when compared to robot therapy alone for improving motor function.	1	Hsieh et al. (2014)
1b	Distributed Constraint-Induced Therapy may produce greater improvements in motor function than conventional care.	1	Lin et al. (2009b)
1a	Distributed constraint-induced therapy may produce greater improvements in motor function than bilateral arm training.	2	Wu et al. (2011); Lin et al. (2009b)
1b	There is conflicting evidence about the effect of Distributed constraint-induced therapy when compared to control treatment for improving motor function.	1	Wu et al. (2011)
1b	Low frequency repetitive transcranial magnetic stimulation with occupational therapy training may produce greater improvements in motor function than constraint-induced movement therapy.	1	Abo et al. (2014)
2	Tele-Health constraint-induced movement therapy may not have a difference in efficacy when compared to In-Lab constraint-induced movement therapy for improving motor function.	1	Uswatte et al. (2021)

2	Robot-assisted Therapy with conventional rehab may not have a difference in efficacy when compared to Constraint induced movement therapy with conventional rehab for improving motor function.	1	Terranova T.T. et al. (2021)
1b	Bilateral transcranial direct current stimulation with modified constraint-induced movement therapy and conventional rehab may produce greater improvements in motor function than Sham transcranial direct current stimulation with modified constraint-induced movement therapy and conventional rehab.	1	Garrido et al. (2023)
1b	Anodal transcranial direct current stimulation with constraint-induced movement therapy may not have a difference in efficacy when compared to Sham transcranial direct current stimulation with constraint-induced movement therapy for improving motor function.	1	Unger et al. (2023)
1b	Constraint-induced movement therapy in-person may not have a difference in efficacy when compared to Constraint-induced movement therapy via telerehabilitation for improving motor function.	1	Shamweel & Gupta (2024)
2	Mirror Therapy may produce greater improvements in motor function than modified constraint-induced movement therapy.	1	Kaviraja et al. (2021)
1b	Constraint induced movement therapy (constraint-induced movement therapy) with Conventional rehabilitation may produce greater improvements in motor function than Conventional rehabilitation.	1	Wang et al. (2023f)
1b	Constraint induced movement therapy (constraint-induced movement therapy) with Conventional rehabilitation may produce greater improvements in motor function than Upper limb task-oriented training with Conventional rehabilitation.	1	Wang et al. (2023f)
1b	CIMT may not have a difference in efficacy when compared to Therapeutic Climbing for improving motor function.	1	Khan et al. (2011)
1b	Kinesiotape with mCIMT may not have a difference in efficacy when compared to Sham Kinesiotape with mCIMT for improving motor function.	1	Huang et al. (2021b)
1b	Dual tDCS with mCIMT and conventional rehabilitation may not have a difference in efficacy when compared to Sham Dual tDCS with mCIMT and conventional rehabilitation for improving motor function.	1	Kim et al. (2021)
1b	Dual-tDCS combined with PNMES with CIMT may produce greater improvements in motor function than CIMT.	1	Takebayashi et al. (2017)
1b	There is conflicting evidence about the effect of Anodal tDCS with Modified CIMT when compared to Sham tDCS with CIMT for improving motor function.	1	Rocha et al. (2016)
1b	Trunk training with mCIMT may not have a difference in efficacy when compared to mCIMT for improving motor function.	1	Lima et al. (2014)
1b	CIMT-6hr with cycloserine may not have a difference in efficacy when compared to CIMT-6hr with placebo for improving motor function.	1	Nadeau et al. (2014)
1b	Modified Constraint-Induced Movement Therapy with Exercise/custom physiotherapy (Telerehabilitation) may produce greater improvements in motor function than Home exercise program.	1	Saygili et al. (2024)
1b	Cathodal tDCS with Modified CIMT may not have a difference in efficacy when compared to Sham tDCS with CIMT for improving motor function.	1	Rocha et al. (2016)
1b	Kinesiotape may not have a difference in efficacy when compared to Sham Kinesiotape with mCIMT for improving motor function.	1	Huang et al. (2021b)

STROKE SEVERITY			
LoE	**Conclusion Statement**	**RCTs**	**References**
1a	Constraint-induced movement therapy may not have a difference in efficacy when compared to conventional therapy for improving stroke severity.	3	Stock et al. (2018); Treger et al. (2012); Ploughman et al. (2004)
2	Constraint-induced movement therapy combined with other interventions may not have a difference in efficacy when compared to constraint-induced movement therapy alone for improving stroke severity.	1	Yoon et al. (2014)
1b	Constraint-induced movement therapy combined with other interventions may not have a difference in efficacy when compared to conventional therapy for improving stroke severity.	1	Khan et al. (2011)
1b	Kinesiotape with mCIMT may not have a difference in efficacy when compared to Sham Kinesiotape with mCIMT for improving stroke severity.	1	Huang et al. (2021b)
1b	Kinesiotape may not have a difference in efficacy when compared to Sham Kinesiotape with mCIMT for improving stroke severity.	1	Huang et al. (2021b)

MUSCLE STRENGTH			
LoE	**Conclusion Statement**	**RCTs**	**References**
2	Different approaches to constraint-induced movement therapy: some approaches may produce greater improvements in muscle strength than others.	1	Sawaki et al. (2008)
1b	There is conflicting evidence about the effect of Constraint-induced movement therapy combined with other interventions when compared to bilateral arm training for improving muscle strength.	1	Suputtitada et al. (2004)
1b	Constraint-induced movement therapy may not have a difference in efficacy when compared to conventional therapy for improving muscle strength.	2	Hammer et al. (2009); Ploughman et al. (2004)
1a	Constraint-induced movement therapy combined with other interventions may not have a difference in efficacy when compared to constraint-induced movement therapy or sham for improving muscle strength.	3	Andrade et al. (2017); Figlewski et al. (2017); Bolognini et al. (2011)
1a	Constraint-induced movement therapy combined with other interventions may not have a difference in efficacy when compared to conventional therapy for improving muscle strength.	5	Takebayashi et al. (2022); Kwakkel et al. (2016); Seok et al. (2016); van Delden et al. (2013); Khan et al. (2011)
2	Constraint-induced movement therapy combined with other interventions may produce greater improvements in muscle strength than constraint-induced movement therapy alone.	1	Yoon et al. (2014)
1b	CIMT may not have a difference in efficacy when compared to Therapeutic Climbing for improving muscle strength.	1	Khan et al. (2011)
1b	Anodal tDCS with Modified CIMT may not have a difference in efficacy when compared to Sham tDCS with CIMT for improving muscle strength.	1	Rocha et al. (2016)
1b	Modified Constraint-Induced Movement Therapy with Exercise/custom physiotherapy (Telerehabilitation) may produce greater improvements in muscle strength than Home exercise program.	1	Saygili et al. (2024)
1b	Cathodal tDCS with Modified CIMT may not have a difference in efficacy when compared to Sham tDCS with CIMT for improving muscle strength.	1	Rocha et al. (2016)

SPASTICITY			
LoE	**Conclusion Statement**	**RCTs**	**References**
1a	Constraint-induced movement therapy may not have a difference in efficacy when compared to conventional therapy for improving spasticity.	3	Rocha et al. (2021); Smania et al. (2012); Hammer et al. (2009)
1a	Constraint-induced movement therapy combined with other interventions may produce greater improvements in spasticity than conventional therapy.	2	Alaca & Öcal (2022); Takebayashi et al. (2022)
1b	BtxA (Dysport) with modified constraint-induced movement therapy may not have a difference in efficacy when compared to BtxA (Dysport) with conventional rehabilitation for improving spasticity.	1	Sun et al. (2010)
1b	Botox with modified constraint-induced movement therapy may not have a difference in efficacy when compared to Botox with Conventional therapy (high dose) for improving spasticity.	1	Nasb et al. (2019)
1b	Nintendo Wii-based movement therapy may not have a difference in efficacy when compared to Modified constraint-induced movement therapy for improving spasticity.	1	McNulty et al. (2014)
2	Robot-assisted Therapy with conventional rehab may not have a difference in efficacy when compared to Constraint induced movement therapy with conventional rehab for improving spasticity.	1	Terranova T.T. et al. (2021)
1b	Constraint induced movement therapy (constraint-induced movement therapy) with Conventional rehabilitation may produce greater improvements in spasticity than Conventional rehabilitation.	1	Wang et al. (2023f)
1b	Constraint induced movement therapy (constraint-induced movement therapy) with Conventional rehabilitation may produce greater improvements in spasticity than Upper limb task-oriented training with Conventional rehabilitation.	1	Wang et al. (2023f)
1b	Constraint-induced movement therapy may produce greater improvements in spasticity than Motor learning programme.	1	Batool et al. (2015)
1b	Constraint-induced movement therapy combined with other interventions may produce greater improvements in spasticity than constraint-induced movement therapy or sham.	1	Andrade et al. (2017)
1b	Constraint-induced movement therapy combined with other interventions may not have a difference in efficacy when compared to constraint-induced movement therapy for improving spasticity.	1	Bang et al. (2016)
1b	Kinesiotape with mCIMT may not have a difference in efficacy when compared to Sham Kinesiotape with mCIMT for improving spasticity.	1	Huang et al. (2021b)
1b	Kinesiotape may not have a difference in efficacy when compared to Sham Kinesiotape with mCIMT for improving spasticity.	1	Huang et al. (2021b)

RANGE OF MOTION			
LoE	**Conclusion Statement**	**RCTs**	**References**
1b	Nintendo Wii-based movement therapy may not have a difference in efficacy when compared to Modified constraint-induced movement therapy for improving range of motion.	1	McNulty et al. (2014)
2	Constraint-induced movement therapy may not have a difference in efficacy when compared to conventional therapy for improving range of motion.	1	Taub et al. (1993)
1b	Modified constraint-induced movement therapy with trunk restraint may produce greater improvements in range of motion than modified constraint-induced movement therapy.	1	Bang et al. (2015)

1b	Constraint-induced movement therapy combined with other interventions may produce greater improvements in range of motion than constraint-induced movement therapy.	1	Bang et al. (2018)
1b	Constraint-induced movement therapy combined with other interventions may not have a difference in efficacy when compared to conventional therapy for improving range of motion.	1	Khan et al. (2011)
1b	CIMT may not have a difference in efficacy when compared to Therapeutic Climbing for improving range of motion.	1	Khan et al. (2011)

PROPRIOCEPTION			
LoE	**Conclusion Statement**	**RCTs**	**References**
1a	Different approaches to constraint-induced movement therapy may not have a difference in efficacy when compared with one another for improving proprioception.	2	Brogardh et al. (2009); Brogardh & Sjolund (2006)
1a	Constraint-induced movement therapy combined with other interventions may not have a difference in efficacy when compared to conventional therapy for improving proprioception.	3	Alaca & Öcal (2022); Kwakkel et al. (2016); van Delden et al. (2013)

2. Activities

ACTIVITIES OF DAILY LIVING			
LoE	**Conclusion Statement**	**RCTs**	**References**
1a	Constraint-induced movement therapy: some approaches may produce greater improvements in performance of activities of daily living than others.	10	Abdullahi et al. (2018); Kaura et al. (2018); Doussoulin et al. (2017); Souza et al. (2015); Rickards et al. (2014); Krawczyk et al. (2012); Brogardh et al. (2009); Gauthier et al. (2008); Brogardh & Sjolund (2006); Sterr et al. (2002)
1b	Received modifed constraint-induced movement therapy with task-specific training 3hr may not have a difference in efficacy when compared to constraint-induced movement therapy-received 300 repetitions of task specific training or constraint-induced movement therapy with 600 repetitions task specific training for improving performance of activities of daily living.	1	Abdullahi et al. (2018)
1b	Constraint-induced movement therapy combined with other interventions may produce greater improvements in performance of activities of daily living than bilateral arm training.	1	van der Lee et al. (1999)
1a	There is conflicting evidence about the effect of Constraint-induced movement therapy when compared to conventional therapy for improving performance of activities of daily living.	29	Ceylan et al. (2023); Gauthier L.V. et al. (2022); Bhardwaj et al. (2021); Baldwin et al. (2018); Yu et al. (2017); Liu et al. (2016a); Yadav et al. (2016); Barzel et al. (2015); Thrane et al. (2015); Smania et al. (2012); Treger et al. (2012); Lin et al. (2010a); Tariah et al. (2010); Dromerick et al. (2009); Hammer et al. (2009); Dahl et al. (2008); Lin et al. (2008); Myint et al. (2008); Boake et al. (2007); Lin et al. (2007); Wu et al. (2007a); Wu et al. (2007b); Wu et al. (2007c); Wolf et al. (2006); Page et al. (2005b); Ploughman et al. (2004);

			Wittenberg et al. (2003); Dromerick et al. (2000); Taub et al. (1993)
2	Left-Modified Constraint Induced Movement Therapy with Conventional therapy may not have a difference in efficacy when compared to Right-Modified Constraint Induced Movement Therapy with Conventional therapy for improving performance of activities of daily living.	1	Ceylan et al. (2023)
1b	Modified constraint-induced movement therapy with daily physical therapy may result in lesser improvements in performance of activities of daily living when compared to self-regulated constraint-induced movement therapy with daily physical therapy.	1	Liu et al. (2016a)
1a	Constraint-induced movement therapy combined with other interventions may produce greater improvements in performance of activities of daily living than constraint-induced movement therapy.	7	Kolbasi et al. (2024); Bang et al. (2018); Kim et al. (2018a); Bang et al. (2016); Bang et al. (2015); Yoon et al. (2014); Woodbury et al. (2009)
2	Modified constraint-induced movement therapy may not have a difference in efficacy when compared to Bilateral training for improving performance of activities of daily living.	1	Hayner et al. (2010)
1a	Constraint-induced movement therapy combined with other interventions may not have a difference in efficacy when compared to conventional therapy for improving performance of activities of daily living.	9	Alaca & Öcal (2022); Takebayashi et al. (2022); Anjum A.F. et al. (2021); Kwakkel et al. (2016); Seok et al. (2016); van Delden et al. (2013); Wu et al. (2012b); Wu et al. (2012c); Khan et al. (2011)
1b	Robotic self training with constraint-induced movement therapy may not have a difference in efficacy when compared to Robotic self training with conventional care for improving performance of activities of daily living.	1	Takebayashi et al. (2022)
1b	Distributed Constraint-Induced Movement Therapy with Trunk Restraint may not have a difference in efficacy when compared to Distributed Constraint-Induced Movement Therapy for improving performance of activities of daily living.	1	Wu et al. (2012b)
1a	Constraint-induced movement therapy combined with other interventions may produce greater improvements in performance of activities of daily living than motor relearning programmes.	2	Shah et al. (2016); Batool et al. (2015)
1b	Expanded constraint-induced movement therapy may produce greater improvements in performance of activities of daily living than usual care or placebo treatment.	1	Uswatte et al. (2018)
1b	There is conflicting evidence about the effect of Constraint-induced movement therapy when compared to Bobath therapy for improving performance of activities of daily living.	1	Hüseyinsinoğlu et al. (2012)
2	Donepezil with constraint-induced movement therapy may not have a difference in efficacy when compared to Placebo with constraint-induced movement therapy for improving performance of activities of daily living.	1	Nadeau et al. (2004)
2	Mental practice with modified constraint-induced movement therapy may produce greater improvements in performance of activities of daily living than modified constraint-induced movement therapy.	1	Park et al. (2015a)
1b	Constraint-induced movement therapy with bilateral arm training may not have a difference in efficacy when compared to Bimanual task-related training for improving performance of activities of daily living.	1	Brunner et al. (2012)

1b	Constraint-induced movement therapy with Conventional therapy and Hand mitt may produce greater improvements in performance of activities of daily living than Conventional therapy with Hand mitt.	1	Lin et al. (2009a)
1b	BtxA (Dysport) with modified constraint-induced movement therapy may produce greater improvements in performance of activities of daily living than BtxA (Dysport) with conventional rehabilitation.	1	Sun et al. (2010)
1b	Botox with modified constraint-induced movement therapy may produce greater improvements in performance of activities of daily living than Botox with Conventional therapy (high dose).	1	Nasb et al. (2019)
1b	High frequency repetitive transcranial magnetic stimulation with constraint-induced movement therapy may not have a difference in efficacy when compared to Sham repetitive transcranial magnetic stimulation with constraint-induced movement therapy for improving performance of activities of daily living.	1	Malcolm et al. (2007)
2	There is conflicting evidence about the effect of Unilateral robot assisted therapy with modified constraint-induced movement therapy when compared to Robot assist therapy for improving performance of activities of daily living.	1	Hung et al. (2019b)
2	Unilateral robot assisted therapy with modified constraint-induced movement therapy may result in lesser improvements in performance of activities of daily living when compared to Bilateral robot assisted therapy with bilateral arm training.	1	Hung et al. (2019b)
1b	There is conflicting evidence about the effect of Robot-Assisted Therapy with Modified Constraint-Induced Therapy when compared to Robot-Assisted Therapy for improving performance of activities of daily living.	1	Hsieh et al. (2016)
1b	Nintendo Wii-based movement therapy may produce greater improvements in performance of activities of daily living than Modified constraint-induced movement therapy.	1	McNulty et al. (2014)
1b	Unilateral robot assisted therapy with constraint-induced movement therapy (unilateral arm) may not have a difference in efficacy when compared to Robot assisted therapy alone (both modes) for improving performance of activities of daily living.	1	Hung et al. (2019d)
1b	Unilateral robot assisted therapy with constraint-induced movement therapy (unilateral arm) may not have a difference in efficacy when compared to Bilateral robot assisted therapy with BAT (Bimanual tracking) for improving performance of activities of daily living.	1	Hung et al. (2019d)
2	Shaping training with constraint-induced movement therapy transfer package (TP) may not have a difference in efficacy when compared to Shaping training for improving performance of activities of daily living.	1	Taub et al. (2013)
1b	Robot therapy with distributed constraint induced therapy may not have a difference in efficacy when compared to Conventional Therapy for improving performance of activities of daily living.	1	Hsieh et al. (2014)
1b	Robot therapy with distributed constraint induced therapy may not have a difference in efficacy when compared to robot therapy alone for improving performance of activities of daily living.	1	Hsieh et al. (2014)
1b	Distributed Constraint-Induced Therapy may not have a difference in efficacy when compared to conventional care for improving performance of activities of daily living.	1	Lin et al. (2009b)
1a	Distributed constraint-induced therapy may not have a difference in efficacy when compared to bilateral arm training for improving performance of activities of daily living.	2	Wu et al. (2011); Lin et al. (2009b)

1b	There is conflicting evidence about the effect of Distributed constraint-induced therapy when compared to control treatment for improving performance of activities of daily living.	1	Wu et al. (2011)
2	Tele-Health constraint-induced movement therapy may not have a difference in efficacy when compared to In-Lab constraint-induced movement therapy for improving performance of activities of daily living.	1	Uswatte et al. (2021)
2	Robot-assisted Therapy with conventional rehab may not have a difference in efficacy when compared to Constraint induced movement therapy with conventional rehab for improving performance of activities of daily living.	1	Terranova T.T. et al. (2021)
1b	Bilateral transcranial direct current stimulation with modified constraint-induced movement therapy and conventional rehab may produce greater improvements in performance of activities of daily living than Sham transcranial direct current stimulation with modified constraint-induced movement therapy and conventional rehab.	1	Garrido et al. (2023)
1b	Constraint-induced movement therapy in-person may not have a difference in efficacy when compared to Constraint-induced movement therapy via telerehabilitation for improving performance of activities of daily living.	1	Shamweel & Gupta (2024)
1b	Constraint induced movement therapy (constraint-induced movement therapy) with Conventional rehabilitation may produce greater improvements in performance of activities of daily living than Conventional rehabilitation.	1	Wang et al. (2023f)
1b	Constraint induced movement therapy (constraint-induced movement therapy) with Conventional rehabilitation may produce greater improvements in performance of activities of daily living than Upper limb task-oriented training with Conventional rehabilitation.	1	Wang et al. (2023f)
1a	Constraint-induced movement therapy combined with other interventions may not have a difference in efficacy when compared to constraint-induced movement therapy or sham for improving performance of activities of daily living.	3	Andrade et al. (2017); Cunningham et al. (2015); Bolognini et al. (2011)
1b	CIMT may not have a difference in efficacy when compared to Therapeutic Climbing for improving performance of activities of daily living.	1	Khan et al. (2011)
1b	There is conflicting evidence about the effect of Dual tDCS with mCIMT and conventional rehabilitation when compared to Sham Dual tDCS with mCIMT and conventional rehabilitation for improving performance of activities of daily living.	1	Kim et al. (2021)
1b	There is conflicting evidence about the effect of dual-tDCS combined with PNMES with CIMT when compared to CIMT for improving performance of activities of daily living.	1	Takebayashi et al. (2017)
1b	Trunk training with mCIMT may not have a difference in efficacy when compared to mCIMT for improving performance of activities of daily living.	1	Lima et al. (2014)
1b	CIMT-6hr with cycloserine may not have a difference in efficacy when compared to CIMT-6hr with placebo for improving performance of activities of daily living.	1	Nadeau et al. (2014)
1b	Modified Constraint-Induced Movement Therapy with Exercise/custom physiotherapy (Telerehabilitation) may produce greater improvements in performance of activities of daily living than Home exercise program.	1	Saygili et al. (2024)

DEXTERITY			
LoE	**Conclusion Statement**	**RCTs**	**References**
2	Constraint-induced movement therapy combined with other interventions may not have a difference in efficacy when compared to bilateral arm training for improving dexterity.	1	Kale et al. (2019)
1a	Constraint-induced movement therapy may not have a difference in efficacy when compared to conventional therapy for improving dexterity.	8	Ceylan et al. (2023); Gauthier L.V. et al. (2022); Bhardwaj et al. (2021); Stock et al. (2018); Barzel et al. (2015); Thrane et al. (2015); Myint et al. (2008); Boake et al. (2007)
2	Left-Modified Constraint Induced Movement Therapy with Conventional therapy may not have a difference in efficacy when compared to Right-Modified Constraint Induced Movement Therapy with Conventional therapy for improving dexterity.	1	Ceylan et al. (2023)
1a	Constraint-induced movement therapy combined with other interventions may not have a difference in efficacy when compared to conventional therapy for improving dexterity.	3	Seok et al. (2016); Kwakkel et al. (2016); van Delden et al. (2013)
1b	Constraint-induced movement therapy combined with other interventions may not have a difference in efficacy when compared to motor relearning programmes for improving dexterity.	1	Shah et al. (2016)
2	Donepezil with constraint-induced movement therapy may not have a difference in efficacy when compared to Placebo with constraint-induced movement therapy for improving dexterity.	1	Nadeau et al. (2004)
1b	Constraint-induced movement therapy with bilateral arm training may not have a difference in efficacy when compared to Bimanual task-related training for improving dexterity.	1	Brunner et al. (2012)
1b	Nintendo Wii-based movement therapy may not have a difference in efficacy when compared to Modified constraint-induced movement therapy for improving dexterity.	1	McNulty et al. (2014)
2	Constraint-induced movement therapy combined with other interventions may produce greater improvements in dexterity than constraint-induced movement therapy alone.	1	Yoon et al. (2014)
1a	There is conflicting evidence about the effect of Constraint-induced movement therapy combined with other interventions when compared to constraint-induced movement therapy or sham for improving dexterity.	2	Andrade et al. (2017); Cunningham et al. (2015)
1b	Kinesiotape with mCIMT may not have a difference in efficacy when compared to Sham Kinesiotape with mCIMT for improving dexterity.	1	Huang et al. (2021b)
1b	Modified Constraint-Induced Movement Therapy with Exercise/custom physiotherapy (Telerehabilitation) may produce greater improvements in dexterity than Home exercise program.	1	Saygili et al. (2024)
1b	Kinesiotape may not have a difference in efficacy when compared to Sham Kinesiotape with mCIMT for improving dexterity.	1	Huang et al. (2021b)

Key Points

- Received modifed constraint-induced movement therapy with task-specific training 3hr may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to constraint-induced movement therapy-received 300 repetitions of task specific training or constraint-induced movement therapy with 600 repetitions task specific training.
- Constraint-induced movement therapy: some approaches may be more beneficial than others for improving muscle strength and performance of activities of daily living; different approaches to constraint-

induced movement therapy may not have a difference in efficacy when compared with one another for improving motor function and proprioception.

- Constraint-induced movement therapy may not be beneficial for improving motor function, stroke severity, muscle strength, spasticity, range of motion, and dexterity after stroke when compared to conventional therapy; the literature is mixed regarding performance of activities of daily living.
- Left-Modified Constraint Induced Movement Therapy with Conventional therapy may not be beneficial for improving motor function, dexterity, and performance of activities of daily living after stroke when compared to Right-Modified Constraint Induced Movement Therapy with Conventional therapy.
- Modified constraint-induced movement therapy with daily physical therapy may not be beneficial for improving motor function after stroke when compared to self-regulated constraint-induced movement therapy with daily physical therapy.
- Modified constraint-induced movement therapy with daily physical therapy may be less beneficial than self-regulated constraint-induced movement therapy with daily physical therapy for improving performance of activities of daily living after stroke.
- Constraint-induced movement therapy combined with other interventions may be beneficial for improving motor function, range of motion, and performance of activities of daily living, but not spasticity, after stroke when compared to constraint-induced movement therapy.
- Constraint-induced movement therapy combined with other interventions may be beneficial for improving spasticity, but not muscle strength and performance of activities of daily living, after stroke when compared to constraint-induced movement therapy or sham; the literature is mixed regarding motor function and dexterity.
- The literature is mixed regarding the effect of Constraint-induced movement therapy on improvement of motor function after stroke when compared to conventional therapy or no treatment.
- Modified constraint-induced movement therapy may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Bilateral training.
- Constraint-induced movement therapy combined with other interventions may be beneficial for improving spasticity, but not stroke severity, muscle strength, range of motion, proprioception, performance of activities of daily living, and dexterity, after stroke when compared to conventional therapy; the literature is mixed regarding motor function.
- Robotic self training with constraint-induced movement therapy may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Robotic self training with conventional care.
- Distributed Constraint-Induced Movement Therapy with Trunk Restraint may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Distributed Constraint-Induced Movement Therapy.
- Constraint-induced movement therapy combined with other interventions may be beneficial for improving performance of activities of daily living, but not motor function and dexterity, after stroke when compared to motor relearning programmes.
- Constraint-induced movement therapy may be beneficial for improving motor function after stroke when compared to no treatment or conventional therapy.
- Expanded constraint-induced movement therapy may be beneficial for improving performance of activities of daily living after stroke when compared to usual care or placebo treatment; the literature is mixed regarding motor function.
- Constraint-induced movement therapy may not be beneficial for improving motor function after stroke when compared to Bobath therapy; the literature is mixed regarding performance of activities of daily living.
- Donepezil with constraint-induced movement therapy may not be beneficial for improving motor function, dexterity, and performance of activities of daily living after stroke when compared to Placebo with constraint-induced movement therapy.
- Mental practice with modified constraint-induced movement therapy may be beneficial for improving motor function and performance of activities of daily living after stroke when compared to modified constraint-induced movement therapy.

- Scalp cluster acupuncture with constraint-induced movement therapy may be beneficial for improving motor function after stroke when compared to Body acupuncture with traditional rehabilitation.
- Constraint-induced movement therapy with bilateral arm training may not be beneficial for improving motor function, dexterity, and performance of activities of daily living after stroke when compared to Bimanual task-related training.
- Constraint-induced movement therapy with Conventional therapy and Hand mitt may be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Conventional therapy with Hand mitt.
- Modified constraint-induced movement therapy with conventional physical therapy may be beneficial for improving motor function after stroke when compared to HABIT (hand arm bimanual intensive training) with conventional physical therapy.
- BtxA (Dysport) with modified constraint-induced movement therapy may be beneficial for improving motor function and performance of activities of daily living, but not spasticity, after stroke when compared to BtxA (Dysport) with conventional rehabilitation.
- Botox with modified constraint-induced movement therapy may be beneficial for improving motor function and performance of activities of daily living, but not spasticity, after stroke when compared to Botox with Conventional therapy (high dose).
- High frequency repetitive transcranial magnetic stimulation with constraint-induced movement therapy may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Sham repetitive transcranial magnetic stimulation with constraint-induced movement therapy.
- Unilateral robot assisted therapy with modified constraint-induced movement therapy may not be beneficial for improving motor function after stroke when compared to Robot assist therapy; the literature is mixed regarding performance of activities of daily living.
- Unilateral robot assisted therapy with modified constraint-induced movement therapy may not be beneficial for improving motor function after stroke when compared to Bilateral robot assisted therapy with bilateral arm training.
- Unilateral robot assisted therapy with modified constraint-induced movement therapy may be less beneficial than Bilateral robot assisted therapy with bilateral arm training for improving performance of activities of daily living after stroke.
- The literature is mixed regarding the effect of Robot-Assisted Therapy with Modified Constraint-Induced Therapy on improvement of motor function and performance of activities of daily living after stroke when compared to Robot-Assisted Therapy.
- Nintendo Wii-based movement therapy may be beneficial for improving performance of activities of daily living, but not motor function, dexterity, spasticity, and range of motion, after stroke when compared to Modified constraint-induced movement therapy.
- Unilateral robot assisted therapy with constraint-induced movement therapy (unilateral arm) may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Robot assisted therapy alone (both modes).
- Unilateral robot assisted therapy with constraint-induced movement therapy (unilateral arm) may not be beneficial for improving performance of activities of daily living after stroke when compared to Bilateral robot assisted therapy with BAT (Bimanual tracking).
- Unilateral robot assisted therapy with constraint-induced movement therapy (unilateral arm) may be less beneficial than Bilateral robot assisted therapy with BAT (Bimanual tracking) for improving motor function after stroke.
- Shaping training with constraint-induced movement therapy transfer package (TP) may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Shaping training.
- Robot therapy with distributed constraint induced therapy may not be beneficial for improving performance of activities of daily living after stroke when compared to Conventional Therapy; the literature is mixed regarding motor function.
- Robot therapy with distributed constraint induced therapy may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to robot therapy alone.

- Distributed Constraint-Induced Therapy may be beneficial for improving motor function, but not performance of activities of daily living, after stroke when compared to conventional care.
- Distributed constraint-induced therapy may be beneficial for improving motor function, but not performance of activities of daily living, after stroke when compared to bilateral arm training.
- The literature is mixed regarding the effect of Distributed constraint-induced therapy on improvement of motor function and performance of activities of daily living after stroke when compared to control treatment.
- Low frequency repetitive transcranial magnetic stimulation with occupational therapy training may be beneficial for improving motor function after stroke when compared to constraint-induced movement therapy.
- Tele-Health constraint-induced movement therapy may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to In-Lab constraint-induced movement therapy.
- Robot-assisted Therapy with conventional rehab may not be beneficial for improving motor function, performance of activities of daily living, and spasticity after stroke when compared to Constraint induced movement therapy with conventional rehab.
- Bilateral transcranial direct current stimulation with modified constraint-induced movement therapy and conventional rehab may be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Sham transcranial direct current stimulation with modified constraint-induced movement therapy and conventional rehab.
- Anodal transcranial direct current stimulation with constraint-induced movement therapy may not be beneficial for improving motor function after stroke when compared to Sham transcranial direct current stimulation with constraint-induced movement therapy.
- Constraint-induced movement therapy in-person may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Constraint-induced movement therapy via telerehabilitation.
- Mirror Therapy may be beneficial for improving motor function after stroke when compared to modified constraint-induced movement therapy.
- Constraint induced movement therapy (constraint-induced movement therapy) with Conventional rehabilitation may be beneficial for improving motor function, performance of activities of daily living, and spasticity after stroke when compared to Conventional rehabilitation.
- Constraint induced movement therapy (constraint-induced movement therapy) with Conventional rehabilitation may be beneficial for improving motor function, performance of activities of daily living, and spasticity after stroke when compared to Upper limb task-oriented training with Conventional rehabilitation.
- Constraint-induced movement therapy combined with other interventions may be beneficial for improving dexterity and muscle strength, but not stroke severity, after stroke when compared to constraint-induced movement therapy alone.
- Constraint-induced movement therapy may be beneficial for improving spasticity after stroke when compared to Motor learning programme.
- Modified constraint-induced movement therapy with trunk restraint may be beneficial for improving range of motion after stroke when compared to modified constraint-induced movement therapy.
- CIMT may not be beneficial for improving motor function, muscle strength, range of motion, and performance of activities of daily living after stroke when compared to Therapeutic Climbing.
- Kinesiotape with mCIMT may not be beneficial for improving motor function, stroke severity, spasticity, and dexterity after stroke when compared to Sham Kinesiotape with mCIMT.
- Dual tDCS with mCIMT and conventional rehabilitation may not be beneficial for improving motor function after stroke when compared to Sham Dual tDCS with mCIMT and conventional rehabilitation; the literature is mixed regarding performance of activities of daily living.
- Dual-tDCS combined with PNMES with CIMT may be beneficial for improving motor function after stroke when compared to CIMT; the literature is mixed regarding performance of activities of daily living.
- Anodal tDCS with Modified CIMT may not be beneficial for improving muscle strength after stroke when compared to Sham tDCS with CIMT; the literature is mixed regarding motor function.

- Trunk training with mCIMT may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to mCIMT.
- CIMT-6hr with cycloserine may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to CIMT-6hr with placebo.
- Modified Constraint-Induced Movement Therapy with Exercise/custom physiotherapy (Telerehabilitation) may be beneficial for improving motor function, muscle strength, performance of activities of daily living, and dexterity after stroke when compared to Home exercise program.
- Constraint-induced movement therapy combined with other interventions may be beneficial for improving performance of activities of daily living, but not dexterity, after stroke when compared to bilateral arm training; the literature is mixed regarding motor function and muscle strength.
- Cathodal tDCS with Modified CIMT may not be beneficial for improving motor function and muscle strength after stroke when compared to Sham tDCS with CIMT.
- Kinesiotape may not be beneficial for improving motor function, stroke severity, spasticity, and dexterity after stroke when compared to Sham Kinesiotape with mCIMT.

Summary of Key Points: Constraint-Induced Movement Therapy (CIMT)

Intervention	Control(s)	Function domain(s)	Effect
Constraint-induced movement therapy	One another (different approaches compared)	Motor function, proprioception	−
Received modifed constraint-induced movement therapy with task-specific training 3hr	constraint-induced movement therapy-received 300 repetitions of task specific training or constraint-induced movement therapy with 600 repetitions task specific training	Motor function, performance of activities of daily living	−
Constraint-induced movement therapy combined with other interventions	bilateral arm training	Performance of activities of daily living	+
Constraint-induced movement therapy combined with other interventions	bilateral arm training	Dexterity	−
Constraint-induced movement therapy combined with other interventions	bilateral arm training	Motor function, muscle strength	=
Constraint-induced movement therapy	conventional therapy	Motor function, stroke severity, muscle strength, spasticity, range of motion, dexterity	−
Constraint-induced movement therapy	conventional therapy	Performance of activities of daily living	=
Left-Modified Constraint Induced Movement Therapy with Conventional therapy	Right-Modified Constraint Induced Movement Therapy with Conventional therapy	Motor function, dexterity, performance of activities of daily living	−
Modified constraint-induced movement therapy with daily physical therapy	self-regulated constraint-induced movement therapy with daily physical therapy	Motor function, performance of activities of daily living	−
Constraint-induced movement therapy combined with other interventions	constraint-induced movement therapy	Motor function, range of motion, performance of activities of daily living	+
Constraint-induced movement therapy combined with other interventions	constraint-induced movement therapy or sham	Spasticity	+
Constraint-induced movement therapy combined with other interventions	constraint-induced movement therapy or sham	Muscle strength, performance of activities of daily living	−
Constraint-induced movement therapy	conventional therapy or no treatment	Motor function	=

Modified constraint-induced movement therapy	Bilateral training	Motor function, performance of activities of daily living	−
Constraint-induced movement therapy combined with other interventions	conventional therapy	Spasticity	+
Constraint-induced movement therapy combined with other interventions	conventional therapy	Stroke severity, muscle strength, range of motion, proprioception, performance of activities of daily living, dexterity	−
Constraint-induced movement therapy combined with other interventions	conventional therapy	Motor function	=
Robotic self training with constraint-induced movement therapy	Robotic self training with conventional care	Motor function, performance of activities of daily living	−
Distributed Constraint-Induced Movement Therapy with Trunk Restraint	Distributed Constraint-Induced Movement Therapy	Motor function, performance of activities of daily living	−
Constraint-induced movement therapy combined with other interventions	motor relearning programmes	Performance of activities of daily living	+
Constraint-induced movement therapy combined with other interventions	motor relearning programmes	Motor function, dexterity	−
Constraint-induced movement therapy	no treatment or conventional therapy	Motor function	+
Expanded constraint-induced movement therapy	usual care or placebo treatment	Performance of activities of daily living	+
Expanded constraint-induced movement therapy	usual care or placebo treatment	Motor function	=
Constraint-induced movement therapy	Bobath therapy	Motor function	−
Constraint-induced movement therapy	Bobath therapy	Performance of activities of daily living	=
Donepezil with constraint-induced movement therapy	Placebo with constraint-induced movement therapy	Motor function, dexterity, performance of activities of daily living	−
Mental practice with modified constraint-induced movement therapy	modified constraint-induced movement therapy	Motor function, performance of activities of daily living	+
Scalp cluster acupuncture with constraint-induced movement therapy	Body acupuncture with traditional rehabilitation	Motor function	+
Constraint-induced movement therapy with bilateral arm training	Bimanual task-related training	Motor function, dexterity, performance of activities of daily living	−
Constraint-induced movement therapy with Conventional therapy and Hand mitt	Conventional therapy with Hand mitt	Motor function, performance of activities of daily living	+
Modified constraint-induced movement therapy with conventional physical therapy	HABIT (hand arm bimanual intensive training) with conventional physical therapy	Motor function	+
BtxA (Dysport) with modified constraint-induced movement therapy	BtxA (Dysport) with conventional rehabilitation	Motor function, performance of activities of daily living	+
BtxA (Dysport) with modified constraint-induced movement therapy	BtxA (Dysport) with conventional rehabilitation	Spasticity	−
Botox with modified constraint-induced movement therapy	Botox with Conventional therapy (high dose)	Motor function, performance of activities of daily living	+
Botox with modified constraint-induced movement therapy	Botox with Conventional therapy (high dose)	Spasticity	−

High frequency repetitive transcranial magnetic stimulation with constraint-induced movement therapy	Sham repetitive transcranial magnetic stimulation with constraint-induced movement therapy	Motor function, performance of activities of daily living	−
Unilateral robot assisted therapy with modified constraint-induced movement therapy	Robot assist therapy	Motor function	−
Unilateral robot assisted therapy with modified constraint-induced movement therapy	Robot assist therapy	Performance of activities of daily living	=
Unilateral robot assisted therapy with modified constraint-induced movement therapy	Bilateral robot assisted therapy with bilateral arm training	Motor function, performance of activities of daily living	−
Robot-Assisted Therapy with Modified Constraint-Induced Therapy	Robot-Assisted Therapy	Motor function, performance of activities of daily living	=
Nintendo Wii-based movement therapy	Modified constraint-induced movement therapy	Performance of activities of daily living	+
Nintendo Wii-based movement therapy	Modified constraint-induced movement therapy	Motor function, dexterity, spasticity, range of motion	−
Unilateral robot assisted therapy with constraint-induced movement therapy (unilateral arm)	Robot assisted therapy alone (both modes)	Motor function, performance of activities of daily living	−
Unilateral robot assisted therapy with constraint-induced movement therapy (unilateral arm)	Bilateral robot assisted therapy with BAT (Bimanual tracking)	Motor function, performance of activities of daily living	−
Shaping training with constraint-induced movement therapy transfer package (TP)	Shaping training	Motor function, performance of activities of daily living	−
Robot therapy with distributed constraint induced therapy	Conventional Therapy	Performance of activities of daily living	−
Robot therapy with distributed constraint induced therapy	Conventional Therapy	Motor function	=
Robot therapy with distributed constraint induced therapy	robot therapy alone	Motor function, performance of activities of daily living	−
Distributed Constraint-Induced Therapy	conventional care	Motor function	+
Distributed Constraint-Induced Therapy	conventional care	Performance of activities of daily living	−
Distributed constraint-induced therapy	bilateral arm training	Performance of activities of daily living	−
Distributed constraint-induced therapy	bilateral arm training	Motor function	+
Distributed constraint-induced therapy	control treatment	Motor function, performance of activities of daily living	=
Low frequency repetitive transcranial magnetic stimulation with occupational therapy training	constraint-induced movement therapy	Motor function	+
Tele-Health constraint-induced movement therapy	In-Lab constraint-induced movement therapy	Motor function, performance of activities of daily living	−
Robot-assisted Therapy with conventional rehab	Constraint induced movement therapy with conventional rehab	Motor function, performance of activities of daily living, spasticity	−

Bilateral transcranial direct current stimulation with modified constraint-induced movement therapy and conventional rehab	Sham transcranial direct current stimulation with modified constraint-induced movement therapy and conventional rehab	Motor function, performance of activities of daily living	+
Anodal transcranial direct current stimulation with constraint-induced movement therapy	Sham transcranial direct current stimulation with constraint-induced movement therapy	Motor function	-
Constraint-induced movement therapy in-person	Constraint-induced movement therapy via telerehabilitation	Motor function, performance of activities of daily living	-
Mirror Therapy	modified constraint-induced movement therapy	Motor function	+
Constraint induced movement therapy (constraint-induced movement therapy) with Conventional rehabilitation	Conventional rehabilitation	Motor function, performance of activities of daily living, spasticity	+
Constraint induced movement therapy (constraint-induced movement therapy) with Conventional rehabilitation	Upper limb task-oriented training with Conventional rehabilitation	Motor function, performance of activities of daily living, spasticity	+
Constraint-induced movement therapy combined with other interventions	constraint-induced movement therapy alone	Dexterity, muscle strength	+
Constraint-induced movement therapy combined with other interventions	constraint-induced movement therapy alone	Stroke severity	-
Constraint-induced movement therapy	One another (different approaches compared)	Muscle strength, performance of activities of daily living	+
Constraint-induced movement therapy	Motor learning programme	Spasticity	+
Modified constraint-induced movement therapy with trunk restraint	modified constraint-induced movement therapy	Range of motion	+
CIMT	Therapeutic Climbing	Motor function, muscle strength, range of motion, performance of activities of daily living	-
Constraint-induced movement therapy combined with other interventions	constraint-induced movement therapy	Spasticity	-
Constraint-induced movement therapy combined with other interventions	constraint-induced movement therapy or sham	Motor function, dexterity	=
Kinesiotape with mCIMT	Sham Kinesiotape with mCIMT	Motor function, stroke severity, spasticity, dexterity	-
Dual tDCS with mCIMT and conventional rehabilitation	Sham Dual tDCS with mCIMT and conventional rehabilitation	Motor function	-
Dual tDCS with mCIMT and conventional rehabilitation	Sham Dual tDCS with mCIMT and conventional rehabilitation	Performance of activities of daily living	=
Dual-tDCS combined with PNMES with CIMT	CIMT	Motor function	+
Dual-tDCS combined with PNMES with CIMT	CIMT	Performance of activities of daily living	=
Anodal tDCS with Modified CIMT	Sham tDCS with CIMT	Muscle strength	-
Anodal tDCS with Modified CIMT	Sham tDCS with CIMT	Motor function	=
Trunk training with mCIMT	mCIMT	Motor function, performance of activities of daily living	-

CIMT-6hr with cycloserine	CIMT-6hr with placebo	Motor function, performance of activities of daily living	–
Modified Constraint-Induced Movement Therapy with Exercise/custom physiotherapy (Telerehabilitation)	Home exercise program	Motor function, muscle strength, performance of activities of daily living, dexterity	+
Cathodal tDCS with Modified CIMT	Sham tDCS with CIMT	Motor function, muscle strength	–
Kinesiotape	Sham Kinesiotape with mCIMT	Motor function, stroke severity, spasticity, dexterity	–

Trunk Restraint



Adapted from: https://www.ortopedia-almirall.com/en/producto/cinturon-sujecion-tronco-y-pelvis-cierre-magnetico/

A total of six RCTs were found that evaluated trunk restraint for upper extremity motor rehabilitation. One RCT compared trunk restraint combined with other interventions with reaching and reach-to-grasp task training (Michaelsen et al. (2004)). One RCT compared trunk restraint with conventional therapy (deOliveiraCacho et al. (2015)). One RCT compared trunk restraint with trunk restraint (Jiang et al. (2021b)). One RCT compared trunk restraint combined with other interventions with task-specific training (Writer & Nayak (2012)). One RCT compared trunk restraint combined with other interventions with trunk restraint or non-robotic electromechanical devices (Yang et al. (2021)). One RCT compared trunk restraint combined with other interventions with CIMT (Lima et al. (2014)).

In addition, 11 RCTs in which trunk restraint formed part of a combined or comparative intervention are cross-referenced at the end of Table 7; their primary listings appear in other tables.

The methodological details and results of all six RCTs are presented in Table 7.

Table 7. RCTs Evaluating Trunk Restraint for Upper Extremity Motor Rehabilitation

Authors (Year) Study Design (PEDro Score) Sample Size start Sample Size end	Interventions Duration: Session length, frequency per week for total number of weeks	Outcome Measures Result (direction of effect)

Time post stroke category Study design		
Trunk restraint combined with other interventions compared to reaching and reach-to-grasp task training		
Michaelsen et al. (2004) RCT (5) NStart=28 NEnd=28 TPS=Chronic A + B vs A/B *Also in Table 4 (Task-Specific Training)*	E: Reach training with physical trunk restraint C: Reach training w/o physical trunk restraint Duration: 60 trials/session; 1session training (+Additional 10 trials pre and post session)	E vs C: Kinematics performance outcome measures (-) trunk anterior displacement (+exp) trunk rotation (-) elbow exension (+exp) shoulder horizontal adduction (-) shoulder flexion (-) Temporal Coordination Index (+exp)
Trunk restraint compared to conventional therapy		
deOliveiraCacho et al. (2015) RCT (7) NStart=22 NEnd=20 TPS=Chronic A vs 0	E: Trunk Restraint Therapy C: Conventional Care Duration: 45min, 2d/wk, 5wk	E vs C: Fugl-Meyer Assessment Barthel Index Modified Ashworth Scale trunk displacement shoulder/eblow active joint range of motion velocity rate
Trunk restraint compared to trunk restraint		
Jiang et al. (2021b) RCT (9) NStart=60 NEnd=57 TPS=Chronic A1 vs A2 *Also in Table 2 (Bilateral Arm Training)*	E1: Balance Training + Affected Hand at Low Back E2: Balance Training + Elevated Affected Shoulder C: Balance Training Duration: 30min/d, 5d/wk, 4wks	E1 vs E2 vs C: Fugl-Meyer Assessment- Upper Extremity (+exp2) Elbow Flexors Contraction Rate (+exp) Barthel Index (-) 10 metre walk test (+exp2)
Trunk restraint combined with other interventions compared to task-specific training		
Writer & Nayak (2012) RCT (4) NStart=30 NEnd=30 TPS=Not Reported A + B vs A/B *Also in Table 4 (Task-Specific Training)*	E: Task Specific training + Trunk restraint training C: Task Specific Training without Trunk restraint Duration: Not reported	E vs C: Fugl-Meyer Assessment (+exp) TEMPA (+exp) ROM-albow extension (+exp)
Trunk restraint combined with other interventions compared to trunk restraint or non-robotic electromechanical devices		
Yang et al. (2021) RCT (5) NStart=30 NEnd=28 TPS=Chronic A + B1 vs A + B2 *Also in Table 16 (Robotics)*	E: Trunk support + visual feedback SMART upper limb training system C: Trunk restraint + visual feedback SMART upper limb training system Duration: 30m/day, 3d/wk, 4wks	E vs C: PASS (+exp) FRT (+exp) ROM (-) MMT (-) FMA-UE (+exp)
Trunk restraint combined with other interventions compared to CIMT		
Lima et al. (2014) Pilot RCT (7) NStart=22 NEnd=21	E: Trunk training + mCIMT C: mCIMT Duration: 3hrs/d, 5d/wk for 2wks	E vs C: WMFT (-) Global strength (-) Motor activity log (-)

TPS=Chronic A + B vs A/B *Also in Table 6 (Constraint-Induced Movement Therapy (CIMT))*		Bilateral Activity Assessment Scale (-) handgrip strength pinch strength stroke specific QOL trunk displacement peak velocity elbow ROM
Cross-Referenced RCTs: Combined or Comparative Interventions Involving Trunk Restraint (results included in this table's levels of evidence)		
Senocak et al. (2023) RCT (4) NStart=42 NEnd=41 TPS=Subacute A + B vs A/B *Primary listing: Table 16 (Robotics)*	E: Robotic rehab + trunk rehab C: Conventional rehab + trunk rehab Duration: 60min/d, 5d/wk, 6wks	E vs C: FMA-UE (-) WMFT (-) Trunk Impairment scale (-)
Joo et al. (2022) RCT (8) NStart=36 NEnd=36 TPS=Acute A + B vs A/B *Primary listing: Table 16 (Robotics)*	E: Robot-assisted therapy (Armeo Spring system) + trunk restraint + general physical therapy C: Robot-assisted therapy (RT) + sham trunk restraint + general physical therapy Duration: 30min/d (RT) + 30min 2x/d general physical therapy, 5d/wk, 3wks	E vs C: FMA-UE (+exp) proximal (+exp) distal (-) WFMT (+exp) MAL (+exp) MBI (-) Muscle strength elbow flex (-) elbow ext (+exp)
Tedla et al. (2022) RCT (9) NStart=54 NEnd=54 TPS=Subacute A + B vs A/B vs 0 *Primary listing: Table 31 (Transcranial Direct Current Stimulation (tDCS))*	E1: Bilateral tDCS + trunk restraint/training + Conventional physical therapy E2: Sham tDCS + trunk restraint/training + Conventional physical therapy C: Conventional physical therapy Duration: 90min/d, 4d/wk, 6 wks	E1/E2 vs C: FMA (+exp1/2) WMFT time (+exp1/2) function (+exp1/2) TIS (+exp1/2) 10MWT (-) Stroke Specific Quality of Life (+exp1/2) E1 vs E2: FMA (+exp1) WMFT time (+exp1) function (+exp1) TIS (+exp1) 10MWT (-) Stroke Specific Quality of Life (+exp1)
Bang et al. (2018) Pilot RCT (8) NStart=24 NEnd=24 TPS=Acute A + B vs A/B *Primary listing: Table 6 (Constraint-Induced Movement Therapy (CIMT))*	E: mCIMT+ trunk restraint C: mCIMT alone Duration: 20sessions, 60min/d, 5d/wk, for 4wks	E vs C: ARAT (+exp) FMA UE (+exp) Modified Barthel Index (+exp) Motor activity logs (+exp) Maximal elbow extension angle during reach (+exp)
Bang et al. (2015) RCT (8)	E: mCIMT with trunk restraint C: mCIMT	E vs C: Action Research Arm Test (+exp)

NStart=18 NEnd=18 TPS=Subacute A + B vs A/B *Primary listing: Table 6 (Constraint-Induced Movement Therapy (CIMT))*	Duration: 1hr/d, 5ds/wk for 4wks	Fugl-Meyer Assessment (+exp) Modified Barthel Index (+exp) Motor Activity Log (+exp) Maximum Elbow Extension Angle During Reaching (+exp)
Wu et al. (2012b) RCT (6) NStart=57 NEnd=57 TPS=Chronic A + B vs A/B vs 0 *Primary listing: Table 6 (Constraint-Induced Movement Therapy (CIMT))*	E1: Distributed Constraint-Induced Movement Therapy with Trunk Restraint E2: Distributed Constraint-Induced Movement Therapy C: Conventional Therapy Duration: 2hrs, 5d/wk, 3wks	E1/E2 vs C: Action Research Arm Test (+exp1) +exp2 Grasp (-) Grip (+exp1) Pinch (+exp1) Gross Movement (+exp1,+exp2) Motor Activity Log Amount (+exp2) Quality (+exp1,+exp2) Frenchay Activities Index (+exp1) +exp2 Chores (-) Leisure/work (-) Outdoor Activities (+exp1) Stroke Impact Scale Strength (+exp2) ADLs (-) Mobility (-) Hand Function (+exp1,+exp2) E1 vs E2: Action Research Arm Test (-) Grasp (-) Grip (+exp1) Pinch (-) Gross Movement (-) Motor Activity Log Amount (-) Quality (-) Frenchay Activities Index (-) Chores (-) Leisure/work (-) Outdoor Activities (-) Stroke Impact Scale Strength (+exp2) ADLs (-) Mobility (-) Hand Function (-)
Wu et al. (2012c) Pilot RCT (7) NStart=45 NEnd=45 TPS=Chronic A + B vs A/B vs 0 *Primary listing: Table 6 (Constraint-Induced Movement Therapy (CIMT))*	E1: Distributed constraint-induced therapy (dCIT) + trunk restraint E2: dCIT C: Conventional Therapy Duration: 2hr, 3d/wk, 3 wk	E1/E2 vs C: Motor Activity Log (+exp1, +exp2) Fugl-Meyer Assessment (+exp1) Kinematic tasks at 90% arm length maximum grip aperture (+exp1, +exp2) percentage of time to maximum grip aperture (-) joint range - normalized shoulder flexion (+exp1, +exp2) trunk contribution slope start (+exp)

		trunk contribution slope middle (-) trunk contribution slope end (-) Kinematic tasks at 125% arm length; - maximum grip aperture (+exp1, +exp2)
Thielman et al. (2010) Pilot RCT (5) NStart=16 NEnd=16 TPS=Chronic A + B1 vs A + B2 *Primary listing: Table 20 (Feedback-Based Training)*	E: Trunk Restraint Training + auditory feedback C: Trunk Restraint Training + tactile feedback Duration: 40-45 min/d, 12 x total, 2-3d/wk	E vs C: Reaching Performance Scale near target (+exp) far target (-) Active range of motion (-) Fugl-Meyer Assessment (-) Motor activity Log (-) Grip strength (-) Wolf-motor function test (-) elbow extension (-)
Woodbury et al. (2009) Pilot RCT (5) NStart=12 NEnd=11 TPS=Chronic A + B vs A/B *Primary listing: Table 6 (Constraint-Induced Movement Therapy (CIMT))*	E: modified Constraint Induced Movement Therapy (mCIMT) + Trunk Restraint C: modified constraint Induced Movement Therapy (mCIMT) Duration: 6h/d, for 10d	E vs C: Hand path trajectories (+exp) Wolf Motor Function Test (-) Motor Activity Log (-) Fugl-Meyer Assessment Upper-Extremity (-) Reach Kinematics; Temporal Segmentation (-) Spatial Segmentation (-) Shoulder-elbow active range of motion (+exp) Trunk Displacement (+exp) shoulder-elbow interjoint coordination (-)
Thielman et al. (2008) RCT (4) NStart=12 NEnd=11 TPS=Chronic A + B vs A + C *Primary listing: Table 4 (Task-Specific Training)*	E1: Task-related Training + Trunk Restraint E2: Resistive Exercises + Trunk Restraint Duration: 45min/d, 3x/wk, for 4wks	E1 vs E2: Movement time (-) First velocity peak (-) Trunk motion (-) Arm motion (-) Wolf Motor Function Test (-) Fugl-Meyer Assessment (-) Active Range of Motion (-)
Michaelsen et al. (2006) RCT (7) NStart=30 NEnd=30 TPS=Chronic A + B vs A/B *Primary listing: Table 4 (Task-Specific Training)*	E: Task specific training with trunk restraint C: Task specific training Duration: 60min/d, 3d/wk, 5wk	E vs C: FMA UE (+exp) TEMPA (+exp) Trunk displacement (-) Elbow extension (+exp) Elbow strength (-) BBT (-) Peak velocity (-) Trajectory smoothness (-) Trajectory straightness (-)

Abbreviations and table notes: C=control group; D=days; E=experimental group; H=hours; Min=minutes; RCT=randomized controlled trial; TPS=time post stroke category (Acute: less than 30 days, Subacute: more than 1 month but less than 6 months, Chronic: over 6 months); Wk=weeks.

+exp indicates a statistically significant between groups difference at α=0.05 in favour of the experimental group

+exp1/+exp2/+exp3 indicates a statistically significant between groups difference at α=0.05 in favour of the first, second or third experimental group

+con indicates a statistically significant between groups difference at α=0.05 in favour of the control group

- indicates no statistically significant between groups differences at α=0.05

1. Body Functions and Structures

MOTOR FUNCTION			
LoE	**Conclusion Statement**	**RCTs**	**References**
1b	Balance Training with Affected Hand at Low Back may produce greater improvements in motor function than Balance Training.	1	Jiang et al. (2021b)
2	Task Specific training with Trunk restraint training may produce greater improvements in motor function than Task Specific Training without Trunk restraint.	1	Writer & Nayak (2012)
2	Trunk support with visual feedback SMART upper limb training system may produce greater improvements in motor function than Trunk restraint with visual feedback SMART upper limb training system.	1	Yang et al. (2021)
2	Task-related Training with Trunk Restraint may not have a difference in efficacy when compared to Resistive Exercises with Trunk Restraint for improving motor function.	1	Thielman et al. (2008)
1b	Modified constraint-induced movement therapy with trunk restraint may produce greater improvements in motor function than modified constraint-induced movement therapy.	1	Bang et al. (2015)
1b	Task specific training with trunk restraint may produce greater improvements in motor function than Task specific training.	1	Michaelsen et al. (2006)
1b	Distributed Constraint-Induced Movement Therapy with Trunk Restraint may produce greater improvements in motor function than Conventional Therapy.	1	Wu et al. (2012b)
1b	Distributed Constraint-Induced Movement Therapy with Trunk Restraint may not have a difference in efficacy when compared to Distributed Constraint-Induced Movement Therapy for improving motor function.	1	Wu et al. (2012b)
1b	Robot-assisted therapy (Armeo Spring system) with trunk restraint and general physical therapy may produce greater improvements in motor function than Robot-assisted therapy (RT) with sham trunk restraint and general physical therapy.	1	Joo et al. (2022)
1b	Bilateral transcranial direct current stimulation with trunk restraint or training and Conventional physical therapy may produce greater improvements in motor function than Conventional physical therapy.	1	Tedla et al. (2022)
1b	Bilateral transcranial direct current stimulation with trunk restraint or training and Conventional physical therapy may produce greater improvements in motor function than Sham transcranial direct current stimulation with trunk restraint or training and Conventional physical therapy.	1	Tedla et al. (2022)
2	Robotic rehab with trunk rehab may not have a difference in efficacy when compared to Conventional rehab with trunk rehab for improving motor function.	1	Senocak et al. (2023)
1b	Trunk training with mCIMT may not have a difference in efficacy when compared to mCIMT for improving motor function.	1	Lima et al. (2014)
1b	MCIMT with trunk restraint may produce greater improvements in motor function than mCIMT alone.	1	Bang et al. (2018)
1b	Distributed constraint-induced therapy (dCIT) with trunk restraint may produce greater improvements in motor function than Conventional Therapy.	1	Wu et al. (2012c)
1b	DCIT may not have a difference in efficacy when compared to Conventional Therapy for improving motor function.	1	Wu et al. (2012c)

2	Trunk Restraint Training with auditory feedback may not have a difference in efficacy when compared to Trunk Restraint Training with tactile feedback for improving motor function.	1	Thielman et al. (2010)
2	Modified Constraint Induced Movement Therapy (mCIMT) with Trunk Restraint may not have a difference in efficacy when compared to modified constraint Induced Movement Therapy (mCIMT) for improving motor function.	1	Woodbury et al. (2009)

MUSCLE STRENGTH			
LoE	**Conclusion Statement**	**RCTs**	**References**
2	There is conflicting evidence about the effect of Trunk support with visual feedback SMART upper limb training system when compared to Trunk restraint with visual feedback SMART upper limb training system for improving muscle strength.	1	Yang et al. (2021)
1b	Task specific training with trunk restraint may not have a difference in efficacy when compared to Task specific training for improving muscle strength.	1	Michaelsen et al. (2006)
1b	There is conflicting evidence about the effect of Robot-assisted therapy (Armeo Spring system) with trunk restraint and general physical therapy when compared to Robot-assisted therapy (RT) with sham trunk restraint and general physical therapy for improving muscle strength.	1	Joo et al. (2022)
2	Trunk Restraint Training with auditory feedback may not have a difference in efficacy when compared to Trunk Restraint Training with tactile feedback for improving muscle strength.	1	Thielman et al. (2010)

SPASTICITY			
LoE	**Conclusion Statement**	**RCTs**	**References**
1b	Balance Training with Affected Hand at Low Back may produce greater improvements in spasticity than Balance Training.	1	Jiang et al. (2021b)

RANGE OF MOTION			
LoE	**Conclusion Statement**	**RCTs**	**References**
2	Task Specific training with Trunk restraint training may produce greater improvements in range of motion than Task Specific Training without Trunk restraint.	1	Writer & Nayak (2012)
2	Trunk support with visual feedback SMART upper limb training system may not have a difference in efficacy when compared to Trunk restraint with visual feedback SMART upper limb training system for improving range of motion.	1	Yang et al. (2021)
2	Task-related Training with Trunk Restraint may not have a difference in efficacy when compared to Resistive Exercises with Trunk Restraint for improving range of motion.	1	Thielman et al. (2008)
1b	Modified constraint-induced movement therapy with trunk restraint may produce greater improvements in range of motion than modified constraint-induced movement therapy.	1	Bang et al. (2015)
1b	MCIMT with trunk restraint may produce greater improvements in range of motion than mCIMT alone.	1	Bang et al. (2018)
2	Trunk Restraint Training with auditory feedback may not have a difference in efficacy when compared to Trunk Restraint Training with tactile feedback for improving range of motion.	1	Thielman et al. (2010)

2. Activities

ACTIVITIES OF DAILY LIVING			
LoE	**Conclusion Statement**	**RCTs**	**References**
1b	Balance Training with Affected Hand at Low Back may not have a difference in efficacy when compared to Balance Training for improving performance of activities of daily living.	1	Jiang et al. (2021b)
2	Trunk support with visual feedback SMART upper limb training system may produce greater improvements in performance of activities of daily living than Trunk restraint with visual feedback SMART upper limb training system.	1	Yang et al. (2021)
1b	Modified constraint-induced movement therapy with trunk restraint may produce greater improvements in performance of activities of daily living than modified constraint-induced movement therapy.	1	Bang et al. (2015)
1b	Distributed Constraint-Induced Movement Therapy with Trunk Restraint may produce greater improvements in performance of activities of daily living than Conventional Therapy.	1	Wu et al. (2012b)
1b	Distributed Constraint-Induced Movement Therapy with Trunk Restraint may not have a difference in efficacy when compared to Distributed Constraint-Induced Movement Therapy for improving performance of activities of daily living.	1	Wu et al. (2012b)
1b	There is conflicting evidence about the effect of Robot-assisted therapy (Armeo Spring system) with trunk restraint and general physical therapy when compared to Robot-assisted therapy (RT) with sham trunk restraint and general physical therapy for improving performance of activities of daily living.	1	Joo et al. (2022)
1b	Trunk training with mCIMT may not have a difference in efficacy when compared to mCIMT for improving performance of activities of daily living.	1	Lima et al. (2014)
1b	MCIMT with trunk restraint may produce greater improvements in performance of activities of daily living than mCIMT alone.	1	Bang et al. (2018)
1b	Distributed constraint-induced therapy (dCIT) with trunk restraint may produce greater improvements in performance of activities of daily living than Conventional Therapy.	1	Wu et al. (2012c)
1b	DCIT may produce greater improvements in performance of activities of daily living than Conventional Therapy.	1	Wu et al. (2012c)
2	Trunk Restraint Training with auditory feedback may not have a difference in efficacy when compared to Trunk Restraint Training with tactile feedback for improving performance of activities of daily living.	1	Thielman et al. (2010)
2	Modified Constraint Induced Movement Therapy (mCIMT) with Trunk Restraint may not have a difference in efficacy when compared to modified constraint Induced Movement Therapy (mCIMT) for improving performance of activities of daily living.	1	Woodbury et al. (2009)

DEXTERITY			
LoE	**Conclusion Statement**	**RCTs**	**References**
1b	Task specific training with trunk restraint may not have a difference in efficacy when compared to Task specific training for improving dexterity.	1	Michaelsen et al. (2006)

Key Points

- Balance Training with Affected Hand at Low Back may be beneficial for improving motor function and spasticity, but not performance of activities of daily living, after stroke when compared to Balance Training.
- Task Specific training with Trunk restraint training may be beneficial for improving motor function and range of motion after stroke when compared to Task Specific Training without Trunk restraint.
- Trunk support with visual feedback SMART upper limb training system may be beneficial for improving motor function and performance of activities of daily living, but not range of motion, after stroke when compared to Trunk restraint with visual feedback SMART upper limb training system; the literature is mixed regarding muscle strength.
- Task-related Training with Trunk Restraint may not be beneficial for improving motor function and range of motion after stroke when compared to Resistive Exercises with Trunk Restraint.
- Modified constraint-induced movement therapy with trunk restraint may be beneficial for improving motor function, performance of activities of daily living, and range of motion after stroke when compared to modified constraint-induced movement therapy.
- Task specific training with trunk restraint may be beneficial for improving motor function, but not dexterity and muscle strength, after stroke when compared to Task specific training.
- Distributed Constraint-Induced Movement Therapy with Trunk Restraint may be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Conventional Therapy.
- Distributed Constraint-Induced Movement Therapy with Trunk Restraint may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Distributed Constraint-Induced Movement Therapy.
- Robot-assisted therapy (Armeo Spring system) with trunk restraint and general physical therapy may be beneficial for improving motor function after stroke when compared to Robot-assisted therapy (RT) with sham trunk restraint and general physical therapy; the literature is mixed regarding performance of activities of daily living and muscle strength.
- Bilateral transcranial direct current stimulation with trunk restraint or training and Conventional physical therapy may be beneficial for improving motor function after stroke when compared to Conventional physical therapy.
- Bilateral transcranial direct current stimulation with trunk restraint or training and Conventional physical therapy may be beneficial for improving motor function after stroke when compared to Sham transcranial direct current stimulation with trunk restraint or training and Conventional physical therapy.
- Robotic rehab with trunk rehab may not be beneficial for improving motor function after stroke when compared to Conventional rehab with trunk rehab.
- Trunk training with mCIMT may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to mCIMT.
- MCIMT with trunk restraint may be beneficial for improving motor function, range of motion, and performance of activities of daily living after stroke when compared to mCIMT alone.
- Distributed constraint-induced therapy (dCIT) with trunk restraint may be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Conventional Therapy.
- DCIT may be beneficial for improving performance of activities of daily living, but not motor function, after stroke when compared to Conventional Therapy.
- Trunk Restraint Training with auditory feedback may not be beneficial for improving motor function, muscle strength, range of motion, and performance of activities of daily living after stroke when compared to Trunk Restraint Training with tactile feedback.
- Modified Constraint Induced Movement Therapy (mCIMT) with Trunk Restraint may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to modified constraint Induced Movement Therapy (mCIMT).

Summary of Key Points: Trunk Restraint

Intervention	Control(s)	Function domain(s)	Effect

Balance Training with Affected Hand at Low Back	Balance Training	Motor function, spasticity	+
Balance Training with Affected Hand at Low Back	Balance Training	Performance of activities of daily living	–
Task Specific training with Trunk restraint training	Task Specific Training without Trunk restraint	Motor function, range of motion	+
Trunk support with visual feedback SMART upper limb training system	Trunk restraint with visual feedback SMART upper limb training system	Motor function, performance of activities of daily living	+
Trunk support with visual feedback SMART upper limb training system	Trunk restraint with visual feedback SMART upper limb training system	Range of motion	–
Trunk support with visual feedback SMART upper limb training system	Trunk restraint with visual feedback SMART upper limb training system	Muscle strength	=
Task-related Training with Trunk Restraint	Resistive Exercises with Trunk Restraint	Motor function, range of motion	–
Modified constraint-induced movement therapy with trunk restraint	modified constraint-induced movement therapy	Motor function, performance of activities of daily living, range of motion	+
Task specific training with trunk restraint	Task specific training	Motor function	+
Task specific training with trunk restraint	Task specific training	Dexterity, muscle strength	–
Distributed Constraint-Induced Movement Therapy with Trunk Restraint	Conventional Therapy	Motor function, performance of activities of daily living	+
Distributed Constraint-Induced Movement Therapy with Trunk Restraint	Distributed Constraint-Induced Movement Therapy	Motor function, performance of activities of daily living	–
Robot-assisted therapy (Armeo Spring system) with trunk restraint and general physical therapy	Robot-assisted therapy (RT) with sham trunk restraint and general physical therapy	Motor function	+
Robot-assisted therapy (Armeo Spring system) with trunk restraint and general physical therapy	Robot-assisted therapy (RT) with sham trunk restraint and general physical therapy	Performance of activities of daily living, muscle strength	=
Bilateral transcranial direct current stimulation with trunk restraint or training and Conventional physical therapy	Conventional physical therapy	Motor function	+
Bilateral transcranial direct current stimulation with trunk restraint or training and Conventional physical therapy	Sham transcranial direct current stimulation with trunk restraint or training and Conventional physical therapy	Motor function	+
Robotic rehab with trunk rehab	Conventional rehab with trunk rehab	Motor function	–
Trunk training with mCIMT	mCIMT	Motor function, performance of activities of daily living	–
MCIMT with trunk restraint	mCIMT alone	Motor function, range of motion, performance of activities of daily living	+
Distributed constraint-induced therapy (dCIT) with trunk restraint	Conventional Therapy	Motor function, performance of activities of daily living	+

DCIT	Conventional Therapy	Performance of activities of daily living	+
DCIT	Conventional Therapy	Motor function	–
Trunk Restraint Training with auditory feedback	Trunk Restraint Training with tactile feedback	Motor function, muscle strength, range of motion, performance of activities of daily living	–
Modified Constraint Induced Movement Therapy (mCIMT) with Trunk Restraint	modified constraint Induced Movement Therapy (mCIMT)	Motor function, performance of activities of daily living	–

Stretching Programs



Adapted from: http://advrehabnj.com/2014/10/08/trigger-finger-occupational-therapy/

Spasticity following stroke relates to hypertonicity or increased active tension of the muscle. Contracture may also occur as a result of spasticity and atrophic changes in the mechanical properties of muscles. Since surgery is the only treatment option once a contracture has developed, prevention is encouraged. Stretching may help to prevent contracture formation and, although well-accepted as a treatment strategy, although the evidence base is extremely limited for this intervention.

A total of twenty-four RCTs were found that evaluated stretching programs for upper extremity motor rehabilitation. One RCT compared passive stretching and joint mobilization with no treatment (Carey et al. (1990)). Three RCTs compared passive stretching and joint mobilization with conventional therapy (Liu et al. (2024b); Pain et al. (2018); Tseng et al. (2007)). Ten RCTs compared stretching and positioning programs with conventional therapy (García-Bravo et al. (2024); Yang H. et al. (2023); Zhao et al. (2022b); Schmid et al. (2014); Horsley et al. (2007); Gustafsson et al. (2006); deJong et al. (2006); Ada et al. (2005); Jones et al. (2005); Turton et al. (2005)). Two RCTs compared stretching and positioning programs combined with other interventions with conventional therapy (You et al. (2014); Dean et al. (2000a)). One RCT compared different approaches to stretching and positioning programs (Pickenbrock et al. (2015)). One RCT compared stretching and positioning programs combined with other interventions with sham (deJong et al. (2013)). One RCT compared passive stretching and joint mobilization combined with other interventions with conventional therapy (Wolny et al. (2010)). One RCT compared passive stretching and joint mobilization with sham (Holt K. et al. (2021)). Three RCTs compared different approaches to passive stretching and joint mobilization (Glize et al. (2022); van Bladel et al. (2022); Lynch et al. (2005)). One RCT compared stretching and positioning programs with stretching and positioning programs (Feng et al. (2024)).

In addition, 18 RCTs in which stretching programs formed part of a combined or comparative intervention are cross-referenced at the end of Table 8; their primary listings appear in other tables.

The methodological details and results of all twenty-four RCTs are presented in Table 8.

Table 8. RCTs Evaluating Stretching Programs for Upper Extremity Motor Rehabilitation

Authors (Year) Study Design (PEDro Score) Sample Size start Sample Size end Time post stroke category Study design	Interventions Duration: Session length, frequency per week for total number of weeks	Outcome Measures Result (direction of effect)
Passive stretching and joint mobilization compared to no treatment		
Carey et al. (1990) RCT (4) NStart=16 NEnd=16 TPS=Chronic A vs 0	E: Manual stretch C: No Treatment Duration: 5min for experimental group	E vs C: Accuracy index (AI) during Joint movement tracking test (JMTT) calculated from EMG measures (exp+) AI during Force tracking test (FTT) calculated from EMG measures (-)
Passive stretching and joint mobilization compared to conventional therapy		
Liu et al. (2024b) RCT (7) NStart=74 NEnd=71 TPS=Chronic A vs 0	E: Maitland mobilization technique therapy + Routine rehabilitation C: Routine physical therapy Duration: E: 30min/d 5d/wk for 8wks mobilization therapy + 75min/d 5d/wk for 8wks routine rehabilitation, C: 75min/d 5d/wk for 8wks routine rehabilitation	E vs C: FMA-UE (+exp) BBT (+exp) FIM (+exp) Brunnstrom Stages (-) modified Ashworth Scale (-)
Pain et al. (2018) Pilot RCT (3) NStart=22 NEnd=20 TPS=Chronic A vs 0	E: Shoulder mobilization program + conventional care C: Conventional care Duration: 1h, 3x/wk, 4wk	E vs C: Sternoclavicular Range of Motion (+exp) Acromioclavicular Range of Motion (+exp) Glenohumoral Range of Motion (+exp) Chedoke-McMaster Stroke Assessment (-) Pain Intensity Numeric Rating Scale (+exp)
Tseng et al. (2007) RCT (6) NStart=59 NEnd=59 TPS=Chronic A1 vs A2 vs 0	E1: Nurse supervised range of motion exercise program E2: Nurse assisted range of motion exercise program C: Usual care Duration: 10-20min, 2x/d, 6d/wk for 4wk	E1/E2 vs C: E1/ E2 vs C: Functional independence- ADL subscale (+exp1, +exp2) self-reported pain (+exp1, +exp2) Chinese version of Geriatric Depression Scale – Short Form (+exp1, +exp2) joint angle Shoulder Flexion Shoulder Extension (+exp1, +exp2) Shoulder Abduction (+exp1, +exp2) Shoulder Adduction (+exp1, +exp2) Elbow Flexion (+exp1, +exp2) Elbow Extension (+exp1, +exp2) Wrist Flexion (+exp1, +exp2) Wrist Extension (+exp1, +exp2) Hip Flexion (+exp1, +exp2) Hip Abduction (+exp1, +exp2) Hip Adduction (+exp1, +exp2) Knee Flexion (+exp1, +exp2) knee Extension (+exp1, +exp2) Ankle Dorsal flexion (+exp1, +exp2) Ankle Plantar flexion (+exp1, +exp2) Ankle Eversion (+exp1, +exp2)

		Ankle inversion (+exp1, +exp2) E1/ E2: Functional independence- ADL subscale (-) self-reported pain (-) Chinese version of Geriatric Depression Scale – Short Form (-) joint angle Shoulder Flexion (+exp2) Shoulder Extension (+exp2) Shoulder Abduction (+exp2) Shoulder Adduction (+exp2) Elbow Flexion (+exp2) Elbow Extension (-) Wrist Flexion (+exp2) Wrist Extension (+exp2) Hip Flexion (+exp2) Hip Abduction (+exp2) Hip Adduction (+exp2) Knee Flexion (+exp2) knee Extension (-) Ankle Dorsal flexion (-) Ankle Plantar flexion (+exp2) Ankle Eversion (+exp2) Ankle inversion (+exp2)
Stretching and positioning programs compared to conventional therapy		
García-Bravo et al. (2024) RCT (8) NStart=30 NEnd=30 TPS=Chronic A vs 0	E: Neuropilates + conventional occupational and physiotherapy C: Conventional occupational and physiotherapy Duration: 60min/d, 2d/wk, 3mon	E vs C: FIM (+exp) Functional Reach Test (+exp) TUG (-) 9HPT right (+exp) left (-) BBT right (+exp) left (-) DASH Disability (-) Occupation (+exp) Client Satisfaction Questionnaire (CSQ-8) (+exp)
Yang H. et al. (2023) RCT (6) NStart=30 NEnd=30 TPS=Subacute A vs 0	E: Baduanjin Qigong + Conventional therapy C: Conventional therapy Duration: E: 40 mins/d, 3d/wk, 8wks	E vs C: Surface electromyography biceps brachii elbow extension (-) triceps brachii elbow flexion (-) CCR of triceps brachii (-) triceps brachii elbow extension (-) biceps brachii elbow flexion (-) CCR of biceps brachii (-) PK254P Balance Function Detection System open-eye test (-) closed-eye test (-) WHOQOL-BREF (-)

		physical health (-) psychological health (-) social relationships (-) environment (+exp)
Zhao et al. (2022b) RCT (7) NStart=160 NEnd=134 TPS=Subacute A vs 0	E: Tai Chi Program C: Conventional Rehab Duration: 40min/d, 3d/wk, 12wks	E vs C: FMA-UE (-) WMFT performance time (+exp) Grip (-) Functional ability (+exp) Berg balance scale (+exp) Trunk impairement (+exp) GDS (+exp) Shoulder PROM Flexion (-) Extension (+exp) Abduction (-) Rotation (-) Shoulder Pain "shoulderQ"(-) MBI (+exp) SSQOL (+exp)
Schmid et al. (2014) Pilot RCT (6) NStart=47 NEnd=39 TPS=Chronic A vs 0	E: therapeutic-yoga C: usual care Duration: 1hr, 2x/wk, 8wk	E vs C: Active Range of Motion (no stat) Passive Range of Motion (no stat) 6min walk test (no stat) 2min step test (no stat) pain - no stats (no stat) Brief pain inventory + arm curl test + sit to stand (no stat)
Horsley et al. (2007) RCT (8) NStart=40 NEnd=40 TPS=Acute A vs 0	E: Daily stretch + conventional therapy C: Conventional therapy Duration: E: 1x/d; 5d/wk; 4wks + 30min of stretch/d ; C: 1x/d; 5d/wk;4wks	E vs C: Pain VAS (-) Motor assessment Scale (-) torque passive ROM (-)
Gustafsson et al. (2006) RCT (6) NStart=34 NEnd=32 TPS=Acute A vs 0	E: Static Positional Stretching C: Conventional care Duration: 40min/d	E vs C: MAS (-) mBI (-) RVAS (-) MVAS (-) shoulder ROM (-) Ritchie articular index (-)
deJong et al. (2006) Pilot RCT (7) NStart=19 NEnd=17 TPS=Subacute A vs 0	E: Positioning procedure + conventional care C: Conventional care Duration: 30min/session, 2session/d, 5d/wk 5 wk	E vs C: Passive range of motion; - Shoulder abduction (+exp) - Shoulder external rotation (-) Shoulder flexion (-) - Elbow extension (-) Forearm supination (-) Ashworth scale (-) Barthel Index (-) Fugl-Meyer Assessment Upper extremity (+exp)

Ada et al. (2005) RCT (8) NStart=36 NEnd=31 TPS=Acute A vs 0	E: Sustained positioning Position 1: maximum external rotation Position 2: 90° of flexion C: Conventional care Duration: 30min/session 2x/d, 5d/wk for 4wk	E vs C: Passive shoulder external rotation (+exp) Contracture external rotation (+con) Passive shoulder external flexion (-) Contracture flexion (-) Motor Assessment Scale (-)
Jones et al. (2005) RCT (6) NStart=120 NEnd=120 TPS=Acute A vs 0	E: Group Educational Teaching (Provided to and by Nursing Staff) toprovide enhanced positioning care C: standard rehab Duration: 30min observations by a researcher, duration not reported for the actual care period.	E vs C: Rivermead Mobility Index (-) Motricity Index (-) Ashworth Scale Frenchay Arm Test (-) 6-m walk (-) Sit to stand (-)
Turton et al. (2005) RCT (6) NStart=29 NEnd=25 TPS=Acute A vs 0	E: Muscle stretching regime + standard arm care C: standard arm care Duration: 2hr/d, 12wk	E vs C: Passive range of wrist extension (-) Passive range of shoulder external rotation (-) Affected shoulder external rotation contracture (-) Affected wrist extension contracture (-)
Stretching and positioning programs combined with other interventions compared to conventional therapy		
You et al. (2014) RCT (5) NStart=45 NEnd=41 TPS=Chronic A + B vs A/B vs 0 *Also in Table 3 (Exercise and Strength Training)*	E1: Stretching + Joint-stabilizing exercises E2: Stretching C: Standard exercise Duration: 30min/d, 5d/wk, for 8wk	E1 vs C: Motor Assessment Scale (+exp1) Thickness of tendon E1 vs E2: Motor Assessment Scale (+exp2) Thickness of tendon E2 vs C: Motor Assessment Scale (-) Thickness of tendon
Dean et al. (2000a) RCT (7) NStart=23 NEnd=23 TPS=Subacute A + B vs A/B	E: Sustained positioning + Multidisciplinary Reahabilitation Program C: Multidisciplinary Reahabilitation Program Duration: 60min, 5d/wk, for 6wk	E vs C: Pain VAS(-) Passive external rotation(-) Active Adduction(-)
Different approaches to stretching and positioning programs compared against one another		
Pickenbrock et al. (2015) RCT (8) NStart=218 NEnd=202 TPS=Subacute A1 vs A2	E: Positioning in Neutral C: Conventional Positioning Duration: 2hr, 1 session	E vs C: Passive Range of Motion Hip Flexion (+exp) Shoulder Flexion (+exp) Shoulder External Rotation (+exp)
Stretching and positioning programs combined with other interventions compared to sham		
deJong et al. (2013) RCT (8) NStart=48 NEnd=46 TPS=Subacute A + B vs 0	E: Static arm positioning + NMES C: Sham positioning and sham NMES Duration: 45min/session; 2x/d, 5x/wk, 8wk	E vs C: Passive range of motion Shoulder external rotation (-) Flexion and abduction (-) Elbow extension (-) Forearm supination (-) Wrist extension with extended fingers (-)

Also in Table 22 (Neuromuscular Electrical Stimulation (NMES))		Flexed fingers (-) Tardieu Scale (-) Leeds Adult/Arm Spasticity Impact Scale (-) Fugl-Meyer Assessment Upper Extremity (-) ShoulderQ which was used to assess shoulder pain
Passive stretching and joint mobilization combined with other interventions compared to conventional therapy		
Wolny et al. (2010) RCT (5) NStart=96 NEnd=96 TPS=Chronic A + B vs A/B vs 0 *Also in Table 3 (Exercise and Strength Training)*	E1: Individual proprioceptive neuromuscular facilitation exercises + Conventional care E2: Individual proprioceptive neuromuscular facilitation exercises + neuromobilization of the affected upper extremity + Conventional care C: Conventional care Duration: 45min, 1x/d, 18d	E1 vs E2 vs C: E1/ E2: two-point discriminatory sense (+exp2) stereognosia (-) thermaesthesia (+exp) E2/C: two-point discriminatory sense (+exp2) stereogNosia (+exp2) thermaesthesia (+exp2)
Passive stretching and joint mobilization compared to sham		
Holt K. et al. (2021) RCT (6) NStart=63 NEnd=55 TPS=Chronic A vs 0	E: Chiropractic spinal adjustments + physical therapy C: Sham Chiro + PT Duration: 55min(Chiro: 15min/d PT:40min/d), 3d/wk, 4wks	E vs C: FMA (+exp) SS-QOL (-) TUG (-) mRS (-) SST (-)
Different approaches to passive stretching and joint mobilization compared against one another		
Glize et al. (2022) RCT (5) NStart=76 NEnd=71 TPS=Acute A1 vs A2	E: Specific positioning of the shoulder in abduction, external rotation and flexion in bed, chair and during mobilization + Conventional Care C: Usual practice i.e. positioning using a standard support scarf + Conventional Care Duration: 10min/d, 3d/wk mobilizations; 2-3hr/d, 7d position change	E vs C: Pain VAS (-) MAS (-) MADRS (-) BI (+exp) CRPS (-) MRC (-)
van Bladel et al. (2022) RCT (3) NStart=11 NEnd=11 TPS=Subacute A1 vs A2	E: Stretching/mobilization in scapular plane + Scapular mobilization in all planes + glenohumeral mobilization + conventional rehab C: Glenohumeral mobilization + Scapular mobilization in all planes + Streching/mobilization in scapular plane + conventional rehab Duration: 20min/d, 5d/wk, 12wks	E vs C: PROM (no stat) VAS (no stat) MAS (no stat) TIS (no stat) FMA-UE (no stat)
Lynch et al. (2005) Pilot RCT (5) NStart=35 NEnd=32 TPS=Acute A1 vs A2	E: Continuous passive ROM exercises C: Self-ROM exercises Duration: 25min/d, 5d/wk for 4wk	E vs C: Reduction in pain (-) mAS (-) FMA (-) Joint stability (-)
Stretching and positioning programs compared to stretching and positioning programs		
Feng et al. (2024) RCT (7)	E: Upper limb training with position changes, bedside exercise and resistance bands + Conventional rehabilitation	E vs C: grip strength (+exp)

NStart=80 NEnd=77 TPS=Subacute A vs 0	C: Basic Upper limb training + Conventional rehabilitation Duration: 30reps/set, 2sets/d, 5d/wk for 4wks	muscle thickness (+exp) FMA-UE (+exp) Hamilton Depression Scale (+exp)
Cross-Referenced RCTs: Combined or Comparative Interventions Involving Stretching Programs (results included in this table's levels of evidence)		
Ersoy & Iyigun (2024) RCT (5) NStart=70 NEnd=60 TPS=Chronic A vs B vs 0 *Primary listing: Table 3 (Exercise and Strength Training)*	E1: Boxing training E2: Scapular stabilization training C: No intervention or therapy Duration: 50min/d, 3d/wk for 8wks	E1/E2 vs C: Scapular mobility frontal plane (+exp1) sagittal plane (+exp1) transverse plane (+exp1) Scapular Balance Angle (+exp1) Manual Function Test (+exp1/2) E1 vs E2: Scapular mobility frontal plane (-) sagittal plane (-) transverse plane (-) Scapular Balance Angle (-) Manual Function Test (+exp1) VAS-treatment satisfaction (+exp1)
Hwang et al. (2024) RCT (7) NStart=44 NEnd=43 TPS=Subacute A + B vs A/B *Primary listing: Table 33 (Botulinum Toxin)*	E: Botulinum toxin A injection + structured stretching exercises + conventional rehabilitation C: Self-stretching exercises + conventional rehabilitation Duration: 20min/d, 5d/wk for 6mo stretching exercises	E vs C: modified Ashworth Scale elbow (+exp) wrist (+exp) fingers (+exp) VAS-pain (+exp) Korean modified Barthel Index (+exp) FMA-UE (-) EQ-5D (+exp) EMG signals - root mean square flexion (+exp) extension (+exp)
Kim et al. (2024b) RCT (5) NStart=28 NEnd=28 TPS=Chronic A + B1 vs A + B2 *Primary listing: Table 20 (Feedback-Based Training)*	E: Upper limb control of less-affected side with real-time feedback C: Upper limb control of affected side with real-time feedback Duration: 30min/d 5d/wk for 4wks	E vs C: Digital Manual Muscle Tester shoulder flexion (-) shoulder extension (+exp) ROM shoulder flexion (+exp) shoulder extension (-) Manual Function Test (-) respiratory function forced vital capacity (+exp) forced expiratory volume in 1s (+exp) peak expiratory flow (-) body sway (+exp) center of pressure path length (+exp) average velocity (-) Korean mBI (+exp)
Kim et al. (2024a) RCT (5)	E: Sling-suspension-based active shoulder joint exercises + General rehab (physcial therapy and FES)	E vs C: radiographic imaging-shoulder subluxation (+exp)

NStart=40 NEnd=28 TPS=Subacute A vs B *Primary listing: Table 9 (Orthotics and Taping)*	C: Motorized upper extremity exercise (passive exercises) + General rehab (physcial therapy and FES) Duration: 90min/d (30min sling or motor exercise, 30min FES, 30min physical therapy), 5d/wk for 4wks	degree of pain in shoulder joint upper trapezius (+exp) deltoid (+exp) infraspinatus (-) manual muscle testing flexors (+exp) extensors (-) abductors (+exp) adductors (-) external rotators (+exp) internal rotators (-) FMA-UE (+exp) Manual Function Test (+exp)
Vanoglio et al. (2024) Pilot RCT (5) NStart=21 NEnd=21 TPS=Acute A + B vs C *Primary listing: Table 16 (Robotics)*	E: Gloreha Aria (Robotic exoskeleton) + Virtual reality + Conventional therapy C: Self mobilization + Conventional therapy Duration: Total motor therapy (330 mins/week, 6 days/week, 6 weeks); Upper Limb rehab (150 mins/week, 5ds/wk, 6 wks); Speech rehabilitation (200 mins/wk, 4ds/wk, 6 wks); Gloreha aria/self mobilization (30 mins/d, 5ds/wk, 6wks)	E vs C: FMA-UE (-) wrist (-) hand (-) coordination/speed (-) motor skills (-) sensation (-) passive joint motion (-) joint pain (-) MES-UE (-) Grip strength (-) Barthel Index (-) FIM (-) Quick-DASH (-)
Sugiarto & Kesoema (2023) RCT (5) NStart=30 NEnd=30 TPS=Chronic A + B + C vs A/A + B *Primary listing: Table 26 (Extracorporeal Shockwave Therapy)*	E: Radial Shock Wave Therapy + Infrared therapy + Static Stretching C: Infrared therapy + Static Stretching Duration: 1d/wk, 6wks (Radial Shock Wave Therapy); 15mins/d, 3d/wk, 6wks (infrared therapy); 5mins/d, 3d/wk, 6wks (static stretching)	E vs C: Tardieu Spasticity Scale wrist resistance (+exp) fingers resistance (+exp)
Korkmaz et al. (2022) RCT (6) NStart=44 NEnd=41 TPS=Chronic A + B vs A/B *Primary listing: Table 27 (Additional Afferent and Peripheral Stimulation Methods)*	E: high intensity laser (HILT) + therapeutic exercise program + regular rehab C: therapeutic exercise program + regular rehab Duration: HILT: 2.5-6min/d, 3d/wk, 3wks (9 sessions); therapeutic exercise program: 5d/wk, 3wks (15 sessions)	E vs C: VAS-pain (+exp) PROM shoulder joint flexion (-) abduction (-) external rotation (+exp) SPADI (+exp) pain (+exp) disability (+exp) BRS (+exp) MAS (-) Nottingham Health Profile (+exp) pain (+exp) emotion (+exp) sleep (+exp) social (+exp) physical (+exp) energy (-)

		FIM (+exp) PTRCT (+exp)
Remy-Neris et al. (2021) RCT (8) NStart=215 NEnd=208 TPS=Subacute A vs B *Primary listing: Table 16 (Robotics)*	E: games-based training using an exoskeleton + usual rehab C: basic stretching and active exercises + usual rehab Duration: 90min/d, 5d/wk, 4wks	E vs C: E: FMA (-) ARAT (-) Ashworth score (-) Pain VAS (-) FIM (-) SIS (-) EQ-5D (-)
Martins et al. (2020) RCT (8) NStart=36 NEnd=28 TPS=Chronic A vs B *Primary listing: Table 4 (Task-Specific Training)*	E: Task-Specific Circuit Training C: Stretching + Memory exercises + Education Duration: 60min, 3x/wk, 12wks	E vs C: Human Activity Profile Adjusted Activity Score (-) 10-Meter Walk Test (-) Test d'Evaluation Des Membres Superieurs de Personnes Agees (tempa) (-) Grip Strength (-) Knee Extensor Strength (-) 6-Minute Walk Test (-) Stroke Specific Quality of Life Scale (+exp) EnergyExpenditure (-)
Wei et al. (2019a) RCT (4) NStart=40 NEnd=40 TPS=Subacute A + B vs A/B *Primary listing: Table 44 (Acupuncture)*	E: Acupuncture + neuromuscular joint facilitation C: Acupuncture Duration: 30min, 1x/d, 6x/wk	E vs C: Passive Range of Motion: (+exp) Fugl Meyer Upper Extremity: (+exp) Barthel Index: (-) Visual analogue scale (+exp)
Coroian et al. (2018) RCT (7) NStart=20 NEnd=16 TPS=Chronic A vs B *Primary listing: Table 3 (Exercise and Strength Training)*	E: Isokinetic strengthening C: Passive joint mobilization Duration: 45min/d, 3d/wk for 6wk	E vs C: Fugl-Meyer Assessment Upper Extremity (+con) Box and Block Test (-) Modified Ashworth Scale (-) Barthel Index (-) Isokinetic Peak Torque (-)
Khallaf et al. (2018) RCT (5) NStart=26 NEnd=24 TPS=Chronic A vs B *Primary listing: Table 3 (Exercise and Strength Training)*	E: Muscle strength trainining and task specific exercise C: Traditional passive stretch and Range of Motion exercises Duration: 16 wks, 5x/wk, 60 min	E vs C: Nine Hole Peg Test: (-) Fugl-Meyers Assessment Upper Extremity: (-) Hand: (-) Wrist Extension: (-) Metacarpophalangeal Extension: (-) Thumb Carpometacarpal Extension: (-) elbow extension
Colomer et al. (2016) RCT (8) NStart=34 NEnd=31 TPS=Chronic A vs B *Primary listing: Table 10 (Mirror Therapy)*	E: Mirror therapy C: Passive mobilization Duration: 45min/d, 3d/wk for 8wk	E vs C: NSA (+exp) FMA (-) WMFT (+exp)

Santamato et al. (2015) RCT (8) NStart=70 NEnd=70 TPS=Chronic A + B vs A + C *Primary listing: Table 33 (Botulinum Toxin)*	E: Botox-A + adhesive taping C: Botox-A + Manual Stretching (with splint to maintain maximum stretching) Duration: E: 15-30min/d, 10d; C: 60min/d, 10d	E vs C: Modified Ashworth Scale wrist (+exp) finger (+exp) Disability Assessment Scale (-) fingers position at rest (+exp)
Noma et al. (2012) RCT (7) NStart=36 NEnd=36 TPS=Subacute A vs B vs 0 *Primary listing: Table 25 (Muscle Vibration)*	E: Muscle vibration C1: Stretch control C2: Rest control Duration: 1x, 5min	E vs C1: Modified Ashworth Scale Elbow flex: (+exp) Wrist flex: (+exp) E vs C2: Modified Ashworth Scale Elbow flex: (+exp) Wrist flex: (+exp) C1 vs C2: Modified Ashworth Scale Elbow flex: (-) Wrist flex: (-) F-wave amplitude F/M ratio F-wave persistence
Quaney et al. (2009) Pilot RCT (6) NStart=40 NEnd=38 TPS=Chronic A vs B *Primary listing: Table 3 (Exercise and Strength Training)*	E: Aerobic exercise C: Stretching exercise Duration: 45min/session, 3x/wk, 8wk	E vs C: VO2 max: (+exp) Wisconsin Card Sorting Task: (-) Stroop task: (-) Trail-making B-A: (-) Serial reaction time task: Repeat: (+exp) Random: (-) Predictive grip force modulation: (+exp) Fugl Meyer total: (-) + BBS + get up and go test (fast speed)
Mann et al. (2005) Pilot RCT (6) NStart=22 NEnd=22 TPS=Subacute A vs B *Primary listing: Table 22 (Neuromuscular Electrical Stimulation (NMES))*	E: NMES C: Passive extension exercises Duration: 10-30min twice/d for 12wk	E vs C: ARAT (+exp): -grasp (+exp) grip (+exp) pinch (+exp) gross movement (-)
Cauraugh et al. (2003a) RCT (6) NStart=34 NEnd=34 TPS=Chronic A + B1 vs A + B2 vs A *Primary listing: Table 22 (Neuromuscular Electrical Stimulation (NMES))*	E1: Blocked NMES training (NMES+Hand ROM training) E2: Random NMES training (NMES+Hand ROM training) C: Hand ROM exercises (Passive movements, voluntary UE extensions/abduction) Duration: 90min/d, 2d/wk, for 2wks	E1/E2 vs C: BBT (+exp1, +exp2) Premotor and motor reaction times (+exp1, +exp2) variability in Sustained Muscle Contraction RMSE for force production (+exp1, +exp2) E1 vs E2: BBT (-) Premotor and motor reaction times (+exp1)

Abbreviations and table notes: C=control group; D=days; E=experimental group; H=hours; Min=minutes; RCT=randomized controlled trial; TPS=time post stroke category (Acute: less than 30 days, Subacute: more than 1 month but less than 6 months, Chronic: over 6 months); Wk=weeks.

+exp indicates a statistically significant between groups difference at α=0.05 in favour of the experimental group

+exp1/+exp2/+exp3 indicates a statistically significant between groups difference at α=0.05 in favour of the first, second or third experimental group

+con indicates a statistically significant between groups difference at α=0.05 in favour of the control group

- indicates no statistically significant between groups differences at α=0.05

1. Body Functions and Structures

MOTOR FUNCTION			
LoE	**Conclusion Statement**	**RCTs**	**References**
1b	Passive stretching and joint mobilization may produce greater improvements in motor function than conventional therapy.	1	Liu et al. (2024b)
1a	Stretching and positioning programs may produce greater improvements in motor function than conventional therapy.	3	García-Bravo et al. (2024); Zhao et al. (2022b); deJong et al. (2006)
1b	Static arm positioning with neuromuscular electrical stimulation may not have a difference in efficacy when compared to Sham positioning and sham neuromuscular electrical stimulation for improving motor function.	1	deJong et al. (2013)
1b	Chiropractic spinal adjustments with physical therapy may produce greater improvements in motor function than Sham Chiro with physical therapy.	1	Holt K. et al. (2021)
1b	Upper limb training with position changes, bedside exercise and resistance bands with Conventional rehabilitation may produce greater improvements in motor function than Basic Upper limb training with Conventional rehabilitation.	1	Feng et al. (2024)
2	Acupuncture with neuromuscular joint facilitation may produce greater improvements in motor function than Acupuncture.	1	Wei et al. (2019a)
1b	Isokinetic strengthening may result in lesser improvements in motor function when compared to Passive joint mobilization.	1	Coroian et al. (2018)
2	Muscle strength trainining and task specific exercise may not have a difference in efficacy when compared to Traditional passive stretch and Range of Motion exercises for improving motor function.	1	Khallaf et al. (2018)
1b	There is conflicting evidence about the effect of Mirror therapy when compared to Passive mobilization for improving motor function.	1	Colomer et al. (2016)
1b	Task-Specific Circuit Training may not have a difference in efficacy when compared to Stretching with Memory exercises and Education for improving motor function.	1	Martins et al. (2020)
1b	Games-based training using an exoskeleton with usual rehab may not have a difference in efficacy when compared to basic stretching and active exercises with usual rehab for improving motor function.	1	Remy-Neris et al. (2021)
2	Boxing training may produce greater improvements in motor function than No intervention or therapy.	1	Ersoy & Iyigun (2024)
2	Boxing training may produce greater improvements in motor function than Scapular stabilization training.	1	Ersoy & Iyigun (2024)
1b	Botulinum toxin A injection with structured stretching exercises and conventional rehabilitation may not have a difference in efficacy when compared to Self-stretching exercises with conventional rehabilitation for improving motor function.	1	Hwang et al. (2024)
2	Upper limb control of less-affected side with real-time feedback may not have a difference in efficacy when compared to Upper limb control of affected side with real-time feedback for improving motor function.	1	Kim et al. (2024b)

2	Sling-suspension-based active shoulder joint exercises with General rehab (physcial therapy and functional electrical stimulation) may produce greater improvements in motor function than Motorized upper extremity exercise (passive exercises) with General rehab (physcial therapy and functional electrical stimulation).	1	Kim et al. (2024a)
2	Different approaches to passive stretching and joint mobilization may not have a difference in efficacy when compared with one another for improving motor function.	1	Lynch et al. (2005)
2	Gloreha Aria (Robotic exoskeleton) with Virtual reality and Conventional therapy may not have a difference in efficacy when compared to Self mobilization with Conventional therapy for improving motor function.	1	Vanoglio et al. (2024)
1b	Aerobic exercise may not have a difference in efficacy when compared to Stretching exercise for improving motor function.	1	Quaney et al. (2009)
1b	NMES may produce greater improvements in motor function than Passive extension exercises.	1	Mann et al. (2005)

STROKE SEVERITY			
LoE	**Conclusion Statement**	**RCTs**	**References**
1b	Passive stretching and joint mobilization may not have a difference in efficacy when compared to conventional therapy for improving stroke severity.	2	Liu et al. (2024b); Pain et al. (2018)
1b	Chiropractic spinal adjustments with physical therapy may not have a difference in efficacy when compared to Sham Chiro with physical therapy for improving stroke severity.	1	Holt K. et al. (2021)
1b	High intensity laser (HILT) with therapeutic exercise program and regular rehab may produce greater improvements in stroke severity than therapeutic exercise program with regular rehab.	1	Korkmaz et al. (2022)

MUSCLE STRENGTH			
LoE	**Conclusion Statement**	**RCTs**	**References**
1a	Stretching and positioning programs may not have a difference in efficacy when compared to conventional therapy for improving muscle strength.	2	Horsley et al. (2007); Jones et al. (2005)
2	Different approaches to passive stretching and joint mobilization may not have a difference in efficacy when compared with one another for improving muscle strength.	1	Glize et al. (2022)
1b	Upper limb training with position changes, bedside exercise and resistance bands with Conventional rehabilitation may produce greater improvements in muscle strength than Basic Upper limb training with Conventional rehabilitation.	1	Feng et al. (2024)
1b	Blocked neuromuscular electrical stimulation training (neuromuscular electrical stimulation with Hand range of motion training) may produce greater improvements in muscle strength than Hand range of motion exercises (Passive movements, voluntary UE extensions or abduction).	1	Cauraugh et al. (2003a)
1b	Isokinetic strengthening may not have a difference in efficacy when compared to Passive joint mobilization for improving muscle strength.	1	Coroian et al. (2018)
1b	Task-Specific Circuit Training may not have a difference in efficacy when compared to Stretching with Memory exercises and Education for improving muscle strength.	1	Martins et al. (2020)

2	There is conflicting evidence about the effect of Upper limb control of less-affected side with real-time feedback when compared to Upper limb control of affected side with real-time feedback for improving muscle strength.	1	Kim et al. (2024b)
2	There is conflicting evidence about the effect of Sling-suspension-based active shoulder joint exercises with General rehab (physcial therapy and functional electrical stimulation) when compared to Motorized upper extremity exercise (passive exercises) with General rehab (physcial therapy and functional electrical stimulation) for improving muscle strength.	1	Kim et al. (2024a)
2	Gloreha Aria (Robotic exoskeleton) with Virtual reality and Conventional therapy may not have a difference in efficacy when compared to Self mobilization with Conventional therapy for improving muscle strength.	1	Vanoglio et al. (2024)
1b	Aerobic exercise may produce greater improvements in muscle strength than Stretching exercise.	1	Quaney et al. (2009)

SPASTICITY			
LoE	**Conclusion Statement**	**RCTs**	**References**
1b	Passive stretching and joint mobilization may not have a difference in efficacy when compared to conventional therapy for improving spasticity.	1	Liu et al. (2024b)
1b	Static arm positioning with neuromuscular electrical stimulation may not have a difference in efficacy when compared to Sham positioning and sham neuromuscular electrical stimulation for improving spasticity.	1	deJong et al. (2013)
2	Different approaches to passive stretching and joint mobilization may not have a difference in efficacy when compared with one another for improving spasticity.	2	Glize et al. (2022); Lynch et al. (2005)
1b	Botox-A with adhesive taping may produce greater improvements in spasticity than Botox-A with Manual Stretching (with splint to maintain maximum stretching).	1	Santamato et al. (2015)
1b	Muscle vibration may produce greater improvements in spasticity than Stretch control or Rest control.	1	Noma et al. (2012)
1b	Isokinetic strengthening may not have a difference in efficacy when compared to Passive joint mobilization for improving spasticity.	1	Coroian et al. (2018)
1b	Games-based training using an exoskeleton with usual rehab may not have a difference in efficacy when compared to basic stretching and active exercises with usual rehab for improving spasticity.	1	Remy-Neris et al. (2021)
1b	High intensity laser (HILT) with therapeutic exercise program and regular rehab may not have a difference in efficacy when compared to therapeutic exercise program with regular rehab for improving spasticity.	1	Korkmaz et al. (2022)
2	Radial Shock Wave Therapy with Infrared therapy and Static Stretching may produce greater improvements in spasticity than Infrared therapy with Static Stretching.	1	Sugiarto & Kesoema (2023)
1b	Botulinum toxin A injection with structured stretching exercises and conventional rehabilitation may produce greater improvements in spasticity than Self-stretching exercises with conventional rehabilitation.	1	Hwang et al. (2024)
1b	Static positional stretching may not have a difference in efficacy when compared to conventional care for improving spasticity.	1	Gustafsson et al. (2006)

1b	Stretching and positioning programs may not have a difference in efficacy when compared to conventional therapy for improving spasticity.	1	deJong et al. (2006)

RANGE OF MOTION			
LoE	**Conclusion Statement**	**RCTs**	**References**
1a	Stretching and positioning programs may not have a difference in efficacy when compared to conventional therapy for improving range of motion.	5	Zhao et al. (2022b); Horsley et al. (2007); Gustafsson et al. (2006); deJong et al. (2006); Ada et al. (2005)
1b	Positioning in Neutral may produce greater improvements in range of motion than Conventional Positioning.	1	Pickenbrock et al. (2015)
1b	Static arm positioning with neuromuscular electrical stimulation may not have a difference in efficacy when compared to Sham positioning and sham neuromuscular electrical stimulation for improving range of motion.	1	deJong et al. (2013)
2	Acupuncture with neuromuscular joint facilitation may produce greater improvements in range of motion than Acupuncture.	1	Wei et al. (2019a)
1b	High intensity laser (HILT) with therapeutic exercise program and regular rehab may not have a difference in efficacy when compared to therapeutic exercise program with regular rehab for improving range of motion.	1	Korkmaz et al. (2022)
2	There is conflicting evidence about the effect of Upper limb control of less-affected side with real-time feedback when compared to Upper limb control of affected side with real-time feedback for improving range of motion.	1	Kim et al. (2024b)
1b	Nurse supervised or assisted range of motion exercise programs may produce greater improvements in range of motion than usual care.	1	Tseng et al. (2007)
1b	Muscle stretching regime with standard arm care may not have a difference in efficacy when compared to standard arm care for improving range of motion.	1	Turton et al. (2005)
1b	Sustained positioning with a multidisciplinary rehabilitation program may not have a difference in efficacy when compared to a multidisciplinary rehabilitation program alone for improving range of motion.	1	Dean et al. (2000a)

PROPRIOCEPTION			
LoE	**Conclusion Statement**	**RCTs**	**References**
1b	Mirror therapy may produce greater improvements in proprioception than Passive mobilization.	1	Colomer et al. (2016)
2	Proprioceptive neuromuscular facilitation exercises with neuromobilization of the affected upper extremity may produce greater improvements in proprioception than proprioceptive neuromuscular facilitation exercises without neuromobilization or conventional care.	1	Wolny et al. (2010)

2. Activities

ACTIVITIES OF DAILY LIVING			
LoE	**Conclusion Statement**	**RCTs**	**References**
1b	Passive stretching and joint mobilization may produce greater improvements in performance of activities of daily living than conventional therapy.	1	Liu et al. (2024b)
1a	Stretching and positioning programs may not have a difference in efficacy when compared to conventional therapy for improving performance of activities of daily living.	7	García-Bravo et al. (2024); Zhao et al. (2022b); Horsley et al. (2007); Gustafsson et al. (2006); deJong et al. (2006); Ada et al. (2005); Jones et al. (2005)
2	There is conflicting evidence about the effect of Stretching with Joint-stabilizing exercises when compared to exercise for improving performance of activities of daily living.	1	You et al. (2014)
2	Stretching with Joint-stabilizing exercises may result in lesser improvements in performance of activities of daily living when compared to Stretching.	1	You et al. (2014)
2	Passive stretching and joint mobilization: some approaches may produce greater improvements in performance of activities of daily living than others.	1	Glize et al. (2022)
1b	There is conflicting evidence about the effect of Botox-A with adhesive taping when compared to Botox-A with Manual Stretching (with splint to maintain maximum stretching) for improving performance of activities of daily living.	1	Santamato et al. (2015)
2	Acupuncture with neuromuscular joint facilitation may not have a difference in efficacy when compared to Acupuncture for improving performance of activities of daily living.	1	Wei et al. (2019a)
1b	Isokinetic strengthening may not have a difference in efficacy when compared to Passive joint mobilization for improving performance of activities of daily living.	1	Coroian et al. (2018)
1b	Games-based training using an exoskeleton with usual rehab may not have a difference in efficacy when compared to basic stretching and active exercises with usual rehab for improving performance of activities of daily living.	1	Remy-Neris et al. (2021)
1b	High intensity laser (HILT) with therapeutic exercise program and regular rehab may produce greater improvements in performance of activities of daily living than therapeutic exercise program with regular rehab.	1	Korkmaz et al. (2022)
1b	Botulinum toxin A injection with structured stretching exercises and conventional rehabilitation may produce greater improvements in performance of activities of daily living than Self-stretching exercises with conventional rehabilitation.	1	Hwang et al. (2024)
2	Upper limb control of less-affected side with real-time feedback may produce greater improvements in performance of activities of daily living than Upper limb control of affected side with real-time feedback.	1	Kim et al. (2024b)
1b	Nurse supervised or assisted range of motion exercise programs may produce greater improvements in performance of activities of daily living than usual care.	1	Tseng et al. (2007)
1b	Static arm positioning with neuromuscular electrical stimulation may not have a difference in efficacy when compared to sham positioning and sham neuromuscular electrical stimulation for improving performance of activities of daily living.	1	deJong et al. (2013)

2	Gloreha Aria (Robotic exoskeleton) with Virtual reality and Conventional therapy may not have a difference in efficacy when compared to Self mobilization with Conventional therapy for improving performance of activities of daily living.	1	Vanoglio et al. (2024)

DEXTERITY			
LoE	**Conclusion Statement**	**RCTs**	**References**
1b	Passive stretching and joint mobilization may produce greater improvements in dexterity than conventional therapy.	1	Liu et al. (2024b)
1b	There is conflicting evidence about the effect of Stretching and positioning programs when compared to conventional therapy for improving dexterity.	1	García-Bravo et al. (2024)
1b	Blocked neuromuscular electrical stimulation training (neuromuscular electrical stimulation with Hand range of motion training) may produce greater improvements in dexterity than Hand range of motion exercises (Passive movements, voluntary UE extensions or abduction).	1	Cauraugh et al. (2003a)
1b	Blocked neuromuscular electrical stimulation training (neuromuscular electrical stimulation with Hand range of motion training) may not have a difference in efficacy when compared to Random neuromuscular electrical stimulation training (neuromuscular electrical stimulation with Hand range of motion training) for improving dexterity.	1	Cauraugh et al. (2003a)
1b	Isokinetic strengthening may not have a difference in efficacy when compared to Passive joint mobilization for improving dexterity.	1	Coroian et al. (2018)
2	Muscle strength trainining and task specific exercise may not have a difference in efficacy when compared to Traditional passive stretch and Range of Motion exercises for improving dexterity.	1	Khallaf et al. (2018)

Key Points

- Passive stretching and joint mobilization: some approaches may be more beneficial than others for improving performance of activities of daily living; different approaches to passive stretching and joint mobilization may not have a difference in efficacy when compared with one another for improving motor function, muscle strength, and spasticity.
- Stretching and positioning programs may be beneficial for improving motor function, but not muscle strength, spasticity, range of motion, and performance of activities of daily living, after stroke when compared to conventional therapy; the literature is mixed regarding dexterity.
- Static arm positioning with neuromuscular electrical stimulation may not be beneficial for improving motor function, spasticity, range of motion, and performance of activities of daily living after stroke when compared to Sham positioning and sham neuromuscular electrical stimulation.
- Chiropractic spinal adjustments with physical therapy may be beneficial for improving motor function, but not stroke severity, after stroke when compared to Sham Chiro with physical therapy.
- Upper limb training with position changes, bedside exercise and resistance bands with Conventional rehabilitation may be beneficial for improving motor function and muscle strength after stroke when compared to Basic Upper limb training with Conventional rehabilitation.
- Acupuncture with neuromuscular joint facilitation may be beneficial for improving motor function and range of motion, but not performance of activities of daily living, after stroke when compared to Acupuncture.
- Isokinetic strengthening may not be beneficial for improving dexterity, performance of activities of daily living, spasticity, and muscle strength after stroke when compared to Passive joint mobilization.
- Isokinetic strengthening may be less beneficial than Passive joint mobilization for improving motor function after stroke.

- Muscle strength trainining and task specific exercise may not be beneficial for improving motor function and dexterity after stroke when compared to Traditional passive stretch and Range of Motion exercises.
- Mirror therapy may be beneficial for improving proprioception after stroke when compared to Passive mobilization; the literature is mixed regarding motor function.
- Task-Specific Circuit Training may not be beneficial for improving motor function and muscle strength after stroke when compared to Stretching with Memory exercises and Education.
- Games-based training using an exoskeleton with usual rehab may not be beneficial for improving motor function, performance of activities of daily living, and spasticity after stroke when compared to basic stretching and active exercises with usual rehab.
- Boxing training may be beneficial for improving motor function after stroke when compared to No intervention or therapy.
- Boxing training may be beneficial for improving motor function after stroke when compared to Scapular stabilization training.
- Botulinum toxin A injection with structured stretching exercises and conventional rehabilitation may be beneficial for improving performance of activities of daily living and spasticity, but not motor function, after stroke when compared to Self-stretching exercises with conventional rehabilitation.
- Upper limb control of less-affected side with real-time feedback may be beneficial for improving performance of activities of daily living, but not motor function, after stroke when compared to Upper limb control of affected side with real-time feedback; the literature is mixed regarding range of motion and muscle strength.
- Sling-suspension-based active shoulder joint exercises with General rehab (physcial therapy and functional electrical stimulation) may be beneficial for improving motor function after stroke when compared to Motorized upper extremity exercise (passive exercises) with General rehab (physcial therapy and functional electrical stimulation); the literature is mixed regarding muscle strength.
- Blocked neuromuscular electrical stimulation training (neuromuscular electrical stimulation with Hand range of motion training) may be beneficial for improving dexterity and muscle strength after stroke when compared to Hand range of motion exercises (Passive movements, voluntary UE extensions or abduction).
- Blocked neuromuscular electrical stimulation training (neuromuscular electrical stimulation with Hand range of motion training) may not be beneficial for improving dexterity after stroke when compared to Random neuromuscular electrical stimulation training (neuromuscular electrical stimulation with Hand range of motion training).
- The literature is mixed regarding the effect of Stretching with Joint-stabilizing exercises on improvement of performance of activities of daily living after stroke when compared to exercise.
- Stretching with Joint-stabilizing exercises may be less beneficial than Stretching for improving performance of activities of daily living after stroke.
- Botox-A with adhesive taping may be beneficial for improving spasticity after stroke when compared to Botox-A with Manual Stretching (with splint to maintain maximum stretching); the literature is mixed regarding performance of activities of daily living.
- High intensity laser (HILT) with therapeutic exercise program and regular rehab may be beneficial for improving performance of activities of daily living and stroke severity, but not spasticity and range of motion, after stroke when compared to therapeutic exercise program with regular rehab.
- Nurse supervised or assisted range of motion exercise programs may be beneficial for improving performance of activities of daily living and range of motion after stroke when compared to usual care.
- Muscle vibration may be beneficial for improving spasticity after stroke when compared to Stretch control or Rest control.
- Radial Shock Wave Therapy with Infrared therapy and Static Stretching may be beneficial for improving spasticity after stroke when compared to Infrared therapy with Static Stretching.
- Static positional stretching may not be beneficial for improving spasticity after stroke when compared to conventional care.
- Positioning in Neutral may be beneficial for improving range of motion after stroke when compared to Conventional Positioning.

- Muscle stretching regime with standard arm care may not be beneficial for improving range of motion after stroke when compared to standard arm care.
- Sustained positioning with a multidisciplinary rehabilitation program may not be beneficial for improving range of motion after stroke when compared to a multidisciplinary rehabilitation program alone.
- Proprioceptive neuromuscular facilitation exercises with neuromobilization of the affected upper extremity may be beneficial for improving proprioception after stroke when compared to proprioceptive neuromuscular facilitation exercises without neuromobilization or conventional care.
- Gloreha Aria (Robotic exoskeleton) with Virtual reality and Conventional therapy may not be beneficial for improving motor function, muscle strength, and performance of activities of daily living after stroke when compared to Self mobilization with Conventional therapy.
- Aerobic exercise may be beneficial for improving muscle strength, but not motor function, after stroke when compared to Stretching exercise.
- NMES may be beneficial for improving motor function after stroke when compared to Passive extension exercises.
- Passive stretching and joint mobilization may be beneficial for improving motor function, performance of activities of daily living, and dexterity, but not stroke severity and spasticity, after stroke when compared to conventional therapy.

Summary of Key Points: Stretching Programs

Intervention	Control(s)	Function domain(s)	Effect
Passive stretching and joint mobilization	conventional therapy	Motor function, performance of activities of daily living, dexterity	+
Passive stretching and joint mobilization	conventional therapy	Stroke severity, spasticity	–
Stretching and positioning programs	conventional therapy	Motor function	+
Stretching and positioning programs	conventional therapy	Muscle strength, spasticity, range of motion, performance of activities of daily living	–
Stretching and positioning programs	conventional therapy	Dexterity	=
Static arm positioning with neuromuscular electrical stimulation	Sham positioning and sham neuromuscular electrical stimulation	Motor function, spasticity, range of motion, performance of activities of daily living	–
Chiropractic spinal adjustments with physical therapy	Sham Chiro with physical therapy	Motor function	+
Chiropractic spinal adjustments with physical therapy	Sham Chiro with physical therapy	Stroke severity	–
Upper limb training with position changes, bedside exercise and resistance bands with Conventional rehabilitation	Basic Upper limb training with Conventional rehabilitation	Motor function, muscle strength	+
Acupuncture with neuromuscular joint facilitation	Acupuncture	Motor function, range of motion	+
Acupuncture with neuromuscular joint facilitation	Acupuncture	Performance of activities of daily living	–
Isokinetic strengthening	Passive joint mobilization	Motor function, dexterity, performance of activities of daily living, spasticity, muscle strength	–
Muscle strength trainining and task specific exercise	Traditional passive stretch and Range of Motion exercises	Motor function, dexterity	–

Mirror therapy	Passive mobilization	Proprioception	+
Mirror therapy	Passive mobilization	Motor function	=
Task-Specific Circuit Training	Stretching with Memory exercises and Education	Motor function, muscle strength	–
Games-based training using an exoskeleton with usual rehab	basic stretching and active exercises with usual rehab	Motor function, performance of activities of daily living, spasticity	–
Boxing training	No intervention or therapy	Motor function	+
Boxing training	Scapular stabilization training	Motor function	+
Botulinum toxin A injection with structured stretching exercises and conventional rehabilitation	Self-stretching exercises with conventional rehabilitation	Performance of activities of daily living, spasticity	+
Botulinum toxin A injection with structured stretching exercises and conventional rehabilitation	Self-stretching exercises with conventional rehabilitation	Motor function	–
Upper limb control of less-affected side with real-time feedback	Upper limb control of affected side with real-time feedback	Performance of activities of daily living	+
Upper limb control of less-affected side with real-time feedback	Upper limb control of affected side with real-time feedback	Motor function	–
Upper limb control of less-affected side with real-time feedback	Upper limb control of affected side with real-time feedback	Range of motion, muscle strength	=
Sling-suspension-based active shoulder joint exercises with General rehab (physcial therapy and functional electrical stimulation)	Motorized upper extremity exercise (passive exercises) with General rehab (physcial therapy and functional electrical stimulation)	Motor function	+
Sling-suspension-based active shoulder joint exercises with General rehab (physcial therapy and functional electrical stimulation)	Motorized upper extremity exercise (passive exercises) with General rehab (physcial therapy and functional electrical stimulation)	Muscle strength	=
Blocked neuromuscular electrical stimulation training (neuromuscular electrical stimulation with Hand range of motion training)	Hand range of motion exercises (Passive movements, voluntary UE extensions or abduction)	Dexterity, muscle strength	+
Blocked neuromuscular electrical stimulation training (neuromuscular electrical stimulation with Hand range of motion training)	Random neuromuscular electrical stimulation training (neuromuscular electrical stimulation with Hand range of motion training)	Dexterity	–
Stretching with Joint-stabilizing exercises	exercise	Performance of activities of daily living	=
Stretching with Joint-stabilizing exercises	Stretching	Performance of activities of daily living	–
Passive stretching and joint mobilization	One another (different approaches compared)	Performance of activities of daily living	+
Botox-A with adhesive taping	Botox-A with Manual Stretching (with splint to maintain maximum stretching)	Spasticity	+

Botox-A with adhesive taping	Botox-A with Manual Stretching (with splint to maintain maximum stretching)	Performance of activities of daily living	=
High intensity laser (HILT) with therapeutic exercise program and regular rehab	therapeutic exercise program with regular rehab	Performance of activities of daily living, stroke severity	+
High intensity laser (HILT) with therapeutic exercise program and regular rehab	therapeutic exercise program with regular rehab	Spasticity, range of motion	–
Nurse supervised or assisted range of motion exercise programs	usual care	Performance of activities of daily living, range of motion	+
Passive stretching and joint mobilization	One another (different approaches compared)	Motor function, muscle strength, spasticity	–
Muscle vibration	Stretch control or Rest control	Spasticity	+
Radial Shock Wave Therapy with Infrared therapy and Static Stretching	Infrared therapy with Static Stretching	Spasticity	+
Static positional stretching	conventional care	Spasticity	–
Positioning in Neutral	Conventional Positioning	Range of motion	+
Muscle stretching regime with standard arm care	standard arm care	Range of motion	–
Sustained positioning with a multidisciplinary rehabilitation program	a multidisciplinary rehabilitation program alone	Range of motion	–
Proprioceptive neuromuscular facilitation exercises with neuromobilization of the affected upper extremity	proprioceptive neuromuscular facilitation exercises without neuromobilization or conventional care	Proprioception	+
Gloreha Aria (Robotic exoskeleton) with Virtual reality and Conventional therapy	Self mobilization with Conventional therapy	Motor function, muscle strength, performance of activities of daily living	–
Aerobic exercise	Stretching exercise	Muscle strength	+
Aerobic exercise	Stretching exercise	Motor function	–
NMES	Passive extension exercises	Motor function	+

Orthotics and Taping



Adapted from: https://www.amazon.com/Soft-Resting-Hand-Splint-Left/dp/B007G4TVIK

Upper limb orthotic devices such as splints or kinesthetic tape are generally used to minimize or prevent contractures, reduce spasticity and pain, and prevent edema poststroke (Lannin & Herbert, 2003). Arm weighted support rehabilitation through orthic devices can facilitate recovery of hand movements through performing semiautonomous rehabilitation programs (Bartolo et al. 2014).

A total of 58 RCTs were found that evaluated orthotics and taping for upper extremity motor rehabilitation. Fourteen RCTs compared orthotics with conventional therapy (Abd El-Kafy et al. (2024); Morone et al. (2024); Kim S.-H. et al. (2022); Yang Y.-S. et al. (2021); Liu et al. (2020); Ooi et al. (2020); Morris et al. (2019); Choi et al. (2016c); Copley et al. (2013); Hartwig et al. (2012); Burge et al. (2008); Lannin et al. (2007); Lannin et al. (2003); Poole et al. (1990)). Six RCTs compared orthotics with no treatment (Jones R. et al. (2024); vanBladel et al. (2017); Jang et al. (2016a); Kim et al. (2013c); Jung et al. (2011); Rose et al. (1987)). Six RCTs compared kinesio taping with sham (Yang et al. (2018); Huang et al. (2017a); Santos et al. (2017); Huang et al. (2016b); Appel et al. (2015); Pandian et al. (2013)). Two RCTs compared orthotics combined with other interventions with conventional therapy (Nijenhuis et al. (2017); Platz et al. (2009)). One RCT compared orthotics combined with other interventions with bilateral arm training (Jung et al. (2019)). Eight RCTs compared different approaches to orthotics (Kim et al. (2022); Zheng et al. (2020); Pan et al. (2018a); Ada et al. (2017); Choi et al. (2016b); Fayez & Sayed (2013); Sheehan et al. (2006); Langlois et al. (1991)). Five RCTs compared kinesio taping with conventional therapy (Comley-White et al. (2018); Chatterjee et al. (2016); Pillastrini et al. (2016); Appel et al. (2011); Hanger et al. (2000)). One RCT compared kinesio taping with sham or conventional therapy (Griffin et al. (2006)). Two RCTs compared orthotics combined with other interventions with exercise and custom physiotherapy protocols (Yang & Choi (2024); Basaran et al. (2012)). Two RCTs compared orthotics combined with other interventions with task-specific training (Yu et al. (2021); Huang et al. (2019a)). One RCT compared kinesio taping combined with other interventions with sham or task-specific training (Chou et al. (2024)). One RCT compared orthotics combined with other interventions with stretching and positioning programs (Kim et al. (2024a)). One RCT compared orthotics with sham (Yim & Kim (2024)). One RCT compared kinesio taping combined with other interventions with sham or CIMT (Huang et al. (2021b)). Two RCTs compared kinesio taping combined with other interventions with task-specific training (Huang et al. (2019b); Kim & Kim (2015b)). One RCT compared kinesio taping combined with other interventions with conventional therapy (Hochsprung et al. (2017)). One RCT compared orthotics combined with other interventions with reaching and reach-to-grasp task training (Barry et al. (2012)). One RCT compared orthotics combined with other interventions with orthotics (Shindo et al. (2011)). One RCT compared orthotics combined with other interventions with botulinum toxin (botox) (Lai et al. (2009)). One RCT compared orthotics combined with other interventions with computerized task specific training (Fischer et al. (2007)).

In addition, 13 RCTs in which orthotics and taping formed part of a combined or comparative intervention are cross-referenced at the end of Table 9; their primary listings appear in other tables.

The methodological details and results of all 58 RCTs are presented in Table 9.

Table 9. RCTs Evaluating Orthotics and Taping for Upper Extremity Motor Rehabilitation

Authors (Year) **Study Design (PEDro Score)** **Sample Size start** **Sample Size end** **Time post stroke category** **Study design**	**Interventions** **Duration: Session length, frequency per week for total number of weeks**	**Outcome Measures** **Result (direction of effect)**
Orthotics compared to conventional therapy		
Abd El-Kafy et al. (2024) RCT (6) NStart=40 NEnd=39 TPS=Subacute A vs 0	E: Spiral strapping with hand splint + Conventional physical therapy C: Conventional physical therapy Duration: E: 10hr/d, 6d/wk splint + 1hr/d, 3d/wk for 4wks conventional therapy C: 1hr/d 3d/wk for 4wks	E vs C: modified Ashworth Scale (+exp) ARAT (+exp) hand grip strength (+exp) AROM shoulder abduction (+exp) shoulder external rotation (+exp) elbow extension (+exp) forearm supination (+exp)
Morone et al. (2024) Pilot RCT (6) NStart=24 NEnd=24 TPS=Chronic A vs 0	E: N1-Neurosling shoulder brace + conventional therapy C: Pay attention to upper limb movement during walking + Conventional therapy Duration: E: 8hrs/d/wk, 4wks; C: 1 session/d, 5d/wk, 4wks	E vs C: Trunk Control Test (+exp) Pain-NRS (-) MMST (-) MI (-) 10-MWT walking speed (-) average stride duration (-) average stride frequency (-) Normalized Root Mean Square of acceleration (not stated) Attenuation Coefficient total (+exp) Attenuation coefficient Pelvis-Head, AP (+exp) Attenuation coefficient Pelvis-sternum, AP (+exp) Attenuation Coefficient Sternum-head (-) Log Dimensionless Jerk acceleration (-)
Kim S.-H. et al. (2022) Pilot RCT (7) NStart=12 NEnd=12 TPS=Subacute A vs 0	E: Magnetic orthosis + conventional rehab C: conventional rehab Duration: 150min/d(30 min magnetic orthosis, 120 min conventional), 7d/wk, 4wks	E vs C: WMFT (+exp) MFT (+exp) FMA-UE (+exp) MBI (+exp)
Yang Y.-S. et al. (2021) RCT (5) NStart=30 NEnd=25 TPS=Chronic A vs 0	E: Hand-Wrist Orthosis + conventional rehabilitation C: Conventional physiotherapy Duration: 6hr/d, 6wks; CT:40m/d, 3d/wk, 6wks	E vs C: MAS wrist flexor (+exp) finger flexor (+exp) FMA-UE (-)
Liu et al. (2020) RCT (7) NStart=50 NEnd=50 TPS=Subacute	E: Sling therapy C: Conventional therapy Duration: 30min, 5x/wk for 4wk	E vs C: BI (-) FMA (+exp) SF36(-) VAS-pain shoulder (-)

A vs 0		Berg Balance scale (+exp)
Ooi et al. (2020) RCT (6) NStart=46 NEnd=43 TPS=Subacute A vs 0	E: Lycra glove pressure garment + conventional therapy C: Conventional therapy Duration: 2hrs/wk, 6wk rehab + 6hrs/d of garment	E vs C: Modified Ashworth Scale (-) Disabilities of Arm, Shoulder, Hand Outcome (-) Jebsen Hand Function Test - Time (-)
Morris et al. (2019) Pilot RCT (5) NStart=43 NEnd=35 TPS=Acute A vs 0	E: Lycra orthoses + Usual rehabilitation C: Usual rehabilitation Duration: 8hr/d, for 8wks + 45min/d, 5d/wk	E vs C: Motricity index (no stats) ARAT (no stats) Grip strength (no stats) 9HPT (no stats) Modified Tardieu scale (no stats) Motor activity log (no stats) Eramus Modified Nottingham Sensory Assessment (no stats)
Choi et al. (2016c) RCT (5) NStart=30 NEnd=30 TPS=Subacute A vs 0	E: Resting hand splints + conventional therapy C: Conventional therapy Duration: Conventional - 30min/d, 5d/wk for 12wk	E vs C: VAS (+exp) mAS (-) Hand volume
Copley et al. (2013) RCT (6) NStart=10 NEnd=10 TPS=Not Reported A vs 0	E: Mitt Hand Splint + Standard Occupational Therapy C: Standard Occupational Therapy Duration: 2-4hr/d, 7d/wk, for 3mo	E vs C: Passive Range of Motion (PROM) PROM Wrist (+exp) PROM Fingers (-) Modified Ashworth Scale (-) Modified Tardieu Scale (-)
Hartwig et al. (2012) RCT (7) NStart=41 NEnd=39 TPS=Acute A vs 0	E: Conventional therapy + functional orthosis (Neuro-Lux) C: Conventional therapy Duration: 6x30min/wk, 4wk	E vs C: SHS score
Burge et al. (2008) RCT (8) NStart=31 NEnd=27 TPS=Subacute A vs 0	E: Rehabilitation Orthosis + Conventional Rehabilitation C: Conventional Rehabilitation Duration: 6h/d orthosis + standard care 1x/d, for 13wk	E vs C: Visual Analogue Scale (+exp) Fugl-Meyer Assessment Wrist Passive Range of Motion (-) Wrist Edema (-)
Lannin et al. (2007) RCT (6) NStart=63 NEnd=62 TPS=Acute A1 vs A2 vs 0	E1: extension splint; E2 Neutral splint C: Conventional therapy Duration: 9-12h/d for 4wk	E1 vs E2 vs C: wrist extension muscles (-) Motor assessment scale (-) Tardieu scale (-) DASH (-)
Lannin et al. (2003) RCT (8) NStart=28 NEnd=27 TPS=Subacute	E: Orthotic hand splint + routine therapy C: Conventional therapy Duration: Up to 12h/d, 5d/wk for 4wks splint; 1.5hrs/d, 5d/wk for 4wks routine therapy	E vs C: Motor assessment scale (-) Pain VAS (-) range of wrist extension (-)

A vs 0		
Poole et al. (1990) RCT (5) NStart=18 NEnd=18 TPS=Not Reported A vs 0	E: Inflatable pressure splints + conventional therapy C: Conventional therapy Duration: 30min/d, 5d/wk for 3wks	E vs C: FMA (-)
Orthotics compared to no treatment		
Jones R. et al. (2024) Pilot RCT (1) NStart=31 NEnd=26 TPS=Not Reported A vs 0	E: Immediated Lycra arm sleeve treatment C: Delayed Lycra arm sleeve treatment Duration: 8-10hr/d, 3mo	E vs C: Motor Assessment scale (no stats) shoulder pain using shoulder Q (no stat)
vanBladel et al. (2017) RCT (6) NStart=32 NEnd=28 TPS=Subacute A1 vs A2 vs 0	E1: Actimove Sling E2: Shoulderlift Sling C: No Sling Duration: 6wk	E1 vs E2: Fugl-Meyer Assessment (+exp2) E1 vs C: Fugl-Meyer Assessment (+con) Range of Motion (-) Modified Ashworth Scale (-) Pain (VAS) + Trunk stability (TIS)
Jang et al. (2016a) RCT (5) NStart=21 NEnd=21 TPS=Chronic A vs 0	E: Orthotic splint C: No Training Duration: 3x14min/d, 6d/wk, 4wk	E vs C: Modified Ashworth scale (+exp) Fugl-Meyer Assessment (+exp) Active range of motion (-)
Kim et al. (2013c) RCT (5) NStart=15 NEnd=15 TPS=Chronic A vs 0	E: Hand-stretching device C: No treatment Duration: 10min, 2x/d, 7d/wk, for 4wks	E vs C: Modified Ashworth Scale (+exp)
Jung et al. (2011) RCT (4) NStart=21 NEnd=21 TPS=Chronic A vs 0	E: Hand stretching splint device C: No splint Duration: 40min/d, 6d/wk for 3wk	E vs C: Modified Ashworth Scale (+exp)
Rose et al. (1987) RCT (2) NStart=30 NEnd=30 TPS=Not Reported A1 vs A2 vs 0	E1: Dorsal orthosis E2: Volar orthosis C: No orthosis Duration: 2h	E1/E2 vs C: PROM (+exp) E1 vs C: Spontaneous flexion (+exp) E2 vs C: Spontaneous flexion (-)
Kinesio taping compared to sham		
Yang et al. (2018) RCT (8) NStart=19 NEnd=19	E: Kinesio Taping C: Sham Taping Duration: 1/d, 5d/wk, 4wks	E vs C: Numerical Pain Rating Scale (+exp) Subluxation (-) Active Range of Motion

TPS=Subacute A vs 0		Flexion (-) Abduction (-) Muscle Activity (+exp) EMG parameters
Huang et al. (2017a) RCT (7) NStart=21 NEnd=21 TPS=Subacute A vs 0	E: Kinesiotape+usual care C: Sham tape+usual care Duration: 60min/d, 5d/wk, 3wk Usual care, 2d/wk for 3d consecutive then removal and 24h off kinesio taping, 3wks	E vs C: Pain-NRS (-) Shoulder pain and disability index (-) subluxion mean distance in ultrasound (-) passive range of motion (-)
Santos et al. (2017) RCT Crossover (7) NStart=13 NEnd=13 TPS=Chronic A vs 0	E: Elastic Tape (ET) C: Sham Tape Duration: one-month period between sham and elastic tape	E vs C: Fugl-Meyer Assessment Joint Position Sense ++ shoulder subluxation
Huang et al. (2016b) RCT (7) NStart=49 NEnd=44 TPS=Acute A vs 0	E: Kinesiotape + usual care C: Sham tape + usual care Duration: 1h/d, 5d/wk, 3wk	E vs C: Fugl-Meyer Assessment-Upper Extremity (-) Modified Barthel index (-) Stroke-Specific Quality of Life (-) VAS pain (-) Presence of shoulder pain (+exp) shoulder flexion + shoulder sonography
Appel et al. (2015) Pilot RCT (6) NStart=20 NEnd=17 TPS=Acute A vs 0	E: Shoulder strapping C: Placebo Duration: 4wks	E vs C: Action Research Arm Test (-)
Pandian et al. (2013) RCT (5) NStart=162 NEnd=136 TPS=Acute A vs 0	E: Shoulder Kinesiotaping + Conventional therapy C: Sham taping + Conventional therapy Duration: Not Reported	E vs C: VAS pain (+exp) Shoulder RoM (-) Shoulder pain and disability index (-)
Orthotics combined with other interventions compared to conventional therapy		
Nijenhuis et al. (2017) Pilot RCT (6) NStart=20 NEnd=19 TPS=Chronic A + B vs 0 *Also in Table 17 (Virtual Reality)*	E: Hand orthosis + computerised gaming exercises C: Conventional home exercise Duration: 30min/d, 6d/wk for 6wk	E vs C: Action Research Arm Test (-) Fugl-Meyer Assessment (-) Grip Strength (-) Box and Block Test (-) Motor Activity Log (-) Stroke Impact Scale (-) intrinsic motivation inventory
Platz et al. (2009) RCT (8) NStart=148 NEnd=144 TPS=Subacute A vs B vs 0	E1: Impairment-oriented training E2: Inflatable Splint Arm Therapy C: Conventional therapy Duration: 45min/d, 5d/wk; 4wk	E1 vs E2 vs C: Fugl-Meyer Assessment (-) Upper Extremity Performance Test for the Elderly (-)

Also in Table 4 (Task-Specific Training) *Also in Table 1 (Neurodevelopmental Techniques)*		
Orthotics combined with other interventions compared to bilateral arm training		
Jung et al. (2019) RCT (8) NStart=36 NEnd=36 TPS=Acute A vs B *Also in Table 2 (Bilateral Arm Training)*	E: Shoulder sling exercise (Sling Suspension System on Shoulder Subluxation) C: bilateral arm training Duration: 40min, 5x/wk for 4wks	E vs C: Subluxation (+exp) Shoulder Proprioception (+exp) Fugl-Meyers Upper Extremity (+exp) Manual Functional Test (+exp)
Different approaches to orthotics compared against one another		
Kim et al. (2022) RCT (5) NStart=72 NEnd=41 TPS=Acute A1 vs A2	E: elastic dynamic sling + standard rehab program C: bobath sling + standard rehab program Duration: Worn during active times of the day for 8wks	E vs C: FMA (-) MMT (-) VAS -pain (-) MAS (-) K-MBI (-)
Zheng et al. (2020) RCT (7) NStart=44 NEnd=40 TPS=Subacute A1 vs A2	E: 3D-printed orthosis + conventional therapy C: Low-temperature thermoplastic plate orthosis + conventional therapy Duration: 4-8hr/d for 6wk	E vs C: Visual Analogue Pain Scale (+exp) Passive Range of Motion Extension: (+exp) Flexion: (-) Radial deviation: (-) Ulnar deviation: (+exp) Fugl-Meyer Upper Extremity: (+exp) Modified Ashworth Scale: (+exp) Swelling score
Pan et al. (2018a) RCT (8) NStart=120 NEnd=114 TPS=Subacute A1 vs A2	E1: mod wheelchair arm support + routine services E2: traditional wheelchair arm support + routine services Duration: 60min/d, 6d/wk, for 4wks	E1 vs E2: VAS pain (-) NRS pain (-) FMA (-) Mod BI (+exp) Quality of Life Index- Spitzer Quality of Life Index (+exp)
Ada et al. (2017) RCT (8) NStart=46 NEnd=46 TPS=Acute A1 vs A2	E: Modified lap-tray and triangular sling C: Hemi-sling Duration: During waking hours for 4wk	E vs C: Visual Analogue Scale Pain (-) Motor Assessment Scale (-) Contracture assessed via ROM Shoulder (-) forearm (-) wrist (-) webspace (-) Shoulder subluxation (-)
Choi et al. (2016b) RCT (4) NStart=52 NEnd=52 TPS=Subacute A1 vs A2	E: Dorsal resting hand splint C: Volar resting hand splint Duration: 30min/d, 5d/wk for 8wk	E vs C: mAS (+exp) AROM (+exp) PROM EMG parameters
Fayez & Sayed (2013)	E: Dynamic Hand Splint	E vs C:

RCT (6) NStart=29 NEnd=29 TPS=Chronic A1 vs A2	C: Static Hand Splint Duration: 60min, 1 session	Passive Range of Motion (+exp) Active Range of Motion (+exp) Grip Strength (-)
Sheehan et al. (2006) Pilot RCT (6) NStart=14 NEnd=12 TPS=Not Reported A1 vs A2	E1: Thermoplastic resting splint (5wk) E2: Thermoplastic resting splint (6wk) Duration: 7wk	E1 vs E2: Amount of change in resistance (-) Rate of change in resistance (-)
Langlois et al. (1991) Pilot RCT (1) NStart=13 NEnd=9 TPS=Chronic A1 vs A2	E1: Spint 22hr/d E2: Splint 12hr/d E3: Splint 6hr/d Duration: 6, 12, or 22h/d for 4wk	E1 vs E2 vs E3: Spasticity (-)
Kinesio taping compared to conventional therapy		
Comley-White et al. (2018) RCT (5) NStart=56 NEnd=41 TPS=Acute A1 vs A2 vs 0	E1: Longitudinal strapping E2: Circumferential strapping C: Conventional therapy Duration: 2wk	E1 vs C: Shoulder subluxation (-) Modified Ashworh Scale (-) MAS upper arm (-) hand (-) advanced hand (-) E2 vs C: Shoulder subluxation (-) Modified Ashworh Scale (-) MAS upper arm (-) hand (-) advanced hand (-) E1 vs E2: Shoulder subluxation (-) Modified Ashworh Scale (-) MAS upper arm (-) hand (-) advanced hand (-) Ritchie articular index
Chatterjee et al. (2016) RCT (7) NStart=30 NEnd=30 TPS=Acute A vs 0	E: California Tri-Pull Taping (CTPT) method + conventional neurorehabilitaiton C: Conventional neurorehabilitation Duration: 45min/d, 5d/wk, for 6wks neurorehabilitation, Re-tape mon, wed, fri for 6 weeks	E vs C: Fugl-Meyer Assessment (+exp) Pain reduction (+exp) Active Shoulder Flexion (+exp) Shoulder subluxation
Pillastrini et al. (2016) RCT (8) NStart=32 NEnd=31 TPS=Chronic	E: Neuromuscular taping + Standard PT C: Standard PT Duration: 45min/session, 4 sessions, 4wks	E vs C: VAS (+exp) ModAShworth Scale (-) Range of motion (-)

A vs 0		
Appel et al. (2011) Pilot RCT (5) NStart=13 NEnd=12 TPS=Acute A vs 0	E: Shoulder strap C: Conventional care Duration: Not reported	E vs C: Motor Assessment Scale (No stats) Fugl-Meyer Assessment (No stats) Nine Hole Peg Test (No stats) Stroke Specific Quality of Life Scale (no stats)
Hanger et al. (2000) RCT (7) NStart=98 NEnd=83 TPS=Acute A vs 0	E: Strapping + Standard Physiotherapy C: Standard physiotherapy Duration: 6wk	E vs C: Pain VAS (-) SROMP (-) FIM (-) MAS (-) Rankin Scale (-)
Kinesio taping compared to sham or conventional therapy		
Griffin et al. (2006) RCT (6) NStart=32 NEnd=29 TPS=Acute A vs 0	E: Therapeutic strapping C1: Placebo C2: Standard care Duration: reapplied every 3-4d, 4wk total	E vs C1 vs C2: number of pain free days (+exp) Motor Assessment Scale (-) shoulder ROM (-) Modified Ashworth Scale (-)
Orthotics combined with other interventions compared to exercise and custom physiotherapy protocols		
Yang & Choi (2024) RCT (5) NStart=60 NEnd=53 TPS=Subacute A + B vs A/B *Also in Table 3 (Exercise and Strength Training)*	E: Kinesio taping + GRASP (home program) C: GRASP (Home program) Duration: 60 mins/d, 5ds/wk, 12 wks	E vs C: sEMG % of voluntary referance contraction (-) CAHAI-9 (+exp) DLSES (+exp) MAL amount of use (-) quality of movement (+exp)
Basaran et al. (2012) RCT (7) NStart=39 NEnd=38 TPS=Chronic A + B1 vs A + B2 vs A *Also in Table 3 (Exercise and Strength Training)*	E1: Dorsal hand splint + home-based exercise program E2: Volar hand splint + home-based exercise program C: Home-based exercise program Duration: 10 reps, 3x/d home-based exercise & 10hr/d, 5wk splint	E1 vs E2 vs C: Modified Ashworth Scale (-) Passive ROM of wrist extension (-) Hmax/Max ratio (-) H latency (-)
Orthotics combined with other interventions compared to task-specific training		
Yu et al. (2021) RCT (6) NStart=18 NEnd=14 TPS=Chronic A + B + C vs 0 *Also in Table 4 (Task-Specific Training)*	E1: phase 1 (6wks of no treatment) then phase 2 (6wks of Occupational Therapy Task-Oriented (OTTO)) E2: phase 1 (6wks of Forearm Rotation Orthosis) then phase 2 (6wks of Forearm Rotation Orthosis+ OTTO) C: OT Task-Oriented (OTTO) Duration: OTTO: 60-90min, 2-3x/wk, for 6wk, Orthosis + OTTO: 12wk (6wk each)	E1/E2 vs C: COPM (-) WMFT (-) MAL (-)
Huang et al. (2019a) RCT (5) NStart=10 NEnd=10 TPS=Chronic	E: Three-Dimensional Printed Dynamic Hand Device + Task-Specific Training C: Task-Specific Training Duration: 2d/wk, 4wk task-specific training & 2wk home program	E vs C: Box and Block Test (-) Palmar Pinch Force Test (-) Lateral Pinch Force (-) Grasp Force (-)

A + B vs A/B *Also in Table 4 (Task-Specific Training)*		Motivation during home program (+exp)
Kinesio taping combined with other interventions compared to sham or task-specific training		
Chou et al. (2024) RCT (6) NStart=41 NEnd=41 TPS=Subacute A + B vs A/B *Also in Table 4 (Task-Specific Training)*	E: Kinesio-taping + hand function training + conventional rehabilitation C: Sham kinesio-taping + hand function training + conventional rehabilitation Duration: 5d/wk for 3wks taping + 30min/d hand training + 1 hour conventional rehab	E vs C: FMA UE (no between-group stat) wrist (no between-group stat) hand (no between-group stat) modified Ashworth Scale (no between-group stat) modifed Barthel Index (no between-group stat) Stroke Impact Scale (no between-group stat)
Orthotics combined with other interventions compared to stretching and positioning programs		
Kim et al. (2024a) RCT (5) NStart=40 NEnd=28 TPS=Subacute A vs B *Also in Table 8 (Stretching Programs)*	E: Sling-suspension-based active shoulder joint exercises + General rehab (physcial therapy and FES) C: Motorized upper extremity exercise (passive exercises) + General rehab (physcial therapy and FES) Duration: 90min/d (30min sling or motor exercise, 30min FES, 30min physical therapy), 5d/wk for 4wks	E vs C: radiographic imaging-shoulder subluxation (+exp) degree of pain in shoulder joint upper trapezius (+exp) deltoid (+exp) infraspinatus (-) manual muscle testing flexors (+exp) extensors (-) abductors (+exp) adductors (-) external rotators (+exp) internal rotators (-) FMA-UE (+exp) Manual Function Test (+exp)
Orthotics compared to sham		
Yim & Kim (2024) RCT (6) NStart=42 NEnd=35 TPS=Chronic A vs 0	E: Jeonbuk Tri-pull taping (Shoulder kinesiology taping) + Conventional therapy C: Sham taping + Conventional therapy Duration: 60 mins/d, 5 ds/wk, 6 wks	E vs C: Shoulder subluxation distance (+exp) AROM Flexion (-) abduction (-) Pain-VAS (+exp) SPDI (+exp) mBI (+exp)
Kinesio taping combined with other interventions compared to sham or CIMT		
Huang et al. (2021b) Pilot RCT (7) NStart=40 NEnd=35 TPS=Subacute A + B vs A/B *Also in Table 6 (Constraint-Induced Movement Therapy (CIMT))*	E1: Kinesiotape + mCIMT E2: Kinesiotape C: Sham Kinesiotape + mCIMT Duration: 2hr/d, 5d/wk, for 3 wks mCIMT & 5d/wk for 3 wks KT or Sham taping & 20min hand training with KT 2x/d, 5d/wk for 3 weeks	E1 vs E2 vs C: Modified Tardieu scale (-) Brunnstrom Stage (-) Box and Block test (-) Fugl-Meyer assessment Upper Extremity (-) Stroke Impact Scale (-)
Kinesio taping combined with other interventions compared to task-specific training		
Huang et al. (2019b)	E: Kinesiotaping + stretching & task specific trainings+ conventional rehab	E vs C:

Pilot RCT (6) NStart=36 NEnd=31 TPS=Subacute A + B vs A/B *Also in Table 4 (Task-Specific Training)*	C: stretching & task specific trainings+ conventional rehab+ Conventional Therapy Duration: 7d/wk for 3 weeks tape; 20min/session, 2x/d, 5d/wk for 3wks conventional therapy	Fugl-Meyers Upper Extremity [Proximal (-), Distal (+exp) Mod Ashworth scale (-) Brunnstrom stage (-) Simple test for Evaluating Hand Function (STEF) (-)
Kim & Kim (2015b) RCT (6) NStart=30 NEnd=30 TPS=Chronic A + B vs A/B *Also in Table 4 (Task-Specific Training)*	E: Taping + Task specific training C: Task specific training Duration: 30min/d, 3d/wk for 28wk	E vs C: Manual Function Test (-) Modified Motor Assessment Scale (-) Brunnstrom (-) Functional Independence Measure (+con)
Kinesio taping combined with other interventions compared to conventional therapy		
Hochsprung et al. (2017) Pilot RCT (4) NStart=31 NEnd=21 TPS=Acute A vs B vs 0 *Also in Table 22 (Neuromuscular Electrical Stimulation (NMES))*	E1: Kinesiotaping + Conventional Treatment E2: Neuromuscular electrical stimulation + Conventional Treatment C: Conventional treatment Duration: 7d/wk, 25-30mins/d conventional treatment, 6d/wk KT 4wks, 30mins per session 7d/wk NMES	E1/E2 vs C: pain Visual Analogue Scale (no stat) Barthel Index (no stat) Berg balance Scale (no stat) Arm Research Arm Test (no stat)
Orthotics combined with other interventions compared to reaching and reach-to-grasp task training		
Barry et al. (2012) Pilot RCT (7) NStart=22 NEnd=19 TPS=Chronic A + B vs A/B *Also in Table 4 (Task-Specific Training)*	E: Dynamic Wrist hand orthosis (wearing while doing reach and grasp practice) + home exercise C: Manual-assisted reach and grasp training therapy + home exercise Duration: 60min/wk, for 6wks therapy session, 4d/wk home exercise	E vs C: ARAT (-) BBT (-) SIS (-) Grip strength (-)
Orthotics combined with other interventions compared to orthotics		
Shindo et al. (2011) Pilot RCT (4) NStart=24 NEnd=20 TPS=Subacute A + B vs A/B *Also in Table 22 (Neuromuscular Electrical Stimulation (NMES))*	E: integrated volitional electrical stimulator (IVES) + wrist splint C: wrist splint Duration: 45 min IVES & 8hr splint/d, 3d/wk, 3 wk	E vs C: Fugl-Meyer Assessment (+exp) distal (+exp) proximal (-) Motor Activity Log AOU (-) QOM (-) Action Research Arm Test (-) improvement ratio (+exp)
Orthotics combined with other interventions compared to botulinum toxin (botox)		
Lai et al. (2009) Pilot RCT (2) NStart=36 NEnd=30 TPS=Chronic A + B vs A/B *Also in Table 33 (Botulinum Toxin)*	E: Orthotic splint (Dyna-splint) + Standard care (Boutulinum toxin type A & Manual therapy) C: Standard care (Boutulinum toxin type A & Manual therapy) Duration: 1d/wk, 16wks Usual care, 6-8h/night dyna-splint for 14wks (670h+ total)	E vs C: AROM (No Stats) MAS (No Stats)
Orthotics combined with other interventions compared to computerized task specific training		
Fischer et al. (2007)	E1: Cable orthosis + Virtual Reality	E1/E2 vs C:

Pilot RCT (4) NStart=15 NEnd=15 TPS=Chronic A + B vs A + C vs A *Also in Table 4 (Task-Specific Training); Table 27 (Additional Afferent and Peripheral Stimulation Methods)*	E2: Pneumatic orthosis + Virtual Reality C: Virtual Reality Duration: 60min/d, 3d/wk, for 6wks	WMFT (-) BBT (-) FMA-UE (-) Rancho los amigos functional test (-) grip strength (-) Spasticity with hand manipulatory system (-) Isometric flexion (-) Isometric extension (-) Peak extension velocity (-) Extension ROM (-)
Cross-Referenced RCTs: Combined or Comparative Interventions Involving Orthotics and Taping (results included in this table's levels of evidence)		
Jung K.-S. et al. (2024) RCT (5) NStart=42 NEnd=40 TPS=Chronic A + B + C vs A/A + B *Primary listing: Table 23 (Transcutaneous Electrical Nerve Stimulation (TENS))*	E: TENS + wrist extensor taping + Tast-related training C: TENS + task-related training Duration: 30min TENS + 30min TRT/d, 5d/wk, 6wks	E vs C: Modified ashworth scale (+exp) Isometric muscle strength - wrist extensor (dynamometer) (-) FMA - UE (+exp)
Kumari et al. (2022) RCT (2) NStart=20 NEnd=20 TPS=Not Reported A + B vs A/B *Primary listing: Table 22 (Neuromuscular Electrical Stimulation (NMES))*	E: "Saebo-flex" hand training + Extensor FES + conventional treatment C: Extensor FES + conventional Duration: 45min/d, 5d/wk, 6wks	E vs C: FMA-UE (no stat) Chedoke Hand and Arm scale (no stat) 9HPT (no stat) Power Grip strength (no stat) Lateral grip (no stat) Chuck Pinch strength (no stat) Tip to Tip Pinchstrength (no stat) Pulp pinch strength (no stat)
Wong et al. (2022) Pilot RCT (8) NStart=30 NEnd=30 TPS=Subacute A + B vs A/B *Primary listing: Table 4 (Task-Specific Training)*	E: Task oriented training + Lycra glove C: Task oriented training Duration: 60min/d (30min task training, 30min Lycra glove), 5d/wk, 4wks	E vs C: ARAT (-) 9HPT (-) Grip strength (-) MAS (-) FMA-UE (-) EQ5D (-) BI (-)
Giray et al. (2020) Pilot RCT (8) NStart=20 NEnd=20 TPS=Chronic A + B vs A/B *Primary listing: Table 33 (Botulinum Toxin)*	E: Botulinum toxin A injection + Lycra splint orthotic + upper-limb rehabilitation C: Botulinum toxin-A injection + rehab Duration: 8h/d, 5d/wk, 3wk Orthotic, 2h/d, 5d/wk, 3wks Upper Rehab	E vs C: Fugl-Meyer Assessment Upper Extremity (-) Motricity index (-) modified Ashworth Scale (-) Box and Block Test (-) Stroke Impact Scale (-) Semmes-Weinstein monofilaments (-)
Cruz et al. (2019) RCT (5) NStart=40 NEnd=40 TPS=Chronic A + B vs C	E: Cryotherapy on spastic wrist flexors + Kinesiotherapy C: NMES on wrist extensors Duration: 25min/d, 2d/wk, 8wks	E1 vs E2 vs C: Palmar Grip Strength (-)

Primary listing: Table 24 (Thermal Stimulation)		
Dall'AgNol et al. (2018) RCT (6) NStart=16 NEnd=16 TPS=Chronic A + B vs A/B *Primary listing: Table 44 (Acupuncture)*	E: Kinesio tape + acupuncture C: Acupuncture Duration: 30min, 3x/wk for 12wks	E vs C: Wolf Motor Function Test (-) Modified Ashworth Scale (-) Active Range of Motion (-)
Khallaf et al. (2017) RCT (5) NStart=24 NEnd=24 TPS=Chronic A + B vs 0 *Primary listing: Table 4 (Task-Specific Training)*	E: task specific exercises + wrist/finger extension splint C: Traditional passive stretch and range of motion exercises Duration: 16 wks, 5x/wk, 60 min and study group wore splint for 2h each 3h	E vs C: Nine Hole Peg Test: (+exp) Fugl-Meyers Assessment Upper Extremity: (-) Hand: (-) Wrist Extension: (+exp) Metacarpophalangeal Extension: (+exp) Thumb Carpometacarpal Extension: (+exp)
Santamato et al. (2015) RCT (8) NStart=70 NEnd=70 TPS=Chronic A + B vs A + C *Primary listing: Table 33 (Botulinum Toxin)*	E: Botox-A + adhesive taping C: Botox-A + Manual Stretching (with splint to maintain maximum stretching) Duration: E: 15-30min/d, 10d; C: 60min/d, 10d	E vs C: Modified Ashworth Scale wrist (+exp) finger (+exp) Disability Assessment Scale (-) fingers position at rest (+exp)
Leung et al. (2012) RCT (8) NStart=36 NEnd=32 TPS=Subacute A + B vs A/B *Primary listing: Table 22 (Neuromuscular Electrical Stimulation (NMES))*	E: Electrical Stimulation to Wrist and Finger Extensors with Splint C: Splint Duration: 1h/d, 5d/wk, 4wks stimulation & 12h/d, 5d/wk, 4wks splint	E vs C: Passive Wrist Extension at 2 Nm and 3Nm (-) Wrist and Finger Extensor Muscle Strength (-) Tardieu Scale (-) Motor Assessment Scale (-) Participants' Global Perceived Effect of Treatment (-) Physiotherapists' Perceived Effect of Treatment Rating for Treatment Effectiveness (+exp) Rating for Treatment Worth (+exp) Recommendation of Treatment (-)
Jeon et al. (2012) Pilot RCT (3) NStart=15 NEnd=10 TPS=Chronic A + B vs A/B *Primary listing: Table 4 (Task-Specific Training)*	E: Saebo flex Orthotic splint + intensive training C: Orthotic splint Duration: 1hr/d; 5x/wk+/- training	E vs C: FMA (+exp) BBT (+exp) ARAT (-) resultant velocity shoudler (no stat) elbow (no stat) wrist (no stat)
Lin et al. (2009a) RCT (7) NStart=32 NEnd=32 TPS=Chronic	E: CIMT + Conventional therapy + Hand mitt C: Conventional therapy + Hand mitt Duration: 2 hrs/d, 5 d/wk for 3 wk	E vs C: Fugl-Meyer Assessment (+exp) Stroke Impact Scale (+exp) Nottingham Extended Activities of Daily Living (+exp)

A + B vs A/B *Primary listing: Table 6 (Constraint-Induced Movement Therapy (CIMT))*		Motor Activity Log (+exp) FIM (+exp)
Coote et al. (2008) RCT Crossover (6) NStart=20 NEnd=20 TPS=Chronic A vs B *Primary listing: Table 16 (Robotics)*	E: Robot-mediated therapy (GENTLE/s) C: Sling suspension phase Duration: 30min/d, 3d/wk for 9wk	E vs C: Fugl-Meyer Assessment (+exp) Active Range of Shoulder Flexion (-) Motor Assessment Scale
Yu et al. (2004) RCT (6) NStart=61 NEnd=50 TPS=Chronic A vs B *Primary listing: Table 22 (Neuromuscular Electrical Stimulation (NMES))*	E: Intramuscular NMES C: Sling Duration: 6Hr, 1x/d, 6wk NMES & 6wk Sling	E vs C: Brief Pain Inventory (+exp) Fugl-Meyer Motor Assessment-UL (-) Ashworth Scale (-) FIM-selfcare (-) Arm Motor Ability Test (-)

Abbreviations and table notes: C=control group; D=days; E=experimental group; H=hours; Min=minutes; RCT=randomized controlled trial; TPS=time post stroke category (Acute: less than 30 days, Subacute: more than 1 month but less than 6 months, Chronic: over 6 months); Wk=weeks.

+exp indicates a statistically significant between groups difference at α=0.05 in favour of the experimental group

+exp1/+exp2/+exp3 indicates a statistically significant between groups difference at α=0.05 in favour of the first, second or third experimental group

+con indicates a statistically significant between groups difference at α=0.05 in favour of the control group

- indicates no statistically significant between groups differences at α=0.05

1. Body Functions and Structures

MOTOR FUNCTION			
LoE	**Conclusion Statement**	**RCTs**	**References**
1a	Orthotics may not have a difference in efficacy when compared to conventional therapy for improving motor function.	8	Abd El-Kafy et al. (2024); Kim S.-H. et al. (2022); Yang Y.-S. et al. (2021); Liu et al. (2020); Ooi et al. (2020); Burge et al. (2008); Lannin et al. (2007); Poole et al. (1990)
1b	There is conflicting evidence about the effect of Orthotics when compared to no treatment for improving motor function.	2	vanBladel et al. (2017); Jang et al. (2016a)
1b	Actimove Sling may result in lesser improvements in motor function when compared to Shoulderlift Sling.	1	vanBladel et al. (2017)
1a	Kinesio taping may not have a difference in efficacy when compared to sham for improving motor function.	2	Huang et al. (2016b); Appel et al. (2015)
1b	Impairment-oriented training may not have a difference in efficacy when compared to Conventional therapy for improving motor function.	1	Platz et al. (2009)
1b	Shoulder sling exercise (Sling Suspension System on Shoulder Subluxation) may produce greater improvements in motor function than bilateral arm training.	1	Jung et al. (2019)
1b	Orthotics: some approaches may produce greater improvements in motor function than others.	2	Kim et al. (2022); Zheng et al. (2020)

1b	Mod wheelchair arm support with services may not have a difference in efficacy when compared to traditional wheelchair arm support with services for improving motor function.	1	Pan et al. (2018a)
1b	Kinesio taping may produce greater improvements in motor function than conventional therapy.	1	Chatterjee et al. (2016)
1b	Orthotics combined with other interventions may not have a difference in efficacy when compared to task-specific training for improving motor function.	1	Yu et al. (2021)
2	Sling-suspension-based active shoulder joint exercises with General rehab (physcial therapy and functional electrical stimulation) may produce greater improvements in motor function than Motorized upper extremity exercise (passive exercises) with General rehab (physcial therapy and functional electrical stimulation).	1	Kim et al. (2024a)
1b	Intramuscular neuromuscular electrical stimulation may not have a difference in efficacy when compared to Sling for improving motor function.	1	Yu et al. (2004)
1b	Kinesio tape with acupuncture may not have a difference in efficacy when compared to Acupuncture for improving motor function.	1	Dall'AgNol et al. (2018)
1b	Robot-mediated therapy (GENTLE/s) may produce greater improvements in motor function than Sling suspension phase.	1	Coote et al. (2008)
2	Task specific exercises with wrist or finger extension splint may produce greater improvements in motor function than Traditional passive stretch and range of motion exercises.	1	Khallaf et al. (2017)
1b	Constraint-induced movement therapy with Conventional therapy and Hand mitt may produce greater improvements in motor function than Conventional therapy with Hand mitt.	1	Lin et al. (2009a)
2	Transcutaneous electrical nerve stimulation with wrist extensor taping and Tast-related training may produce greater improvements in motor function than transcutaneous electrical nerve stimulation with task-related training.	1	Jung K.-S. et al. (2024)
1b	Kinesiotape with mCIMT may not have a difference in efficacy when compared to Sham Kinesiotape with mCIMT for improving motor function.	1	Huang et al. (2021b)
1b	There is conflicting evidence about the effect of Kinesiotaping with stretching & task specific trainings and conventional rehab when compared to stretching & task specific trainings with conventional rehab and Conventional Therapy for improving motor function.	1	Huang et al. (2019b)
1b	Orthotics combined with other interventions may not have a difference in efficacy when compared to conventional therapy for improving motor function.	1	Nijenhuis et al. (2017)
1b	Taping with Task specific training may not have a difference in efficacy when compared to Task specific training for improving motor function.	1	Kim & Kim (2015b)
1b	Dynamic Wrist hand orthosis (wearing while doing reach and grasp practice) with home exercise may not have a difference in efficacy when compared to Manual-assisted reach and grasp training therapy with home exercise for improving motor function.	1	Barry et al. (2012)
2	Integrated volitional electrical stimulator (IVES) with wrist splint may produce greater improvements in motor function than wrist splint.	1	Shindo et al. (2011)
2	Cable orthosis with Virtual Reality may not have a difference in efficacy when compared to Virtual Reality for improving motor function.	1	Fischer et al. (2007)

2	Pneumatic orthosis with Virtual Reality may not have a difference in efficacy when compared to Virtual Reality for improving motor function.	1	Fischer et al. (2007)
1b	Task oriented training with Lycra glove may not have a difference in efficacy when compared to Task oriented training for improving motor function.	1	Wong et al. (2022)
1b	Botulinum toxin A injection with Lycra splint orthotic and upper-limb rehabilitation may not have a difference in efficacy when compared to Botulinum toxin-A injection with rehab for improving motor function.	1	Giray et al. (2020)
2	There is conflicting evidence about the effect of Saebo flex Orthotic splint with intensive training when compared to Orthotic splint for improving motor function.	1	Jeon et al. (2012)
1b	Kinesiotape may not have a difference in efficacy when compared to Sham Kinesiotape with mCIMT for improving motor function.	1	Huang et al. (2021b)

STROKE SEVERITY			
LoE	**Conclusion Statement**	**RCTs**	**References**
1b	Kinesio taping may not have a difference in efficacy when compared to conventional therapy for improving stroke severity.	1	Hanger et al. (2000)
1b	Kinesiotape with mCIMT may not have a difference in efficacy when compared to Sham Kinesiotape with mCIMT for improving stroke severity.	1	Huang et al. (2021b)
1b	Kinesiotaping with stretching & task specific trainings and conventional rehab may not have a difference in efficacy when compared to stretching & task specific trainings with conventional rehab and Conventional Therapy for improving stroke severity.	1	Huang et al. (2019b)
1b	Taping with Task specific training may not have a difference in efficacy when compared to Task specific training for improving stroke severity.	1	Kim & Kim (2015b)
1b	Kinesiotape may not have a difference in efficacy when compared to Sham Kinesiotape with mCIMT for improving stroke severity.	1	Huang et al. (2021b)

MUSCLE STRENGTH			
LoE	**Conclusion Statement**	**RCTs**	**References**
1a	There is conflicting evidence about the effect of Orthotics when compared to conventional therapy for improving muscle strength.	2	Abd El-Kafy et al. (2024); Morone et al. (2024)
1b	Different approaches to orthotics may not have a difference in efficacy when compared with one another for improving muscle strength.	2	Kim et al. (2022); Fayez & Sayed (2013)
2	Orthotics combined with other interventions may not have a difference in efficacy when compared to task-specific training for improving muscle strength.	1	Huang et al. (2019a)
2	There is conflicting evidence about the effect of Sling-suspension-based active shoulder joint exercises with General rehab (physcial therapy and functional electrical stimulation) when compared to Motorized upper extremity exercise (passive exercises) with General rehab (physcial therapy and functional electrical stimulation) for improving muscle strength.	1	Kim et al. (2024a)
1b	Electrical Stimulation to Wrist and Finger Extensors with Splint may not have a difference in efficacy when compared to Splint for improving muscle strength.	1	Leung et al. (2012)

2	Cryotherapy on spastic wrist flexors with Kinesiotherapy may not have a difference in efficacy when compared to neuromuscular electrical stimulation on wrist extensors for improving muscle strength.	1	Cruz et al. (2019)
2	Transcutaneous electrical nerve stimulation with wrist extensor taping and Tast-related training may not have a difference in efficacy when compared to transcutaneous electrical nerve stimulation with task-related training for improving muscle strength.	1	Jung K.-S. et al. (2024)
1b	Orthotics combined with other interventions may not have a difference in efficacy when compared to conventional therapy for improving muscle strength.	1	Nijenhuis et al. (2017)
1b	Dynamic Wrist hand orthosis (wearing while doing reach and grasp practice) with home exercise may not have a difference in efficacy when compared to Manual-assisted reach and grasp training therapy with home exercise for improving muscle strength.	1	Barry et al. (2012)
2	Cable orthosis with Virtual Reality may not have a difference in efficacy when compared to Virtual Reality for improving muscle strength.	1	Fischer et al. (2007)
2	Pneumatic orthosis with Virtual Reality may not have a difference in efficacy when compared to Virtual Reality for improving muscle strength.	1	Fischer et al. (2007)
1b	Thermoplastic resting splint (5wk) may not have a difference in efficacy when compared to Thermoplastic resting splint (6wk) for improving muscle strength.	1	Sheehan et al. (2006)
1b	Task oriented training with Lycra glove may not have a difference in efficacy when compared to Task oriented training for improving muscle strength.	1	Wong et al. (2022)
1b	Botulinum toxin A injection with Lycra splint orthotic and upper-limb rehabilitation may not have a difference in efficacy when compared to Botulinum toxin-A injection with rehab for improving muscle strength.	1	Giray et al. (2020)

SPASTICITY			
LoE	**Conclusion Statement**	**RCTs**	**References**
1a	Orthotics may not have a difference in efficacy when compared to conventional therapy for improving spasticity.	6	Abd El-Kafy et al. (2024); Yang Y.-S. et al. (2021); Ooi et al. (2020); Choi et al. (2016c); Copley et al. (2013); Lannin et al. (2007)
1b	Orthotics may produce greater improvements in spasticity than no treatment.	4	vanBladel et al. (2017); Jang et al. (2016a); Kim et al. (2013c); Jung et al. (2011)
1b	Orthotics: some approaches may produce greater improvements in spasticity than others.	3	Kim et al. (2022); Zheng et al. (2020); Choi et al. (2016b)
1a	Kinesio taping may not have a difference in efficacy when compared to conventional therapy for improving spasticity.	3	Comley-White et al. (2018); Pillastrini et al. (2016); Hanger et al. (2000)
2	Longitudinal strapping may not have a difference in efficacy when compared to Circumferential strapping for improving spasticity.	1	Comley-White et al. (2018)
1b	Therapeutic strapping may not have a difference in efficacy when compared to Placebo or care for improving spasticity.	1	Griffin et al. (2006)
1b	Orthotics combined with other interventions may not have a difference in efficacy when compared to exercise and custom physiotherapy protocols for improving spasticity.	1	Basaran et al. (2012)

1b	Intramuscular neuromuscular electrical stimulation may not have a difference in efficacy when compared to Sling for improving spasticity.	1	Yu et al. (2004)
1b	Botox-A with adhesive taping may produce greater improvements in spasticity than Botox-A with Manual Stretching (with splint to maintain maximum stretching).	1	Santamato et al. (2015)
1b	Electrical Stimulation to Wrist and Finger Extensors with Splint may not have a difference in efficacy when compared to Splint for improving spasticity.	1	Leung et al. (2012)
1b	Kinesio tape with acupuncture may not have a difference in efficacy when compared to Acupuncture for improving spasticity.	1	Dall'AgNol et al. (2018)
2	Transcutaneous electrical nerve stimulation with wrist extensor taping and Tast-related training may produce greater improvements in spasticity than transcutaneous electrical nerve stimulation with task-related training.	1	Jung K.-S. et al. (2024)
1b	Actimove Sling may not have a difference in efficacy when compared to Shoulderlift Sling for improving spasticity.	1	vanBladel et al. (2017)
1b	Kinesiotape with mCIMT may not have a difference in efficacy when compared to Sham Kinesiotape with mCIMT for improving spasticity.	1	Huang et al. (2021b)
1b	Kinesiotaping with stretching & task specific trainings and conventional rehab may not have a difference in efficacy when compared to stretching & task specific trainings with conventional rehab and Conventional Therapy for improving spasticity.	1	Huang et al. (2019b)
2	Cable orthosis with Virtual Reality may not have a difference in efficacy when compared to Virtual Reality for improving spasticity.	1	Fischer et al. (2007)
2	Pneumatic orthosis with Virtual Reality may not have a difference in efficacy when compared to Virtual Reality for improving spasticity.	1	Fischer et al. (2007)
2	Spint 22hr/d may not have a difference in efficacy when compared to Splint 6hr/d for improving spasticity.	1	Langlois et al. (1991)
2	Splint 12hr/d may not have a difference in efficacy when compared to Splint 6hr/d for improving spasticity.	1	Langlois et al. (1991)
1b	Task oriented training with Lycra glove may not have a difference in efficacy when compared to Task oriented training for improving spasticity.	1	Wong et al. (2022)
1b	Botulinum toxin A injection with Lycra splint orthotic and upper-limb rehabilitation may not have a difference in efficacy when compared to Botulinum toxin-A injection with rehab for improving spasticity.	1	Giray et al. (2020)
1b	Kinesiotape may not have a difference in efficacy when compared to Sham Kinesiotape with mCIMT for improving spasticity.	1	Huang et al. (2021b)

RANGE OF MOTION			
LoE	**Conclusion Statement**	**RCTs**	**References**
1a	Orthotics may not have a difference in efficacy when compared to conventional therapy for improving range of motion.	4	Abd El-Kafy et al. (2024); Copley et al. (2013); Lannin et al. (2007); Lannin et al. (2003)
1b	Orthotics may not have a difference in efficacy when compared to no treatment for improving range of motion.	3	vanBladel et al. (2017); Jang et al. (2016a); Rose et al. (1987)
1a	Kinesio taping may not have a difference in efficacy when compared to sham for improving range of motion.	4	Yang et al. (2018); Huang et al. (2017a); Huang et al. (2016b); Pandian et al. (2013)

1a	Orthotics: some approaches may produce greater improvements in range of motion than others.	4	Zheng et al. (2020); Ada et al. (2017); Choi et al. (2016b); Fayez & Sayed (2013)
1a	Kinesio taping may not have a difference in efficacy when compared to conventional therapy for improving range of motion.	3	Chatterjee et al. (2016); Pillastrini et al. (2016); Hanger et al. (2000)
1b	Therapeutic strapping may not have a difference in efficacy when compared to Placebo or care for improving range of motion.	1	Griffin et al. (2006)
1b	Orthotics combined with other interventions may not have a difference in efficacy when compared to exercise and custom physiotherapy protocols for improving range of motion.	1	Basaran et al. (2012)
1b	Jeonbuk Tri-pull taping (Shoulder kinesiology taping) with Conventional therapy may not have a difference in efficacy when compared to Sham taping with Conventional therapy for improving range of motion.	1	Yim & Kim (2024)
1b	Kinesio tape with acupuncture may not have a difference in efficacy when compared to Acupuncture for improving range of motion.	1	Dall'AgNol et al. (2018)
1b	Robot-mediated therapy (GENTLE/s) may not have a difference in efficacy when compared to Sling suspension phase for improving range of motion.	1	Coote et al. (2008)
1b	Electrical Stimulation to Wrist and Finger Extensors with Splint may not have a difference in efficacy when compared to Splint for improving range of motion.	1	Leung et al. (2012)
2	Cable orthosis with Virtual Reality may not have a difference in efficacy when compared to Virtual Reality for improving range of motion.	1	Fischer et al. (2007)
2	Pneumatic orthosis with Virtual Reality may not have a difference in efficacy when compared to Virtual Reality for improving range of motion.	1	Fischer et al. (2007)

PROPRIOCEPTION			
LoE	**Conclusion Statement**	**RCTs**	**References**
1b	Shoulder sling exercise (Sling Suspension System on Shoulder Subluxation) may produce greater improvements in proprioception than bilateral arm training.	1	Jung et al. (2019)
1b	Botulinum toxin A injection with Lycra splint orthotic and upper-limb rehabilitation may not have a difference in efficacy when compared to Botulinum toxin-A injection with rehab for improving proprioception.	1	Giray et al. (2020)

2. Activities

ACTIVITIES OF DAILY LIVING			
LoE	**Conclusion Statement**	**RCTs**	**References**
1a	Orthotics may not have a difference in efficacy when compared to conventional therapy for improving performance of activities of daily living.	4	Kim S.-H. et al. (2022); Liu et al. (2020); Lannin et al. (2007); Lannin et al. (2003)
1a	Kinesio taping may not have a difference in efficacy when compared to sham for improving performance of activities of daily living.	3	Huang et al. (2017a); Huang et al. (2016b); Pandian et al. (2013)
1b	Different approaches to orthotics may not have a difference in efficacy when compared with one another for improving performance of activities of daily living.	2	Kim et al. (2022); Ada et al. (2017)

1b	Mod wheelchair arm support with services may produce greater improvements in performance of activities of daily living than traditional wheelchair arm support with services.	1	Pan et al. (2018a)
1b	Kinesio taping may not have a difference in efficacy when compared to conventional therapy for improving performance of activities of daily living.	2	Comley-White et al. (2018); Hanger et al. (2000)
2	Longitudinal strapping may not have a difference in efficacy when compared to Circumferential strapping for improving performance of activities of daily living.	1	Comley-White et al. (2018)
1b	Therapeutic strapping may not have a difference in efficacy when compared to Placebo or care for improving performance of activities of daily living.	1	Griffin et al. (2006)
2	Orthotics combined with other interventions may produce greater improvements in performance of activities of daily living than exercise and custom physiotherapy protocols.	1	Yang & Choi (2024)
1b	Orthotics combined with other interventions may not have a difference in efficacy when compared to task-specific training for improving performance of activities of daily living.	1	Yu et al. (2021)
1b	Jeonbuk Tri-pull taping (Shoulder kinesiology taping) with Conventional therapy may produce greater improvements in performance of activities of daily living than Sham taping with Conventional therapy.	1	Yim & Kim (2024)
1b	Intramuscular neuromuscular electrical stimulation may not have a difference in efficacy when compared to Sling for improving performance of activities of daily living.	1	Yu et al. (2004)
1b	There is conflicting evidence about the effect of Botox-A with adhesive taping when compared to Botox-A with Manual Stretching (with splint to maintain maximum stretching) for improving performance of activities of daily living.	1	Santamato et al. (2015)
1b	Electrical Stimulation to Wrist and Finger Extensors with Splint may not have a difference in efficacy when compared to Splint for improving performance of activities of daily living.	1	Leung et al. (2012)
1b	Robot-mediated therapy (GENTLE/s) may not have a difference in efficacy when compared to Sling suspension phase for improving performance of activities of daily living.	1	Coote et al. (2008)
1b	Constraint-induced movement therapy with Conventional therapy and Hand mitt may produce greater improvements in performance of activities of daily living than Conventional therapy with Hand mitt.	1	Lin et al. (2009a)
1b	Orthotics combined with other interventions may not have a difference in efficacy when compared to conventional therapy for improving performance of activities of daily living.	1	Nijenhuis et al. (2017)
1b	Taping with Task specific training may result in lesser improvements in performance of activities of daily living when compared to Task specific training.	1	Kim & Kim (2015b)
2	Integrated volitional electrical stimulator (IVES) with wrist splint may not have a difference in efficacy when compared to wrist splint for improving performance of activities of daily living.	1	Shindo et al. (2011)
1b	Task oriented training with Lycra glove may not have a difference in efficacy when compared to Task oriented training for improving performance of activities of daily living.	1	Wong et al. (2022)

DEXTERITY			
LoE	**Conclusion Statement**	**RCTs**	**References**
2	Orthotics combined with other interventions may not have a difference in efficacy when compared to task-specific training for improving dexterity.	1	Huang et al. (2019a)
2	Task specific exercises with wrist or finger extension splint may produce greater improvements in dexterity than Traditional passive stretch and range of motion exercises.	1	Khallaf et al. (2017)
1b	Kinesiotape with mCIMT may not have a difference in efficacy when compared to Sham Kinesiotape with mCIMT for improving dexterity.	1	Huang et al. (2021b)
1b	Orthotics combined with other interventions may not have a difference in efficacy when compared to conventional therapy for improving dexterity.	1	Nijenhuis et al. (2017)
1b	Dynamic Wrist hand orthosis (wearing while doing reach and grasp practice) with home exercise may not have a difference in efficacy when compared to Manual-assisted reach and grasp training therapy with home exercise for improving dexterity.	1	Barry et al. (2012)
2	Cable orthosis with Virtual Reality may not have a difference in efficacy when compared to Virtual Reality for improving dexterity.	1	Fischer et al. (2007)
2	Pneumatic orthosis with Virtual Reality may not have a difference in efficacy when compared to Virtual Reality for improving dexterity.	1	Fischer et al. (2007)
1b	Task oriented training with Lycra glove may not have a difference in efficacy when compared to Task oriented training for improving dexterity.	1	Wong et al. (2022)
1b	Botulinum toxin A injection with Lycra splint orthotic and upper-limb rehabilitation may not have a difference in efficacy when compared to Botulinum toxin-A injection with rehab for improving dexterity.	1	Giray et al. (2020)
2	Saebo flex Orthotic splint with intensive training may produce greater improvements in dexterity than Orthotic splint.	1	Jeon et al. (2012)
1b	Kinesiotape may not have a difference in efficacy when compared to Sham Kinesiotape with mCIMT for improving dexterity.	1	Huang et al. (2021b)

Key Points

- Orthotics may not be beneficial for improving motor function, spasticity, range of motion, and performance of activities of daily living after stroke when compared to conventional therapy; the literature is mixed regarding muscle strength.
- Orthotics may be beneficial for improving spasticity, but not range of motion, after stroke when compared to no treatment; the literature is mixed regarding motor function.
- Actimove Sling may not be beneficial for improving spasticity after stroke when compared to Shoulderlift Sling.
- Actimove Sling may be less beneficial than Shoulderlift Sling for improving motor function after stroke.
- Kinesio taping may not be beneficial for improving motor function, range of motion, and performance of activities of daily living after stroke when compared to sham.
- Impairment-oriented training may not be beneficial for improving motor function after stroke when compared to Conventional therapy.
- Shoulder sling exercise (Sling Suspension System on Shoulder Subluxation) may be beneficial for improving motor function and proprioception after stroke when compared to bilateral arm training.
- Mod wheelchair arm support with services may be beneficial for improving performance of activities of daily living, but not motor function, after stroke when compared to traditional wheelchair arm support with services.

- Kinesio taping may be beneficial for improving motor function, but not performance of activities of daily living, spasticity, range of motion, and stroke severity, after stroke when compared to conventional therapy.
- Orthotics combined with other interventions may not be beneficial for improving motor function, dexterity, performance of activities of daily living, and muscle strength after stroke when compared to task-specific training.
- Sling-suspension-based active shoulder joint exercises with General rehab (physcial therapy and functional electrical stimulation) may be beneficial for improving motor function after stroke when compared to Motorized upper extremity exercise (passive exercises) with General rehab (physcial therapy and functional electrical stimulation); the literature is mixed regarding muscle strength.
- Intramuscular neuromuscular electrical stimulation may not be beneficial for improving motor function, performance of activities of daily living, and spasticity after stroke when compared to Sling.
- Kinesio tape with acupuncture may not be beneficial for improving motor function, spasticity, and range of motion after stroke when compared to Acupuncture.
- Robot-mediated therapy (GENTLE/s) may be beneficial for improving motor function, but not performance of activities of daily living and range of motion, after stroke when compared to Sling suspension phase.
- Task specific exercises with wrist or finger extension splint may be beneficial for improving motor function and dexterity after stroke when compared to Traditional passive stretch and range of motion exercises.
- Constraint-induced movement therapy with Conventional therapy and Hand mitt may be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Conventional therapy with Hand mitt.
- Transcutaneous electrical nerve stimulation with wrist extensor taping and Tast-related training may be beneficial for improving motor function and spasticity, but not muscle strength, after stroke when compared to transcutaneous electrical nerve stimulation with task-related training.
- Longitudinal strapping may not be beneficial for improving performance of activities of daily living and spasticity after stroke when compared to Circumferential strapping.
- Therapeutic strapping may not be beneficial for improving performance of activities of daily living, spasticity, and range of motion after stroke when compared to Placebo or care.
- Orthotics combined with other interventions may be beneficial for improving performance of activities of daily living, but not spasticity and range of motion, after stroke when compared to exercise and custom physiotherapy protocols.
- Jeonbuk Tri-pull taping (Shoulder kinesiology taping) with Conventional therapy may be beneficial for improving performance of activities of daily living, but not range of motion, after stroke when compared to Sham taping with Conventional therapy.
- Botox-A with adhesive taping may be beneficial for improving spasticity after stroke when compared to Botox-A with Manual Stretching (with splint to maintain maximum stretching); the literature is mixed regarding performance of activities of daily living.
- Electrical Stimulation to Wrist and Finger Extensors with Splint may not be beneficial for improving performance of activities of daily living, spasticity, range of motion, and muscle strength after stroke when compared to Splint.
- Cryotherapy on spastic wrist flexors with Kinesiotherapy may not be beneficial for improving muscle strength after stroke when compared to neuromuscular electrical stimulation on wrist extensors.
- Kinesiotape with mCIMT may not be beneficial for improving motor function, stroke severity, spasticity, and dexterity after stroke when compared to Sham Kinesiotape with mCIMT.
- Kinesiotaping with stretching & task specific trainings and conventional rehab may not be beneficial for improving stroke severity and spasticity after stroke when compared to stretching & task specific trainings with conventional rehab and Conventional Therapy; the literature is mixed regarding motor function.
- Taping with Task specific training may not be beneficial for improving motor function and stroke severity after stroke when compared to Task specific training.
- Dynamic Wrist hand orthosis (wearing while doing reach and grasp practice) with home exercise may not be beneficial for improving motor function, muscle strength, and dexterity after stroke when compared to Manual-assisted reach and grasp training therapy with home exercise.

- Integrated volitional electrical stimulator (IVES) with wrist splint may be beneficial for improving motor function, but not performance of activities of daily living, after stroke when compared to wrist splint.
- Cable orthosis with Virtual Reality may not be beneficial for improving motor function, muscle strength, spasticity, range of motion, and dexterity after stroke when compared to Virtual Reality.
- Pneumatic orthosis with Virtual Reality may not be beneficial for improving motor function, muscle strength, spasticity, range of motion, and dexterity after stroke when compared to Virtual Reality.
- Thermoplastic resting splint (5wk) may not be beneficial for improving muscle strength after stroke when compared to Thermoplastic resting splint (6wk).
- Spint 22hr/d may not be beneficial for improving spasticity after stroke when compared to Splint 6hr/d.
- Splint 12hr/d may not be beneficial for improving spasticity after stroke when compared to Splint 6hr/d.
- Orthotics combined with other interventions may not be beneficial for improving motor function, muscle strength, performance of activities of daily living, and dexterity after stroke when compared to conventional therapy.
- Task oriented training with Lycra glove may not be beneficial for improving motor function, muscle strength, spasticity, performance of activities of daily living, and dexterity after stroke when compared to Task oriented training.
- Botulinum toxin A injection with Lycra splint orthotic and upper-limb rehabilitation may not be beneficial for improving motor function, muscle strength, spasticity, proprioception, and dexterity after stroke when compared to Botulinum toxin-A injection with rehab.
- Saebo flex Orthotic splint with intensive training may be beneficial for improving dexterity after stroke when compared to Orthotic splint; the literature is mixed regarding motor function.
- Orthotics: some approaches may be more beneficial than others for improving motor function, spasticity, and range of motion; different approaches to Orthotics may not have a difference in efficacy when compared with one another for improving muscle strength and performance of activities of daily living.
- Taping with Task specific training may be less beneficial than Task specific training for improving performance of activities of daily living after stroke.
- Kinesiotape may not be beneficial for improving motor function, stroke severity, spasticity, and dexterity after stroke when compared to Sham Kinesiotape with mCIMT.

Summary of Key Points: Orthotics and Taping

Intervention	Control(s)	Function domain(s)	Effect
Orthotics	conventional therapy	Motor function, spasticity, range of motion, performance of activities of daily living	−
Orthotics	conventional therapy	Muscle strength	=
Orthotics	no treatment	Spasticity	+
Orthotics	no treatment	Range of motion	−
Orthotics	no treatment	Motor function	=
Actimove Sling	Shoulderlift Sling	Motor function, spasticity	−
Kinesio taping	sham	Motor function, range of motion, performance of activities of daily living	−
Impairment-oriented training	Conventional therapy	Motor function	−
Shoulder sling exercise (Sling Suspension System on Shoulder Subluxation)	bilateral arm training	Motor function, proprioception	+

Orthotics	One another (different approaches compared)	Motor function, spasticity, range of motion	+
Mod wheelchair arm support with services	traditional wheelchair arm support with services	Performance of activities of daily living	+
Mod wheelchair arm support with services	traditional wheelchair arm support with services	Motor function	−
Kinesio taping	conventional therapy	Motor function	+
Kinesio taping	conventional therapy	Performance of activities of daily living, spasticity, range of motion, stroke severity	−
Orthotics combined with other interventions	task-specific training	Motor function, dexterity, performance of activities of daily living, muscle strength	−
Sling-suspension-based active shoulder joint exercises with General rehab (physcial therapy and functional electrical stimulation)	Motorized upper extremity exercise (passive exercises) with General rehab (physcial therapy and functional electrical stimulation)	Motor function	+
Sling-suspension-based active shoulder joint exercises with General rehab (physcial therapy and functional electrical stimulation)	Motorized upper extremity exercise (passive exercises) with General rehab (physcial therapy and functional electrical stimulation)	Muscle strength	=
Intramuscular neuromuscular electrical stimulation	Sling	Motor function, performance of activities of daily living, spasticity	−
Kinesio tape with acupuncture	Acupuncture	Motor function, spasticity, range of motion	−
Robot-mediated therapy (GENTLE/s)	Sling suspension phase	Motor function	+
Robot-mediated therapy (GENTLE/s)	Sling suspension phase	Performance of activities of daily living, range of motion	−
Task specific exercises with wrist or finger extension splint	Traditional passive stretch and range of motion exercises	Motor function, dexterity	+
Constraint-induced movement therapy with Conventional therapy and Hand mitt	Conventional therapy with Hand mitt	Motor function, performance of activities of daily living	+
Transcutaneous electrical nerve stimulation with wrist extensor taping and Tast-related training	transcutaneous electrical nerve stimulation with task-related training	Motor function, spasticity	+
Transcutaneous electrical nerve stimulation with wrist extensor taping and Tast-related training	transcutaneous electrical nerve stimulation with task-related training	Muscle strength	−
Orthotics	One another (different approaches compared)	Performance of activities of daily living, muscle strength	−
Longitudinal strapping	Circumferential strapping	Performance of activities of daily living, spasticity	−
Therapeutic strapping	Placebo or care	Performance of activities of daily living, spasticity, range of motion	−
Orthotics combined with other interventions	exercise and custom physiotherapy protocols	Performance of activities of daily living	+

Orthotics combined with other interventions	exercise and custom physiotherapy protocols	Spasticity, range of motion	–
Jeonbuk Tri-pull taping (Shoulder kinesiology taping) with Conventional therapy	Sham taping with Conventional therapy	Performance of activities of daily living	+
Jeonbuk Tri-pull taping (Shoulder kinesiology taping) with Conventional therapy	Sham taping with Conventional therapy	Range of motion	–
Botox-A with adhesive taping	Botox-A with Manual Stretching (with splint to maintain maximum stretching)	Spasticity	+
Botox-A with adhesive taping	Botox-A with Manual Stretching (with splint to maintain maximum stretching)	Performance of activities of daily living	=
Electrical Stimulation to Wrist and Finger Extensors with Splint	Splint	Performance of activities of daily living, spasticity, range of motion, muscle strength	–
Cryotherapy on spastic wrist flexors with Kinesiotherapy	neuromuscular electrical stimulation on wrist extensors	Muscle strength	–
Kinesiotape with mCIMT	Sham Kinesiotape with mCIMT	Motor function, stroke severity, spasticity, dexterity	–
Kinesiotaping with stretching & task specific trainings and conventional rehab	stretching & task specific trainings with conventional rehab and Conventional Therapy	Stroke severity, spasticity	–
Kinesiotaping with stretching & task specific trainings and conventional rehab	stretching & task specific trainings with conventional rehab and Conventional Therapy	Motor function	=
Taping with Task specific training	Task specific training	Motor function, stroke severity, performance of activities of daily living	–
Dynamic Wrist hand orthosis (wearing while doing reach and grasp practice) with home exercise	Manual-assisted reach and grasp training therapy with home exercise	Motor function, muscle strength, dexterity	–
Integrated volitional electrical stimulator (IVES) with wrist splint	wrist splint	Motor function	+
Integrated volitional electrical stimulator (IVES) with wrist splint	wrist splint	Performance of activities of daily living	–
Cable orthosis with Virtual Reality	Virtual Reality	Motor function, muscle strength, spasticity, range of motion, dexterity	–
Pneumatic orthosis with Virtual Reality	Virtual Reality	Motor function, muscle strength, spasticity, range of motion, dexterity	–
Thermoplastic resting splint (5wk)	Thermoplastic resting splint (6wk)	Muscle strength	–
Spint 22hr/d	Splint 6hr/d	Spasticity	–
Splint 12hr/d	Splint 6hr/d	Spasticity	–
Orthotics combined with other interventions	conventional therapy	Motor function, muscle strength, performance of activities of daily living, dexterity	–
Task oriented training with Lycra glove	Task oriented training	Motor function, muscle strength, spasticity, performance of activities of daily living, dexterity	–

Botulinum toxin A injection with Lycra splint orthotic and upper-limb rehabilitation	Botulinum toxin-A injection with rehab	Motor function, muscle strength, spasticity, proprioception, dexterity	–
Saebo flex Orthotic splint with intensive training	Orthotic splint	Dexterity	+
Saebo flex Orthotic splint with intensive training	Orthotic splint	Motor function	=
Kinesiotape	Sham Kinesiotape with mCIMT	Motor function, stroke severity, spasticity, dexterity	–

Mirror Therapy



Adapted from: https://www.saebo.com/shop/saebo-mirror-box/

A total of 68 RCTs were found that evaluated mirror therapy for upper extremity motor rehabilitation. 26 RCTs compared mirror Therapy with conventional therapy (Ding L. et al. (2024); Kim et al. (2023d); Wang et al. (2023g); Zulfiqar R. et al. (2023); Arfianti et al. (2022); Geller et al. (2022); Wen et al. (2022); Saha et al. (2021); Xiang Zhang et al. (2021); Chinnavan et al. (2020); Bai et al. (2019); Chaudhari et al. (2019); Ding et al. (2019); Arya et al. (2018); Chan et al. (2018); Ding et al. (2018); Gurbuz et al. (2016); Kim et al. (2016a); PervaneVural et al. (2016); Arya et al. (2015); MirelaCristina et al. (2015); Samuelkamaleshkumar et al. (2014); Radajewska et al. (2013); Lee et al. (2012); Michielsen et al. (2011); Dohle et al. (2009)). Ten RCTs compared mirror Therapy with sham (Madhoun et al. (2020); Antoniotti et al. (2019); Lim et al. (2016); Park et al. (2015b); Park et al. (2015d); Invernizzi et al. (2013); Thieme et al. (2013); Nookala & Vadlamudi (2011); Cacchio et al. (2009); Yavuzer et al. (2008b)). Two RCTs compared mirror Therapy combined with other interventions with sham (Choi et al. (2019); Ji et al. (2014)). Two RCTs compared mirror Therapy combined with other interventions with task-specific training (Lin et al. (2014a); Wu et al. (2013b)). Four RCTs evaluated mirror Therapy combined with other interventions (Li et al. (2019); Hsieh et al. (2018a); Mathieson et al. (2018); Lee et al. (2015a)). One RCT compared mirror Therapy combined with other interventions with lower extremity exercise interventions (Tyson et al. (2015)). Three RCTs compared different approaches to mirror therapy (Tesio et al. (2023); Gamez Santiago et al. (2022); Lee et al. (2020a)). One RCT compared mirror Therapy combined with other interventions with stretching and positioning programs (Colomer et al. (2016)). One RCT compared mirror Therapy combined with other interventions with action observation (Harmsen et al. (2015)). One RCT evaluated mirror Therapy (Selles et al. (2014)). Three RCTs compared mirror Therapy combined with other interventions with bilateral arm training (Zhang et al. (2024c); Zhuang et al. (2021); Rodrigues et al. (2016)). Two RCTs compared mirror Therapy combined with other interventions with sham or robotics (Chen et al. (2023c); Rong J. et al. (2021)). One RCT compared virtual reality-based mirror therapy combined with other interventions with conventional therapy (Hsu et al. (2022b)). Five RCTs compared mirror Therapy combined with other interventions with conventional therapy (Fernandez-Solana et al.

(2024); Guo et al. (2019); Oliveira et al. (2018); Amasyali et al. (2016); Kim et al. (2015c)). Two RCTs compared mirror Therapy combined with other interventions with mirror therapy (Lee et al. (2024b); Lin et al. (2014b)). Two RCTs compared mirror Therapy combined with other interventions with cimt (Kaviraja et al. (2021); Preetha et al. (2021)). One RCT compared mirror Therapy with no treatment (Panigrahi A. et al. (2022)). One RCT compared different approaches to virtual reality-based mirror therapy (Lin et al. (2021)).

In addition, 21 RCTs in which mirror therapy formed part of a combined or comparative intervention are cross-referenced at the end of Table 10; their primary listings appear in other tables.

The methodological details and results of all 68 RCTs are presented in Table 10.

Table 10. RCTs Evaluating Mirror Therapy for Upper Extremity Motor Rehabilitation

Authors (Year) **Study Design (PEDro Score)** **Sample Size start** **Sample Size end** **Time post stroke category** **Study design**	**Interventions** **Duration: Session length, frequency per week for total number of weeks**	**Outcome Measures** **Result (direction of effect)**
Mirror Therapy compared to conventional therapy		
Ding L. et al. (2024) RCT (4) NStart=50 NEnd=41 TPS=Subacute A vs 0	E: camera-based Mirror therapy + conventional therapy C: Conventional therapy Duration: 90min/session, 4wks	E vs C: FMA - UE (+exp) FMA - Hand (+exp) BBS (-) FIM (+exp) mBI (-) task accuracy rate (+exp) task reaction time +con Event-related (de)synchronization-EEG-central area (-) Event-related (de)synchronization-EEG-parietal area- affected hand (+exp)
Kim et al. (2023d) RCT (7) NStart=42 NEnd=36 TPS=Chronic A1 vs A2 vs 0	E1: Video augmented mirror therapy + conventional therapy E2: traditional mirror therapy + conventional therapy C: Conventional Rehab Duration: 90min/d(E1/E2:30min mirror therapy, 60min conventional therapy), 5d/wk, 4wks	E1 vs E2: FMA shoulder, elbow, forearm (+exp1) wrist, hand (-) coordination (-) MFT shoulder (+exp1) hand (-) BBT (-) Movement time MT (+exp1) Peak velocity PV (+exp) Trunk displacement TD (+exp) MU movement unit (-) PPV percentage of movement time where peak velocity occurs (-) MGA maximum grip aperture (-) PMGA the percentage of movement time where maximum grip aperture occurs (-) E1 vs C: FMA shoulder, elbow, forearm (+exp1) wrist, hand (+exp1) coordination (-) MFT

		shoulder (+exp1) hand (+exp1) BBT (+exp1) Movement time MT (+exp1) Peak velocity PV (+exp) Trunk displacement TD (+exp) MU movement unit (-) PPV percentage of movement time where peak velocity occurs (-) MGA maximum grip aperture (-) PMGA the percentage of movement time where maximum grip aperture occurs (-) E2 vs C: FMA shoulder, elbow, forearm (+exp2) wrist, hand (+exp2) coordination (-) MFT shoulder (+exp2) hand (+exp2) BBT (+exp2) Movement time MT (-) Peak velocity PV (-) Trunk displacement TD (-) MU movement unit (-) PPV percentage of movement time where peak velocity occurs (-) MGA maximum grip aperture (-) PMGA the percentage of movement time where maximum grip aperture occurs (-)
Wang et al. (2023g) RCT (6) NStart=46 NEnd=46 TPS=Subacute A vs 0	E: Mirror therapy + Conventional therapy C: Conventional therapy Duration: 60min/d, 5d/wk, 4wks	E vs C: FMA-UE (+exp) ERP results
Zulfiqar R. et al. (2023) RCT (5) NStart=34 NEnd=34 TPS=Not Reported A vs 0	E: Mirror Therapy + Conventional therapy C: Conventional therapy Duration: 20mins/d, 5d/wk, 5wks	E vs C: WMFT (no stat) Pain-NRS (no stat)
Arfianti et al. (2022) RCT (5) NStart=18 NEnd=17 TPS=Subacute A vs 0	E: Mirror therapy +conventional rehab C: conventional rehab Duration: 40min/d(20min MT, 20min conventional), 2d/wk, 5wks	E vs C: Brunnstrom stages (+exp) FIM (+exp)
Wen et al. (2022) RCT (7) NStart=52 NEnd=52 TPS=Subacute	E: mirror therapy + conventional care C: conventional care Duration: E: 30min/d mirror therapy + 30min/d 6d/wk for 3wks routine rehabilitation, C: 30min/d 6d/wk for 3wks routine rehabilitation	E vs C: FMA (+exp) IADL (+exp) ARAT (-)

A vs 0		
Geller et al. (2022) Pilot RCT (8) NStart=25 NEnd=22 TPS=Chronic A1 vs A2 vs 0	E1: Unimanual Mirror Therapy E2: Bimanual Mirror Therapy C: Traditional OT Duration: 30min/d, 5d/wk, 6wks	E1 vs E2 vs C: ARAT (-) FMA (-) ABILHAND (-) Grip strength (-) SIS (-)
Saha et al. (2021) RCT (5) NStart=38 NEnd=30 TPS=Chronic A vs 0	E: Rehabilitation + Mirror Therapy C: Conventional Rehabilitation Duration: 30min/d, 5d/wk, for 4wks	E vs C: Functional Independence Measure (+exp) Numeric Pain Rating Scale (+exp) Oedema using Figure-of-eight (+exp)
Xiang Zhang et al. (2021) RCT (6) NStart=60 NEnd=60 TPS=Acute A vs 0	E: Mirror Therapy + OT C: Conventional OT Duration: E: 90min/d (60min MT + 30min OT), 5d/wk for 4wk; C: 30min, 2x/d, 5d/wk, for 4wk	E vs C: FMA (+exp) MBI (+exp) HAMD-17 (+exp)
Chinnavan et al. (2020) RCT (4) NStart=25 NEnd=25 TPS=Chronic A vs 0	E: Mirror therapy C: Conventional therapy Duration: 45min, 3d/wk for 6wk	E vs C: FMA (+exp) FIM (+exp)
Chaudhari et al. (2019) RCT (5) NStart=50 NEnd=50 TPS=Not Reported A vs 0	E: Mirror Therapy + Conventional Therapy C: Conventional Therapy Duration: 3d/wk, for 4wks	E vs C: Modified Brunnstrom Motor Function Test Hand (+exp) Upper Extremity (+exp)
Ding et al. (2019) RCT (7) NStart=20 NEnd=19 TPS=Subacute A vs 0	E: Camera mirror visual feedback therapy + Conventional therapy C: Conventional Therapy Duration: 1.5hrs (1hr camMVF + 30min task)/d, 5d/wk, 4wks	E vs C: FMA Upper limb (+exp) Wrist-hand (+exp) BBS (-) FIM total (+exp) self-care (-) sphincter control (-) transfers (+exp) locomotion (+exp) communication (-) social cognition ability (-) modified Ashworth scale (-) Manual muscle testing (-) EEG global clustering coefficient (+exp) EEG nodal CC (+exp)
Bai et al. (2019) Pilot RCT (8) NStart=34	E1: Movement based mirror therapy + conventional therapy E2: Task based mirror therapy + conventional therapy	E1 vs C: Fugl-Meyer Assessment Upper Extremity (+exp1) Wolf Motor Function Test (-)

NEnd=34 TPS=Subacute A1 vs A2 vs 0	C: Conventional Therapy Duration: 30min 5x/wk for 4wks	Modified Ashworth Scale (-) Modified Barthel Index (-) E2 vs C: Fugl-Meyer Assessment Upper Extremity (-) Wolf Motor Function Test (-) Modified Ashworth Scale (-) Modified Barthel Index (-) E1 vs E2: Fugl-Meyer Assessment Upper Extremity (+exp1) Wolf Motor Function Test (-) Modified Ashworth Scale (-) Modified Barthel Index (-) Grip strength
Arya et al. (2018) RCT (7) NStart=31 NEnd=30 TPS=Chronic A vs 0	E: Mirror therapy C: Conventional Therapy Duration: E: 40min/session, 5d/wk, 6wk + 50min conventional care 5d/wk, 6wk; C: 90min/sesssion, 5d/wk, 6wk	E vs C: Semmes Weinstein MoNofilament (-) 2-Point Discrimination (+exp) Fugl-Meyer Assessment Upper Extremity (+exp)
Chan et al. (2018) RCT (8) NStart=41 NEnd=35 TPS=Acute A vs 0	E: Mirror therapy + Conventional rehabilitation C: Conventional rehabilitation Duration: 2x30min/d, 5d/wk for 4wks Mirror therapy, 2.5h/d, 5d/wk Conventional physiotherapy and occupational therapy + additional time for speech/clinical psychology	E vs C: Fugl-Meyer Assessment Total (-) Proximal (-) Wrist (-) Hand (-) Coordination (-) Wolf Motor Function Test Time (-) Score (-)
Ding et al. (2018) RCT (7) NStart=90 NEnd=79 TPS=Subacute A vs 0	E: Camera-based mirror visual feedback therapy C: Conventional therapy Duration: 1hr, 5d/wk, 4wks	E vs C: FMA upper limb (+exp) Barthel index (+exp) Reaction time (+exp)
Gurbuz et al. (2016) RCT (5) NStart=31 NEnd=31 TPS=Subacute A vs 0	E: Mirror therapy + conventional therapy C: Conventional therapy Duration: 60-120min/d, 5d/wk for 4wks conventional therapy; 20min/d, 5d/wk for 4 wks mirror therapy	E vs C: Brunnstorm Recovery stage (-) FMA (+exp) FIM(-)
Kim et al. (2016a) RCT (5) NStart=25 NEnd=25 TPS=Chronic A vs 0	E: Mirror therapy C: Conventional therapy Duration: 30min/d, 5dwk for 4wk	E vs C: ARAT (+exp) FMA (+exp) BBT (+exp) FIM (+exp)
PervaneVural et al. (2016) RCT (6) NStart=30	E: Mirror therapy + conventional therapy C: Conventional therapy	E vs C: FMA (+exp) FIM (+exp)

NEnd=30 TPS=Subacute A vs 0	Duration: 2-4h/d, 5d/wk for 4wks conventional rehabilitation + 30min/d mirror therapy	modAshworthScale (-) Brunnstrom recovery (-) VAS pain (+exp)
Arya et al. (2015) RCT (8) NStart=33 NEnd=33 TPS=Chronic A vs 0	E: Task-based mirror therapy C: Conventional Therapy Duration: 45min/session, 5d/wk, 8wk	E vs C: Fugl-Meyer Assessment (+exp) Brunnstrom Recovery Stages (+exp)
MirelaCristina et al. (2015) RCT (5) NStart=15 NEnd=15 TPS=Subacute A vs 0	E: Mirror therapy + conventional therapy C: Conventional therapy Duration: 30min/d, 5d/wk for 6wk	E vs C: Ashworth scale (+exp) Bhakta finger flexion scale (+exp) Brunstromm stages (-) FMA UE (-)
Samuelkamaleshkumar et al. (2014) Pilot RCT (6) NStart=20 NEnd=20 TPS=Subacute A vs 0	E: Mirror therapy + Conventional multidisciplinary rehabiltiation program C: Conventional multidisciplinary rehabiltiation program Duration: 6hr, 5d/wk, 3wk rehabilitation & 1hr MT following rehabilitation	E vs C: Fugl-Meyer Assessment (+exp) Brunnstrom Recovery Stage Arm (+exp) Hand (+exp) Box and Block Test (+exp) Modified Ashworth Scale (-)
Radajewska et al. (2013) RCT (4) NStart=60 NEnd=60 TPS=Subacute A vs 0	E: Mirror therapy C: Conventional therapy Duration: 15min/d, 5d/wk for 3wk MT, 2-5h/d, 5d/wk, 3wks CT	E vs C: Frenchay arm test (-) Motor status score (-) Functional Index Repty (+exp)
Lee et al. (2012) RCT (5) NStart=26 NEnd=26 TPS=Subacute A vs 0	E: Mirror therapy + Conventional Rehabilitation C: Conventional therapy Duration: 25min/d, 5d/wk for 4wk MT, 2x/d, 30mins/session, 5d/wk, 4wks	E vs C: Fugl-Meyer Assessment (+exp) Brunnstrom recovery stage (+exp) Manual function test (+exp)
Michielsen et al. (2011) RCT (8) NStart=40 NEnd=32 TPS=Chronic A vs 0	E: Mirror therapy C: Conventional therapy Duration: 1hr/d, 5x/wk for 6wks	E vs C: ARAT (-) ABILHAND (-) Gripforce (-) Tardieu scale (-) FMA (+exp) Stroke-ULAM + EQ5D + fMRI parameters + Pain Vas
Dohle et al. (2009) RCT (6) NStart=48 NEnd=36 TPS=Acute A vs 0	E: Standard therapy + Mirror therapy C: Standard therapy + Additional control therapy Duration: 30min/d, 5d/wk for 6wks Mirror/control therapy	E vs C: FMA-UE Motor (-) ROM (-) Pain (-) Light touch (+exp) Proprioception (-) Neglect score (+exp) ARAT (no stats) FIM motor (-)

		Behavioural inattention test
Mirror Therapy compared to sham		
Madhoun et al. (2020) RCT (6) NStart=35 NEnd=30 TPS=Subacute A vs 0	E: Task based mirror therapy C: Occupational therapy without mirror (sham)+ conventional therapy if the patients required Duration: 25min, 7d/wk for 4wk	E vs C: BRS upper extremity (-) hand (-) FMA (+exp) mAS elbow (-) wrist (-) finger (-) thumb-extension and flexion (-) modified barthel index (-)
Antoniotti et al. (2019) RCT (7) NStart=40 NEnd=35 TPS=Acute A vs 0	E: Mirror therapy C: Sham therapy Duration: 30min 5x/wk for 4wks	E vs C: Fugl-Meyer Assessment Upper Extremity (-) Action Research Arm Test (-) Functional Independence Measure (-) Hamilton Scale for Depression (no stats) Bisection Test (no stats) Extrapersonal/personal scale for neglect (no stats)
Lim et al. (2016) RCT (5) NStart=60 NEnd=60 TPS=Subacute A vs 0	E: Mirror therapy C: Sham Duration: 20min/d, 5d/wk for 4wk	E vs C: FMA (+exp) mBI (+exp) Brunnstrom recovery stages (-)
Park et al. (2015b) RCT (3) NStart=30 NEnd=30 TPS=Chronic A vs 0	E: Mirror Therapy C: Sham Therapy Duration: 30min/d, 5d/wk, 4wks	E vs C: Functional Independence Measure (+exp) Locomotion (-) Self Care (+exp) Communication (-) Social Cognition (-) Transfer (-) Spineter Control (-) FMA (+exp) BBT (+exp)
Park et al. (2015d) RCT (5) NStart=30 NEnd=30 TPS=Chronic A vs 0	E: Mirror therapy C: Non-reflecting mirror Duration: 5d/wk for 6wk	E vs C: MFT (+exp) FIM (+exp)
Invernizzi et al. (2013) RCT (5) NStart=26 NEnd=25 TPS=Acute A vs 0	E: Mirror therapy + conventional therapy C: sham treatment+ Conventional therapy Duration: 60min/d conventional therapy & 30-60min/d mirror therapy, 5d/wk, 4wks	E vs C: ARAT (+exp) Motricity Index (+exp) FIM (+exp)
Thieme et al. (2013)	E1: Individual mirror therapy	E1 vs C:

RCT (8) NStart=60 NEnd=49 TPS=Subacute A1 vs A2 vs 0	E2: Group mirror therapy C: Sham Duration: 30min/d, 20 sessions, 5wk	Fugl-Meyer Assessment (-) Action Research Arm Test (-) Barthel Index (-) Stroke Impact Scale (-) Modified Ashworth Scale (-) Star Cancellation Test (-) E2 vs C: Fugl-Meyer Assessment (-) Action Research Arm Test (-) Barthel Index (-) Stroke Impact Scale (-) Modified Ashworth Scale (-) Star Cancellation Test (+exp1) E1 vs E2: Fugl-Meyer Assessment (-) Action Research Arm Test (-) Barthel Index (-) Stroke Impact Scale (-) Modified Ashworth Scale Finger (+exp1) Wrist (-) Star Cancellation Test (-)
Nookala & Vadlamudi (2011) RCT (4) NStart=30 NEnd=30 TPS=Not Reported A vs 0	E: Mirror Therapy + Conventional Therapy C: Sham Mirror Therapy + Conventional Therapy Duration: 30min, 6d/wk, 6wks	E vs C: Modified Ashworth Scale-wrist flexors (-) Motor Assessment Scale (+exp) Brunstrom stages-Hand (+exp)
Cacchio et al. (2009) RCT (7) NStart=48 NEnd=42 TPS=Subacute A vs 0	E: Mirror Therapy + Conventional Rehab C: Placebo Mirror therapy + Conventional Rehab Duration: 30min/d 5d/wk, first 2wk MT, 60min/d, 5d/wk, last 2wks MT 60min 5d/wk, 4wk CR	E vs C: Pain-Visual Analogue Scale (+exp) Wolf Motor Function Test (+exp) Motor Activity Log (+exp)
Yavuzer et al. (2008b) RCT (7) NStart=40 NEnd=36 TPS=Subacute A vs 0	E: Mirror therapy C: Sham therapy Duration: 2-5h/d, 5d/wk, 4wk	E vs C: Brunnstrom Recovery Stages (+exp) Funtional Indepence Measure (+exp) Modified Ashworth Scale (-)
Mirror Therapy combined with other interventions compared to sham		
Choi et al. (2019) RCT (7) NStart=36 NEnd=36 TPS=Chronic A + B vs A/B vs 0 *Also in Table 17 (Virtual Reality)*	E1: Leap motion VR + mirror therapy E2: Mirror therapy C: Sham Duration: 30min, 3x/wk for 5wk	E1 vs C: MFT (+exp1) Neck discomfort scale (+exp1) SF8(+exp1) E2 vs C: MFT (+exp2) Neck discomfort scale (-) SF8(+exp2) E1 vs E2: MFT (+exp1) Neck discomfort scale (+exp)

		SF8(-)
Ji et al. (2014) RCT (7) NStart=35 NEnd=35 TPS=Chronic A + B vs A/B vs 0 *Also in Table 29 (Repetitive Transcranial Magnetic Stimulation (rTMS))*	E1: Mirror therapy + high frequency (10Hz) rTMS + Traditional PT E2: Mirror therapy + Traditional PT C: Sham + Traditional PT Duration: 15 min/d rTMS + 30min, 5x/d for 6wk Traditional PT	E1 vs E2: Fugl-Meyer Assessment (+exp1) Box and Block Test (+exp1) E1 vs C: Fugl-Meyer Assessment (+exp1) Box and Block Test (+exp1) MEP amplitude (+exp1) latency (+exp1) E2 vs C: Fugl-Meyer Assessment (+exp2) Box and Block Test (+exp2) MEP Amplitude (-) Latency (+exp2)
Mirror Therapy combined with other interventions compared to task-specific training		
Lin et al. (2014a) RCT (7) NStart=43 NEnd=42 TPS=Chronic A + B vs A/B vs 0 *Also in Table 22 (Neuromuscular Electrical Stimulation (NMES)); Table 4 (Task-Specific Training)*	E1: Mirror therapy + Mesh glove (afferent stimulation, primarily NMES) E2: Mirror therapy C: task oriented exercise Duration: 90min/d, 5d/wk for 4wk	E1 vs C: FMA (+exp1) BBT (-) 10MWT (-) MAL (-) ABILHAND (-) E2 vs C: FMA (+exp2) BBT (+con) 10MWT (+con) MAL (-) ABILHAND (-) E1 vs E2: FMA (-) BBT (+exp1) 10MWT (+exp1) MAL (-) ABILHAND (-)
Wu et al. (2013b) RCT (6) NStart=33 NEnd=21 TPS=Chronic A + B vs A/B *Also in Table 4 (Task-Specific Training)*	E: Mirror therapy+ task-oriented functional practice C: task-oriented functional practice Duration: 1.5h/d, 5d/wk, 4wk	E vs C: Revised Nottingham Sensory Assessment (-) Light touch (-) temperature (+exp) Pinprick (-) pressure (-) Tactile localization (-) Bilateral simultaneous touch (-) Tactile total (-) Fugl-Meyer Assessment (+exp) proximal (-) distal (+exp) Motor Activity Log AOU (-) QOM (-) ABILHAND (-) kinematic reaction time (+exp)

Mirror Therapy combined with other interventions compared to control		
Li et al. (2019) RCT (6) NStart=23 NEnd=20 TPS=Chronic A vs B *Also in Table 2 (Bilateral Arm Training)*	E1: Hospital-based task-oriented mirror therapy E2: Bilateral arm training Duration: 90min/d, 3d/wk, 4wks mirror therapy or bilateral arm training & 30-40min/d, 5d/wk, 4wks home training	E1 vs E2: Fugl-Meyer Upper Extremity: (-) Revised Nottingham Sensory Assessment (-) Chedoke Arm and Hand Activity Inventory: (-) Motor Activity Log (-) Stroke Impact Scale (+exp1)
Hsieh et al. (2018a) RCT Crossover (5) NStart=26 NEnd=18 TPS=Chronic A + B1 vs A + B2 *Also in Table 4 (Task-Specific Training)*	E1: Home-based mirror therapy and task specific training E2: Clinic-based mirror therapy and task specific training Duration: 30-45min/d mirror therapy & 45-60min/d task-specific training, 12 sessions, 4wks, 4wk washout	E1 vs E2: FMA (-) BBT (-) Revised Nottingham Sensory assessment (-) Motor activity log Amount of use (+exp1) Quality of movement (-) 10m walk test (-) Sit to stand (+exp1) Canadian Occupational Performance Measure (-) EuroQoL 5D Q - Index (+exp1) EQ-Visual analog scale (-)
Mathieson et al. (2018) RCT (8) NStart=50 NEnd=47 TPS=Acute A + B vs A/B *Also in Table 22 (Neuromuscular Electrical Stimulation (NMES))*	E1: Functional Electrical Stimulation E2: Mirror Therapy E3: Functional Electrical Stimulation + Mirror Therapy Duration: 30min, 2x/d, 5d/wk for 3wk	E1 vs E2: Action Research Arm Test (+exp) Fugl-Meyer Assessment Upper Extremity component (+exp) Nottingham Extended Activities of Daily Living Test (-) Functional Independence Measure (-) Mini Mental Status Examination (-) Attention Processing Tests Level one and two (-) Shape Tests and Star Cancellation Test (-) E1 vs E3: Action Research Arm Test (-) Fugl-Meyer Assessment Upper Extremity component (-) Nottingham Extended Activities of Daily Living Test (-) Functional Independence Measure (-) Mini Mental Status Examination (-) Attention Processing Tests Level one and two (-) Shape Tests and Star Cancellation Test (-) E2 vs E3: Action Research Arm Test (-) Fugl-Meyer Assessment Upper Extremity component (-) Nottingham Extended Activities of Daily Living Test (-) Functional Independence Measure (-) Mini Mental Status Examination (-) Attention Processing Tests Level one and two (-)

		Shape Tests and Star Cancellation Test (-)
Lee et al. (2015a) RCT (7) NStart=48 NEnd=47 TPS=Chronic A + B vs A/B *Also in Table 27 (Additional Afferent and Peripheral Stimulation Methods)*	E1: Mirror therapy + Mesh glove afferent stimulation E2: Mirror therapy E3: Mirror Therapy + Sham Duration: 90min/d, 5d/wk for 4wk	E2 vs C: FMA (-) nottingham sensory assessment (rNSA) (-) Muscle tone ED (-) FCR (-) Muscle stiffness ED (-) FCR (-) BBT affected hand (+con) 10-Meter Walk Test (-) FIM motor (+con) E1 vs C: FMA (-) rNSA (-) Muscle tone ED (-) FCR (+con) Muscle stiffness ED (-) FCR (+con) BBT affected hand (-) 10-Meter Walk Test (-) FIM motor (-) E1 vs E2: FMA (-) rNSA (-) Muscle tone ED (+exp1) FCR (-) Muscle stiffness ED (-) FCR (-) BBT affected hand (+exp1) 10-Meter Walk Test (-) FIM motor (+exp1)
Mirror Therapy combined with other interventions compared to lower extremity exercise interventions		
Tyson et al. (2015) RCT (8) NStart=94 NEnd=85 TPS=Acute A vs B *Also in Table 3 (Exercise and Strength Training)*	E: Mirror therapy + usual care C: Lower-limb exercise + usual care Duration: 1x/d, 4wk	E vs C: Motricity Index (-) Grip Strength (-) Rivermead Assessment of Sensory Perception (-) Modified Ashworth Scale -biceps (-) Box and Block Test (-) Action Research Arm Test (-) Star Cancellation
Different approaches to mirror therapy compared against one another		
Tesio et al. (2023) RCT Crossover (6) NStart=8 NEnd=8	E: Reversed mirror training C: Mirror training Duration: 5d - 2d washout	E vs C: FMA-UE (-) grip strength (-) BBT (-)

TPS=Chronic A1 vs A2		ABILHAND (-)
Gamez Santiago et al. (2022) Pilot RCT (7) NStart=44 NEnd=41 TPS=Acute A1 vs A2	E: Intensively Applied Mirror Therapy + Conventional Physiotherapy C: Spaced MT + Conventional Physiotherapy Duration: exp:5d/wk, 6wks; con: 3d/wk, 10wks (30session)	E vs C: grip strength (+exp) FMA (-) BI (+exp) EMG activity (+exp)
Lee et al. (2020a) RCT (4) NStart=25 NEnd=21 TPS=Subacute A1 vs A2	E: Multi-Joint-Based Mirror Therapy C: Single joint mirror therapy Duration: 30min, 5x/wk, 4wks	E vs C: Fugl-Meyer Assessment (+exp) Upper Arm (+exp) Wrist/Hand (+exp) Motor Activity Log - Amount (+exp) Quality (+exp) Modified Barthel Index (+exp)
Mirror Therapy combined with other interventions compared to stretching and positioning programs		
Colomer et al. (2016) RCT (8) NStart=34 NEnd=31 TPS=Chronic A vs B *Also in Table 8 (Stretching Programs)*	E: Mirror therapy C: Passive mobilization Duration: 45min/d, 3d/wk for 8wk	E vs C: NSA (+exp) FMA (-) WMFT (+exp)
Mirror Therapy combined with other interventions compared to action observation		
Harmsen et al. (2015) RCT (6) NStart=37 NEnd=37 TPS=Chronic A + B vs A/B *Also in Table 12 (Action Observation)*	E: Mirror therapy + action observation C: Action observation Duration: 20 repetitions	E vs C: Movement time (+exp)
Mirror Therapy compared to control		
Selles et al. (2014) RCT (6) NStart=103 NEnd=93 TPS=Chronic A1 vs A2 vs 0	E1: training with the paretic arm with direct view (Paretic-No Mirror) E2: training with the nonparetic arm with direct view (Nonparetic-No Mirror) E3: training with the nonparetic arm with mirror reflection (Nonparetic Mirror) E4: training with both sides and with a nontransparent screen preventing visual control of paretic side (BilateralScreen) E5: training with both sides with mirror reflection of the nonparetic arm (Bilateral-Mirror) Duration: Not Reported	E1 vs E2: Movement time of the reaching task (+exp1) reaction time (-) peak velocity (-) number of peaks (-) movement precision (-) E1 vs E3: Movement time of the reaching task (-) reaction time (-) peak velocity (-) number of peaks (-) movement precision (-) E1 vs E4: Movement time of the reaching task (+exp1) reaction time (-) peak velocity (+exp) number of peaks (-) movement precision (-)

		E1 vs E5: Movement time of the reaching task (+exp1) reaction time (-) peak velocity (+exp) number of peaks (-) movement precision (-) E2 vs E3: Movement time of the reaching task (-) reaction time (-) peak velocity (-) number of peaks (-) movement precision (-) E4 vs E5: Movement time of the reaching task (+exp1) reaction time (-) peak velocity (-) number of peaks (-) movement precision (-)
Mirror Therapy combined with other interventions compared to bilateral arm training		
Zhang et al. (2024c) RCT (6) NStart=50 NEnd=37 TPS=Subacute A + B vs A/B *Also in Table 2 (Bilateral Arm Training)*	E: Mirror therapy + Bilateral arm training + Conventional therapy C: Bilateral Arm training + Conventional therapy Duration: Mirror therapy Group: 90 mins/d (60 mins of mirror therapy, 30 mins of bilateral hand function training), 5ds/wk, 4wks; Control group: 1 hour of additional conventional therapy and 30 mins of bilateral upper arm training, 5ds/wk, 4wks	E vs C: FMA-UE (+exp) Fractional amplitude of Low-frequency fluctuations contrealesional M1(+exp) ipsilesional superior frontal gyrus (+exp) bilateral precuneus (+exp) ipsilesional middle temporal gyrus (+con) Functional connectivity cM1-iM1 (+exp) cM1-Lignual gyrus (+con)
Zhuang et al. (2021) RCT (8) NStart=36 NEnd=36 TPS=Subacute A + B vs A/B *Also in Table 2 (Bilateral Arm Training)*	E1: Associated Mirror Therapy (Mirror Therapy + Bimanual Training) E2: Bimanual Training without mirroring + Conventional Care Duration: 30min, 5d/wk for 4wk	E1 vs E2: FMA (+exp) BBT (-) FIM (+exp)
Rodrigues et al. (2016) Pilot RCT (7) NStart=16 NEnd=16 TPS=Chronic A vs B *Also in Table 2 (Bilateral Arm Training)*	E: Mirror therapy-based Bilateral Training C: Bilateral Training Duration: 1hr/d, 3d/wk, 4wk	E vs C: TEMPA Upper extremity performance test for the elderly (-)- Combined total (-) Unilateral tasks (-) Bilateral tasks (-) Functional scores (-) Unilateral tasks (-) Bilateral tasks (-) Task analysis (-) Unilateral tasks (-) Bilateral tasks (-) Fugl–Meyer Assessment (-); - proximal (-) - distal (-) Proprioception (-)

Mirror Therapy combined with other interventions compared to sham or robotics		
Chen et al. (2023c) RCT (6) NStart=43 NEnd=37 TPS=Chronic A + B vs A/B *Also in Table 16 (Robotics)*	E: Mirror therapy + robot assisted training HOH(Hand of Hope) C: Sham mirror therapy + robot assisted training HOH Duration: 60min/d(20min mirror therapy, 40min robot therapy), 3d/wk, 6wks	E vs C: FMA-UE (-) WMFT (-) NEADL (-) SSEQ (-) DLSES (-)
Rong J. et al. (2021) RCT (8) NStart=40 NEnd=40 TPS=Subacute A + B vs A/B *Also in Table 16 (Robotics)*	E: Mirror Visual Feedback + Robot-Assisted Training C: Sham-Mirror Visual Feedback+ Robot-Assisted Training Duration: 90min/d, 5d/wk, 4wks	E vs C: FMA UL (+exp) HW (-) FIM Total (-) Self-care (+exp) Sphincter control (-) Transfers (-) Locomotion (-) Communication (-) Social cognition ability (-) mBI (-) Grip strength (+exp)
Virtual reality-based mirror therapy combined with other interventions compared to conventional therapy		
Hsu et al. (2022b) RCT (7) NStart=54 NEnd=52 TPS=Chronic A1 vs A2 vs 0	E1: VR-based mirror therapy (VR-MT) + conventional OT E2: mirror therapy (MT) + conventional OT C: conventional OT Duration: 50min/d(30min study condition; 20min OT), 2d/wk, 9wks	E1 vs E2: FMA-UE (-) shoulder (-) wrist (-) hand (+exp1) coordination (-) , MAL AOU (-) QOM (+exp1) BBT (+exp1) SWM (-) MAS (-) E1 vs C: FMA-UE (+exp1) shoulder (-) wrist (+exp1) hand (-) coordination (-) MAL (-) BBT (-) SWM (-) MAS wrist (+exp1) hand (-)
Mirror Therapy combined with other interventions compared to conventional therapy		
Fernandez-Solana et al. (2024) RCT (6) NStart=128 NEnd=120 TPS=Subacute	E1: Mirror therapy + TOT E2: Cognitive therapeutic exercise + TOT C: Conventional therapy (TOT)	E1/E2 vs C: FMA - UE Functionality (+exp1/2) Motor domain (+exp1/2) Sensory domain (+exp1/2)

A vs B vs 0 *Also in Table 13 (Cognitive and Dual-Task Training)*	Duration: E1/E2: 50min/d, 5d/wk, 4wks; C: 30min/d, 5d/wk, 4wks	Range of motion and pain domain (-) E1 vs E2: FMA - UE Functionality (-) Motor domain (-) Sensory domain (-) Range of motion and pain domain (+exp1)
Guo et al. (2019) RCT (6) NStart=120 NEnd=120 TPS=Subacute A + B vs A vs B vs 0	E1: MT + conventional therapy; E2: ESWT + conventional therapy; E3: MT + ESWT + conventional therapy C: Conventional therapy Duration: Conventional-30min/d, 5x/wk, 4wk; Trainings-20m/d, 5x/wk, 4wk	E1 vs C: FMA(+exp1) mAS(+exp1) E2 vs C: FMA(+exp2) mAS(-) E3 vs C: FMA(+exp3) mAS(+exp3) E1 vs E2 vs E3: FMA(+exp1) mAS(+exp1)
Oliveira et al. (2018) Pilot RCT (3) NStart=21 NEnd=21 TPS=Chronic A vs B vs 0 *Also in Table 25 (Muscle Vibration)*	E1: Mirror therapy E2: Vibration therapy C: Conventional therapy Duration: 15min, 3x/wk, 4wk	E1 vs C: Rivermead Mobility Index (+exp1) Jebsen Hand Function Test - Time (+exp1) Wolf Motor Function Test; - Time (+exp1); - Score (+exp1) E2 vs C: Rivermead Mobility Index (+exp2) Jebsen Hand Function Test - Time (+exp2) Wolf Motor Function Test; - Time (+exp2); - Score (+exp2) E1 vs E2: Rivermead Mobility Index (-) Jebsen Hand Function Test - Time (-) Wolf Motor Function Test (-)
Amasyali et al. (2016) Pilot RCT (5) NStart=24 NEnd=21 TPS=Subacute A vs B vs 0 *Also in Table 22 (Neuromuscular Electrical Stimulation (NMES))*	E1: Mirror therapy E2: EMG-triggered neuromuscular stimulation C: Conventional care Duration: E1/E2: 30min/d, 5d/wk, 3wks; C: 2h/d, 5d/wk, 3wks	E vs C: E1/2 v C: Wrist Extension (-) Grip Force (-) Box and Blocks Test (-) Fugl-Meyer Upper Extremity (+exp1) E1 vs E2: Wrist Extension (-) Grip Force (-) Box and Blocks Test (-) Fugl-Meyer Upper Extremity (-)
Kim et al. (2015c) Pilot RCT (5) NStart=33 NEnd=29 TPS=Chronic A + B1 vs A + B2 vs 0 *Also in Table 22 (Neuromuscular Electrical Stimulation (NMES))*	E1: Functional electrical stimulation with biofeedback + mirror therapy E2: FES + mirror therapy C: Conventional rehabilitation Duration: 30 min/d, 5d/wk for 4 wk	E1 vs C: Functional Independence Measure (+exp) Jebsen Taylor Hand test (+exp) Manual Muscle Test wrist extension (+exp) wrist flexion (-) elbow extension (-) elbow flexion (-) Box and Block Test (+exp)

		ROM wrist extension (-) wrist flexion (-) elbow extension () elbow flexion (-) Grip strength (-) Modified Ashworth Scale (-) SSQOL (+exp) E1 vs E2: Functional Independence Measure (-) Jebsen Taylor Hand test (+exp) Manual Muscle Test (+exp) Box and Block Test (+exp) ROM wrist extension (-) wrist flexion (-) elbow extension () elbow flexion (-) Grip strength (+exp) SSQOL (+exp)
Mirror Therapy combined with other interventions compared to mirror therapy		
Lee et al. (2024b) RCT (8) NStart=35 NEnd=32 TPS=Chronic A + B vs A + C *Also in Table 2 (Bilateral Arm Training)*	E1: Unilateral mirror therapy + Unimanual training E2: Unilateral mirror therapy + Bimanual training E3: Bilateral mirror therapy + Bimanual training C: Mirror therapy Duration: 60min/d, 5d/wk, 3-4wks (15 sessions)	E1 vs E2 vs E3 vs C: FMA - UE (-) CAHAI (-) EQ-5D (-) MAL (-) rNSA (-) E1 vs E2: FMA-UE (-) CAHAI (-) EQ-5D (-) MAL (-) rNSA (-) E2 vs E3: FMA-UE (-) CAHAI (+exp2) EQ-5D (+exp2) MAL (-) rNSA (-)
Lin et al. (2014b) Pilot RCT (6) NStart=16 NEnd=16 TPS=Chronic A + B vs A/B *Also in Table 27 (Additional Afferent and Peripheral Stimulation Methods)*	E: Mirror therapy + Mesh glove C: Mirror therapy Duration: 90min/d, 5d/wk for 4wk	E vs C: Modified Ashworth Scale (-) Box and Block Test (+exp) Functional Independence Measure (-) Action Research Arm Test (+exp)
Mirror Therapy combined with other interventions compared to cimt		
Kaviraja et al. (2021) RCT (4) NStart=30 NEnd=30 TPS=Not Reported	E: Mirror Therapy C: modified CIMT Duration: 30min, 5d/wk, 4wk	E vs C: Upper Extremity Functional Index Scale (+exp) FMA-UE (+exp)

A vs B *Also in Table 6 (Constraint-Induced Movement Therapy (CIMT))*		
Preetha et al. (2021) RCT (2) NStart=30 NEnd=30 TPS=Not Reported A vs B *Also in Table 6 (Constraint-Induced Movement Therapy (CIMT))*	E: Task-Based Mirror Therapy (TMBT) C: Constraint Induced Movement Therapy (CIMT) Duration: E: 15min/d, 4d/wk, 4wk, C: 6hr/d, 4d/wk, 4wk	E vs C: FMA (no stat)
Mirror Therapy compared to no treatment		
Panigrahi A. et al. (2022) Pilot RCT (5) NStart=40 NEnd=40 TPS=Subacute A vs 0	E: Mirror therapy C: No treatment/not mentioned Duration: 20-30min/d, 5d/wk, 4wks	E vs C: FMA-UE (+exp)
Different approaches to virtual reality-based mirror therapy compared against one another		
Lin et al. (2021) Pilot RCT (8) NStart=18 NEnd=18 TPS=Chronic A1 vs A2	E: Virtual Reality Mirror Therapy C: Standard Mirror Therapy Duration: 30min, 2x/wk, 9wks	E vs C: Fugl-Meyer Assessment (+exp) Shoulder/Elbow/Forearm (-) Wrist (-) Hand (+exp) Coordination (-)
Cross-Referenced RCTs: Combined or Comparative Interventions Involving Mirror Therapy (results included in this table's levels of evidence)		
Jo et al. (2024) RCT (6) NStart=45 NEnd=45 TPS=Subacute A vs B vs 0 *Primary listing: Table 17 (Virtual Reality)*	E1: Virtual reality-based mirror therapy + conventional physical therapy E2: Traditional mirror therapy + conventional physical therapy C: Conventional physical therapy Duration: 30min/d, 3d/wk for 4wks MT + 60min/d 5d/wk for 4wks conventional therapy	E1/E2 vs C: FMA-UE (+exp1) Manual Function Test (+exp1) BBT (+exp1) E1 vs E2: FMA-UE (+exp1) Manual Function Test (+exp1) BBT (+exp1)
Nimra et al. (2024) Pilot RCT (5) NStart=26 NEnd=26 TPS=Acute A vs B *Primary listing: Table 1 (Neurodevelopmental Techniques)*	E: Brunnstrom movement therapy + conventional therapy C: Mirror Therapy + Conventional therapy Duration: BMT/MT: 12 sessions over 4 weeks; CT: 10min/d, 3d/wk, 4wks	E vs C: FMA Wrist (+exp) Hand (+exp) Coordination and speed (+exp) Brunnstrom hand recovery (+exp)
Zhang et al. (2024b) RCT (7) NStart=60 NEnd=51 TPS=Subacute A + B vs A vs B vs 0 *Primary listing: Table 22 (Neuromuscular Electrical Stimulation (NMES))*	E1: Contralaterally controlled FES (CCFES) + CT E2: Mirror therapy +CT E3: CCFES + Mirror therapy + CT C: Conventional therapy Duration: MT: 20min/d, 5d/wk, 3wks; CCFES: 20min/d, 5d/wk, 3wks; CT: 3-4hr/d, 5d/wk, 3wks	E1 vs E2 vs E3 vs C: FMA - UE Total (-) Wrist (+exp3) ARAT (-) MRCS (-) BI (-) RMT (-)

Kim et al. (2023a) RCT (5) NStart=26 NEnd=24 TPS=Chronic A + B + C vs A/A + B *Primary listing: Table 19 (EMG Biofeedback)*	E: FES-Biofeedback mirror therapy + conventional C: Mirror therapy + conventional rehab Duration: 30min/d, 5d/wk, 4wk	E vs C: Brunnstrom Motor Recovery Stage UE (-) hand (-) FMA-UE (+exp) MFT (+exp) AROM flexion (+exp) extension (+exp) pronation (+exp) supination (+exp) ulnar deviation (+exp) radial deviation (+exp) MBI (-)
Li et al. (2023) RCT (6) NStart=70 NEnd=63 TPS=Chronic A + B vs A + C vs A *Primary listing: Table 16 (Robotics)*	E1: Bilateral robotic priming training + mirror training (R-mirr) E2: Bilateral robotic priming training + the same training without mirror (sham: exactly the R-mirr protocol without mirror) C: Bilateral robotic priming training + movement oriented training Duration: 90min/d, 3d/wk, 6wks	E1/E2 vs C: E1 vs E2/C: FMA-UE (+exp1) ABILHAND (-) SIS (-) Lateral pinch (-) Accelerometer (-)
Won-Gi Choi et al. (2023) Pilot RCT (6) NStart=25 NEnd=25 TPS=Chronic A + B + C vs A/A + B *Primary listing: Table 11 (Mental Practice)*	E1: Mental practice + Task-specific training E2: Mirror therapy E3: Mental practice + Mirror Therapy + Task specific training Duration: 30 mins/d, 5d/wk, 4wks (E1 - 15 mins of mental practice, 15 mins of task-specific training); (E2 - 30 mins of mirror therapy); (E3 - 10 mins of mental practice, 10 mins of task-specific training, 10 mins of mirror therapy)	E1 vs E2 vs E3: FMA (-) ARAT (-) mBI (-) MAL (-)
de Freitas Zanona A. et al. (2023) RCT (8) NStart=36 NEnd=36 TPS=Subacute A + B + C + D vs A + B + C vs A vs 0 *Primary listing: Table 29 (Repetitive Transcranial Magnetic Stimulation (rTMS))*	E1: rTMS + Sham TENS with Mirror therapy and Nonelectrical somatosensory stimulation E2: Sham rTMS + TENS with Mirror therapy and Nonelectrical somatosensory stimulation E3: rTMS + TENS with Mirror therapy and Nonelectrical somatosensory stimulation C: Sham rTMS + Sham TENS with Mirror therapy and Nonelectrical somatosensory stimulation Duration: 80mins/d (20 mins of rTMS, 15 mins of Nonelectrical somatosensory stimulation, 45 minutes of mirror therapy with TENS); 5d/wk, 2wks	E1 vs E2 vs E3 vs C: MEP amplitude (-) somatosensory evoked potential (-) ASY index (no stat)
Schrader et al. (2022) RCT (5) NStart=29 NEnd=24 TPS=Chronic A + B vs A/B	E1: RMT E2: MT Duration: 150 min/wk, 3-5 sessions/wk, 5 weeks	E1 vs E2: FMA-UE (-) MI (-) Pain-NRS (-)

Primary listing: Table 16 (Robotics)		
Hung et al. (2022) Pilot RCT (7) NStart=37 NEnd=37 TPS=Chronic A + B vs A + C vs A *Primary listing: Table 16 (Robotics)*	E1: Robot-assisted training (Bi-Manu-Track BMT robotic arm) + BoNT-A injection + functional practice E2: Mirror therapy + BoNT-A injection + functional practice C: conventional task-oriented movement training + BoNT-A injection + functional practice Duration: 75min/d (45min active, 30min functional practice), 3d/wk, 8 wks	E1 vs E2 vs C: FMA-UE (-) proximal (-) distal (-)], [MAS; -elbow flexor (-); -forearm pronator (-); -wrist flexor (-); -finger PIP flexor (-) MAL (-)
Li Y.-C. et al. (2021) RCT (8) NStart=31 NEnd=31 TPS=Chronic A + B vs A + C *Primary listing: Table 16 (Robotics)*	E: Robotic Priming + MT (RMT) C: Robotic Priming + Bilateral Upper Limb Training (RBULT) Duration: 80-90min/d, 3d/wk, 6wks	E vs C: FMA-UE proximal (-) distal (+exp) rNSA (-) CAHAI (-) Accelerometer data (+exp)
Hsieh et al. (2020) Pilot RCT (6) NStart=21 NEnd=21 TPS=Subacute A vs B vs 0 *Primary listing: Table 12 (Action Observation)*	E1: Action Observation E2: Mirror Therapy C: Customary bilateral arm training (dose-matched execises) Duration: 60min/d, 5d/wk, 3wks	E1 vs C: Fugl-Meyer Assessment (No stats) Box and Block Test Functional Independence Measure (No stats) Stroke Impact Scale (No stats) E2 vs C: Fugl-Meyer Assessment (No stats) Box and Block Test Functional Independence Measure (No stats) Stroke Impact Scale (No stats) E1 vs E2: Fugl-Meyer Assessment (No stats) Box and Block Test Functional Independence Measure (No stats) Stroke Impact Scale (No stats)
Liao et al. (2020) Pilot RCT (7) NStart=34 NEnd=28 TPS=Chronic A + B vs A/B *Primary listing: Table 31 (Transcranial Direct Current Stimulation (tDCS))*	E1: Sequential Combination of Anodal tDCS + Mirror Therapy E2: Concurrent Combination of tDCS + Mirror Therapy C: Sham tDCS + Mirror Therapy Duration: 90min/d, 5d/wk, 4wks	E1 vs E2 vs C: Nottingham Extended Activities of Daily Life (+exp1) Fugl-Meyer Assessment- Upper Extremity (-) Kinematic Variables Trunk Reaction Time (-) Index Reaction Time (-) Trunk Movement Time (-) Index Movement Time (-) Trunk Total Displacement (-) 0 Index Total Displacement (-)
Jan et al. (2019) RCT (5) NStart=66 NEnd=66 TPS=Not Reported A vs B	E: Motor learning program C: Mirror therapy Duration: 2Hr, 3x/wk, 6wk	E vs C: Motor Assessment Scale Upper limb: (+exp) Hand: (+exp) Advance Hand: (+exp)

Primary listing: Table 1 (Neurodevelopmental Techniques)		
Fong et al. (2019) RCT (6) NStart=101 NEnd=96 TPS=Chronic A + B vs A/B *Primary listing: Table 2 (Bilateral Arm Training)*	E: bilateral arm training with visual fb mirror therapy C: bilateral arm training without mirror therapy Duration: 30min x2/wk, 6wk	E vs C: FMA UE (-) Hand (+exp) ARAT (-) WMFT (-)
Ehrensberger et al. (2019) Pilot RCT (7) NStart=35 NEnd=32 TPS=Chronic A + B vs A/B *Primary listing: Table 3 (Exercise and Strength Training)*	E: Mirror and strength training therapy C: Strength training Duration: 3x/wk, 4wk	E vs C: Modified ashworth Scale (-), Biodex dynamometer (authour stated problem), chedoke arm and hand activity inventory (-) ABILHAND (-) london handicap scale
Jin et al. (2019) Pilot RCT (7) NStart=30 NEnd=28 TPS=Chronic A + B1 vs A + B2 vs 0 *Primary listing: Table 31 (Transcranial Direct Current Stimulation (tDCS))*	E1: Bilateral tDCS before mirror therapy E2: tDCS during mirror therapy C: Sham tDCS + mirror therapy Duration: 30min/d, 5d/wk, 2wk	E1 vs E2: ARAT (+exp2) FMA (-) BBT (-) E1 vs C: ARAT (-) FMA (-) BBT (-) E2 vs C: ARAT (+exp2) FMA (-) BBT (-)
Kim & Yim et al. (2018) RCT (5) NStart=24 NEnd=20 TPS=Subacute A + B vs A/B *Primary listing: Table 29 (Repetitive Transcranial Magnetic Stimulation (rTMS))*	E: High-frequency rTMS + Task-oriented mirror therapy (TOMT) C: High-frequency rTMS Duration: 15min/d 5d/wk, 2wks 20Hz hf-rTMS + 20min/d, 5d/wk, 2wks TOMT	E vs C: Hand Grip Strength (-) Pinch Grip (+exp) Box and Block test (+exp) cortical excitability threshold percent (-) Latency (-) amplitude (-)
Schick et al. (2017) RCT (7) NStart=33 NEnd=32 TPS=Subacute A + B vs A/B *Primary listing: Table 22 (Neuromuscular Electrical Stimulation (NMES))*	E: bilateral EMG-triggered multi-channel electrostimulation + mirror therapy C: bilateral EMG-triggered multi-channel electrostimulation Duration: 30min/d, 5d/wk, 3wk	E vs C: Outcomes for all patients Fugl-Meyer Assessment (-) Part A (-) Part B (-) Part C (-) Part D (-) Rivermead Assessment of Somatosensory Performance (-) Box and Block Test (-) Goal Attainment Scaling (-) Barthel Index (-) For patients with very severe paresis Fugl-Meyer Assessment (+exp) Part A (+exp)

		Part B (-) Part C (-) Part D (-)
Cho & Cha (2015) RCT (5) NStart=30 NEnd=27 TPS=Chronic A + B vs A/B *Primary listing: Table 31 (Transcranial Direct Current Stimulation (tDCS))*	E: Dual tDCS + Mirror therapy C: tDCS + Sham mirror Duration: 45min, 3x/wk, for 6wks	E vs C: BBT (+exp) Grip strength (+exp) FMA (-) Jebsen-taylor hand test (-)
Kim et al. (2014a) RCT (7) NStart=27 NEnd=23 TPS=Subacute A + B vs A/B *Primary listing: Table 22 (Neuromuscular Electrical Stimulation (NMES))*	E: Functional Electrical Stimulation + Mirror Therapy C: Functional Electrical Stimulation + Sham Mirror Therapy Duration: 30min/d stimulation/sham + 30min/d ,MT, 5d/wk, 4wks	E vs C: Box and Block Test (-) Fugl-Meyer Assessment Shoulder, Elbow, Forearm (-) Wrist (+exp) Hand (+exp) Coordination (-) Brunnstrom Recovery Stage Upper Extremity (-) Hand (+exp) Manual Function Test Shoulder (-) Hand (+exp)
Kojima et al. (2014) RCT Crossover (5) NStart=13 NEnd=13 TPS=Subacute A + B1 vs A + B2 *Primary listing: Table 22 (Neuromuscular Electrical Stimulation (NMES))*	E1: Immediate Mirror therapy + EMG-triggered NMES + Physical and Occupational therapy E2: delayed Mirror therapy + EMG-triggered NMES + Physical and Occupational therapy Duration: 30 min/d, 4d/wk for 8 wk	E1 vs E2: FMA (+exp) active range of motion (+exp) hand ratio BBT WMFT MAL

Abbreviations and table notes: C=control group; D=days; E=experimental group; H=hours; Min=minutes; RCT=randomized controlled trial; TPS=time post stroke category (Acute: less than 30 days, Subacute: more than 1 month but less than 6 months, Chronic: over 6 months); Wk=weeks.

+exp indicates a statistically significant between groups difference at α=0.05 in favour of the experimental group

+exp1/+exp2/+exp3 indicates a statistically significant between groups difference at α=0.05 in favour of the first, second or third experimental group

+con indicates a statistically significant between groups difference at α=0.05 in favour of the control group

- indicates no statistically significant between groups differences at α=0.05

1. Body Functions and Structures

MOTOR FUNCTION			
LoE	**Conclusion Statement**	**RCTs**	**References**
1a	Mirror Therapy may produce greater improvements in motor function than conventional therapy.	22	Ding L. et al. (2024); Kim et al. (2023d); Wang et al. (2023g); Geller et al. (2022); Wen et al. (2022); Xiang Zhang et al. (2021); Chinnavan et al. (2020); Bai et al. (2019); Ding et al. (2019); Arya et al. (2018); Chan et al. (2018); Ding et al. (2018); Gurbuz et al. (2016); Kim et al. (2016a); PervaneVural et al. (2016); Arya

			et al. (2015); MirelaCristina et al. (2015); Samuelkamaleshkumar et al. (2014); Radajewska et al. (2013); Lee et al. (2012); Michielsen et al. (2011); Dohle et al. (2009)
1b	There is conflicting evidence about the effect of Video augmented mirror therapy with conventional therapy when compared to traditional mirror therapy with conventional therapy for improving motor function.	1	Kim et al. (2023d)
1a	Mirror Therapy may produce greater improvements in motor function than sham.	8	Madhoun et al. (2020); Antoniotti et al. (2019); Lim et al. (2016); Park et al. (2015b); Park et al. (2015d); Invernizzi et al. (2013); Thieme et al. (2013); Cacchio et al. (2009)
1b	Individual mirror therapy may not have a difference in efficacy when compared to Group mirror therapy for improving motor function.	1	Thieme et al. (2013)
1a	Mirror Therapy combined with other interventions may produce greater improvements in motor function than sham.	2	Choi et al. (2019); Ji et al. (2014)
1b	Leap motion virtual reality with mirror therapy may produce greater improvements in motor function than Mirror therapy.	1	Choi et al. (2019)
1b	Mirror therapy with high frequency repetitive transcranial magnetic stimulation and Traditional physical therapy may produce greater improvements in motor function than Mirror therapy with Traditional physical therapy.	1	Ji et al. (2014)
1a	Mirror Therapy combined with other interventions may produce greater improvements in motor function than task-specific training.	2	Lin et al. (2014a); Wu et al. (2013b)
1b	Mirror therapy with Mesh glove (afferent stimulation, primarily neuromuscular electrical stimulation) may not have a difference in efficacy when compared to Mirror therapy for improving motor function.	1	Lin et al. (2014a)
1a	Different approaches to mirror Therapy combined with other interventions may not have a difference in efficacy when compared with one another for improving motor function.	2	Li et al. (2019); Lee et al. (2015a)
2	Home-based mirror therapy and task specific training may not have a difference in efficacy when compared to Clinic-based mirror therapy and task specific training for improving motor function.	1	Hsieh et al. (2018a)
1b	Functional Electrical Stimulation may produce greater improvements in motor function than Mirror Therapy.	1	Mathieson et al. (2018)
1b	Functional Electrical Stimulation may not have a difference in efficacy when compared to Functional Electrical Stimulation with Mirror Therapy for improving motor function.	1	Mathieson et al. (2018)
1b	Mirror Therapy may not have a difference in efficacy when compared to Functional Electrical Stimulation with Mirror Therapy for improving motor function.	1	Mathieson et al. (2018)
1b	Mirror therapy with Mesh glove afferent stimulation may not have a difference in efficacy when compared to Mirror therapy for improving motor function.	1	Lee et al. (2015a)
1b	Mirror therapy with usual care may not have a difference in efficacy when compared to Lower-limb exercise with usual care for improving motor function.	1	Tyson et al. (2015)

1a	Mirror Therapy: some approaches may produce greater improvements in motor function than others.	3	Tesio et al. (2023); Gamez Santiago et al. (2022); Lee et al. (2020a)
1b	There is conflicting evidence about the effect of Mirror therapy when compared to Passive mobilization for improving motor function.	1	Colomer et al. (2016)
1a	Mirror Therapy combined with other interventions may produce greater improvements in motor function than bilateral arm training.	3	Zhang et al. (2024c); Zhuang et al. (2021); Rodrigues et al. (2016)
1a	Mirror Therapy combined with other interventions may not have a difference in efficacy when compared to sham or robotics for improving motor function.	2	Chen et al. (2023c); Rong J. et al. (2021)
1b	Virtual reality-based mirror therapy (virtual reality-mirror therapy) with conventional occupational therapy may not have a difference in efficacy when compared to conventional occupational therapy for improving motor function.	1	Hsu et al. (2022b)
1b	Virtual reality-based mirror therapy (virtual reality-mirror therapy) with conventional occupational therapy may not have a difference in efficacy when compared to mirror therapy with conventional occupational therapy for improving motor function.	1	Hsu et al. (2022b)
1b	Mirror therapy with TOT may produce greater improvements in motor function than Conventional therapy (TOT).	1	Fernandez-Solana et al. (2024)
1b	Mirror therapy with TOT may not have a difference in efficacy when compared to Cognitive therapeutic exercise with TOT for improving motor function.	1	Fernandez-Solana et al. (2024)
1b	Unilateral mirror therapy with Unimanual training may not have a difference in efficacy when compared to Mirror therapy for improving motor function.	1	Lee et al. (2024b)
1b	Unilateral mirror therapy with Unimanual training may not have a difference in efficacy when compared to Unilateral mirror therapy with Bimanual training for improving motor function.	1	Lee et al. (2024b)
1b	Unilateral mirror therapy with Bimanual training may not have a difference in efficacy when compared to Bilateral mirror therapy with Bimanual training for improving motor function.	1	Lee et al. (2024b)
2	Mirror Therapy combined with other interventions may produce greater improvements in motor function than constraint-induced movement therapy.	1	Kaviraja et al. (2021)
1b	There is conflicting evidence about the effect of Functional Electrical Stimulation with Mirror Therapy when compared to Functional Electrical Stimulation with Sham Mirror Therapy for improving motor function.	1	Kim et al. (2014a)
1b	Bilateral electromyography-triggered multi-channel electrostimulation with mirror therapy may not have a difference in efficacy when compared to bilateral electromyography-triggered multi-channel electrostimulation for improving motor function.	1	Schick et al. (2017)
2	Immediate Mirror therapy with electromyography-triggered neuromuscular electrical stimulation and Physical and Occupational therapy may produce greater improvements in motor function than delayed Mirror therapy with electromyography-triggered neuromuscular electrical stimulation and Physical and Occupational therapy.	1	Kojima et al. (2014)
1b	Bilateral arm training; visual fb mirror therapy may not have a difference in efficacy when compared to bilateral arm training without mirror therapy for improving motor function.	1	Fong et al. (2019)

1b	Robotic Priming with mirror therapy (RMT) may not have a difference in efficacy when compared to Robotic Priming with Bilateral Upper Limb Training (RBULT) for improving motor function.	1	Li Y.-C. et al. (2021)
2	RMT may not have a difference in efficacy when compared to mirror therapy for improving motor function.	1	Schrader et al. (2022)
2	Functional electrical stimulation-Biofeedback mirror therapy with conventional may produce greater improvements in motor function than Mirror therapy with conventional rehab.	1	Kim et al. (2023a)
1b	Bilateral robotic priming training with mirror training (R-mirr) may produce greater improvements in motor function than Bilateral robotic priming training with movement oriented training.	1	Li et al. (2023)
1b	Virtual reality-based mirror therapy with conventional physical therapy may produce greater improvements in motor function than Conventional physical therapy.	1	Jo et al. (2024)
1b	Virtual reality-based mirror therapy with conventional physical therapy may produce greater improvements in motor function than Traditional mirror therapy with conventional physical therapy.	1	Jo et al. (2024)
1b	Contralaterally controlled functional electrical stimulation with CT may not have a difference in efficacy when compared to Conventional therapy for improving motor function.	1	Zhang et al. (2024b)
1b	Mirror therapy with conventional therapy may produce greater improvements in motor function than conventional therapy alone.	1	Guo et al. (2019)
2	Brunnstrom movement therapy with conventional therapy may produce greater improvements in motor function than mirror therapy with conventional therapy.	1	Nimra et al. (2024)
1b	Mental practice combined with other interventions may not have a difference in efficacy when compared to mirror therapy for improving motor function.	1	Won-Gi Choi et al. (2023)
2	Mirror therapy may produce greater improvements in motor function than No treatment/not mentioned.	1	Panigrahi A. et al. (2022)
1b	Virtual Reality Mirror Therapy may not have a difference in efficacy when compared to Standard Mirror Therapy for improving motor function.	1	Lin et al. (2021)
1b	There is conflicting evidence about the effect of Movement based mirror therapy with conventional therapy when compared to Task based mirror therapy with conventional therapy for improving motor function.	1	Bai et al. (2019)
2	Mirror Therapy combined with other interventions may produce greater improvements in motor function than conventional therapy.	3	Oliveira et al. (2018); Amasyali et al. (2016); Kim et al. (2015c)
2	Mirror therapy may not have a difference in efficacy when compared to Vibration therapy for improving motor function.	1	Oliveira et al. (2018)
2	Mirror therapy may not have a difference in efficacy when compared to EMG-triggered neuromuscular stimulation for improving motor function.	1	Amasyali et al. (2016)
2	Functional electrical stimulation with biofeedback with mirror therapy may produce greater improvements in motor function than FES with mirror therapy.	1	Kim et al. (2015c)
1b	Mirror Therapy combined with other interventions may produce greater improvements in motor function than mirror therapy.	1	Lin et al. (2014b)
1b	Robot-assisted training (Bi-Manu-Track BMT robotic arm) with BoNT-A injection and functional practice may not have a difference in efficacy when compared to conventional task-oriented movement	1	Hung et al. (2022)

	training with BoNT-A injection and functional practice for improving motor function.		
1b	Mirror therapy with BoNT-A injection and functional practice may not have a difference in efficacy when compared to conventional task-oriented movement training with BoNT-A injection and functional practice for improving motor function.	1	Hung et al. (2022)
1b	Sequential Combination of Anodal tDCS with Mirror Therapy may not have a difference in efficacy when compared to Sham tDCS with Mirror Therapy for improving motor function.	1	Liao et al. (2020)
1b	Bilateral tDCS before mirror therapy may result in lesser improvements in motor function when compared to tDCS during mirror therapy.	1	Jin et al. (2019)
1b	Bilateral tDCS before mirror therapy may not have a difference in efficacy when compared to Sham tDCS with mirror therapy for improving motor function.	1	Jin et al. (2019)
1b	There is conflicting evidence about the effect of tDCS during mirror therapy when compared to Sham tDCS with mirror therapy for improving motor function.	1	Jin et al. (2019)
2	Dual tDCS with Mirror therapy may not have a difference in efficacy when compared to tDCS with Sham mirror for improving motor function.	1	Cho & Cha (2015)
1b	Concurrent Combination of tDCS with Mirror Therapy may not have a difference in efficacy when compared to Sham tDCS with Mirror Therapy for improving motor function.	1	Liao et al. (2020)

STROKE SEVERITY			
LoE	**Conclusion Statement**	**RCTs**	**References**
1a	Mirror Therapy may produce greater improvements in stroke severity than conventional therapy.	7	Arfianti et al. (2022); Gurbuz et al. (2016); PervaneVural et al. (2016); Arya et al. (2015); MirelaCristina et al. (2015); Samuelkamaleshkumar et al. (2014); Lee et al. (2012)
1a	There is conflicting evidence about the effect of Mirror Therapy when compared to sham for improving stroke severity.	4	Madhoun et al. (2020); Lim et al. (2016); Nookala & Vadlamudi (2011); Yavuzer et al. (2008b)
1b	There is conflicting evidence about the effect of Functional Electrical Stimulation with Mirror Therapy when compared to Functional Electrical Stimulation with Sham Mirror Therapy for improving stroke severity.	1	Kim et al. (2014a)
2	Functional electrical stimulation-Biofeedback mirror therapy with conventional may not have a difference in efficacy when compared to Mirror therapy with conventional rehab for improving stroke severity.	1	Kim et al. (2023a)
2	Mirror Therapy with Conventional Therapy may produce greater improvements in stroke severity than Conventional Therapy.	1	Chaudhari et al. (2019)
2	Brunnstrom movement therapy with conventional therapy may produce greater improvements in stroke severity than mirror therapy with conventional therapy.	1	Nimra et al. (2024)

MUSCLE STRENGTH			
LoE	**Conclusion Statement**	**RCTs**	**References**
1a	Mirror Therapy may not have a difference in efficacy when compared to conventional therapy for improving muscle strength.	4	Kim et al. (2023d); Geller et al. (2022); Ding et al. (2019); Michielsen et al. (2011)
2	Mirror Therapy may produce greater improvements in muscle strength than sham.	1	Invernizzi et al. (2013)
1b	Mirror therapy with usual care may not have a difference in efficacy when compared to Lower-limb exercise with usual care for improving muscle strength.	1	Tyson et al. (2015)
1a	There is conflicting evidence about the comparative effects of different approaches to Mirror Therapy for improving muscle strength.	2	Tesio et al. (2023); Gamez Santiago et al. (2022)
1b	Mirror Therapy combined with other interventions may produce greater improvements in muscle strength than sham or robotics.	1	Rong J. et al. (2021)
2	There is conflicting evidence about the effect of High-frequency repetitive transcranial magnetic stimulation with Task-oriented mirror therapy when compared to High-frequency repetitive transcranial magnetic stimulation for improving muscle strength.	1	Kim & Yim et al. (2018)
2	RMT may not have a difference in efficacy when compared to mirror therapy for improving muscle strength.	1	Schrader et al. (2022)
1b	Bilateral robotic priming training with mirror training (R-mirr) may not have a difference in efficacy when compared to Bilateral robotic priming training with movement oriented training for improving muscle strength.	1	Li et al. (2023)
1b	Contralaterally controlled functional electrical stimulation with CT may not have a difference in efficacy when compared to Conventional therapy for improving muscle strength.	1	Zhang et al. (2024b)
2	Mirror Therapy combined with other interventions may not have a difference in efficacy when compared to conventional therapy for improving muscle strength.	2	Amasyali et al. (2016); Kim et al. (2015c)
2	Mirror therapy may not have a difference in efficacy when compared to EMG-triggered neuromuscular stimulation for improving muscle strength.	1	Amasyali et al. (2016)
2	Functional electrical stimulation with biofeedback with mirror therapy may produce greater improvements in muscle strength than FES with mirror therapy.	1	Kim et al. (2015c)
2	Dual tDCS with Mirror therapy may produce greater improvements in muscle strength than tDCS with Sham mirror.	1	Cho & Cha (2015)

SPASTICITY			
LoE	**Conclusion Statement**	**RCTs**	**References**
1a	Mirror Therapy may not have a difference in efficacy when compared to conventional therapy for improving spasticity.	6	Bai et al. (2019); Ding et al. (2019); PervaneVural et al. (2016); MirelaCristina et al. (2015); Samuelkamaleshkumar et al. (2014); Michielsen et al. (2011)
1a	Mirror Therapy may not have a difference in efficacy when compared to sham for improving spasticity.	4	Madhoun et al. (2020); Thieme et al. (2013); Nookala & Vadlamudi (2011); Yavuzer et al. (2008b)

1b	There is conflicting evidence about the effect of Individual mirror therapy when compared to Group mirror therapy for improving spasticity.	1	Thieme et al. (2013)
1b	Different approaches to mirror Therapy combined with other interventions may not have a difference in efficacy when compared with one another for improving spasticity.	1	Lee et al. (2015a)
1b	Mirror therapy with Mesh glove afferent stimulation may not have a difference in efficacy when compared to Mirror therapy for improving spasticity.	1	Lee et al. (2015a)
1b	Mirror therapy with usual care may not have a difference in efficacy when compared to Lower-limb exercise with usual care for improving spasticity.	1	Tyson et al. (2015)
1b	Virtual reality-based mirror therapy (virtual reality-mirror therapy) with conventional occupational therapy may not have a difference in efficacy when compared to mirror therapy with conventional occupational therapy for improving spasticity.	1	Hsu et al. (2022b)
1b	Mirror therapy with conventional therapy may produce greater improvements in spasticity than conventional therapy alone.	1	Guo et al. (2019)
1b	Movement based mirror therapy with conventional therapy may not have a difference in efficacy when compared to Task based mirror therapy with conventional therapy for improving spasticity.	1	Bai et al. (2019)
2	Mirror Therapy combined with other interventions may not have a difference in efficacy when compared to conventional therapy for improving spasticity.	1	Kim et al. (2015c)
1b	Mirror Therapy combined with other interventions may not have a difference in efficacy when compared to mirror therapy for improving spasticity.	1	Lin et al. (2014b)

RANGE OF MOTION			
LoE	**Conclusion Statement**	**RCTs**	**References**
2	Immediate Mirror therapy with electromyography-triggered neuromuscular electrical stimulation and Physical and Occupational therapy may produce greater improvements in range of motion than delayed Mirror therapy with electromyography-triggered neuromuscular electrical stimulation and Physical and Occupational therapy.	1	Kojima et al. (2014)
2	Functional electrical stimulation-Biofeedback mirror therapy with conventional may produce greater improvements in range of motion than Mirror therapy with conventional rehab.	1	Kim et al. (2023a)
2	Mirror Therapy combined with other interventions may not have a difference in efficacy when compared to conventional therapy for improving range of motion.	1	Kim et al. (2015c)
2	Functional electrical stimulation with biofeedback with mirror therapy may not have a difference in efficacy when compared to FES with mirror therapy for improving range of motion.	1	Kim et al. (2015c)

PROPRIOCEPTION			
LoE	**Conclusion Statement**	**RCTs**	**References**
1a	There is conflicting evidence about the effect of Mirror Therapy when compared to conventional therapy for improving proprioception.	2	Arya et al. (2018); Dohle et al. (2009)
1b	Mirror Therapy combined with other interventions may not have a difference in efficacy when compared to task-specific training for improving proprioception.	1	Wu et al. (2013b)

1a	Different approaches to mirror Therapy combined with other interventions may not have a difference in efficacy when compared with one another for improving proprioception.	2	Li et al. (2019); Lee et al. (2015a)
2	Home-based mirror therapy and task specific training may not have a difference in efficacy when compared to Clinic-based mirror therapy and task specific training for improving proprioception.	1	Hsieh et al. (2018a)
1b	Mirror therapy with Mesh glove afferent stimulation may not have a difference in efficacy when compared to Mirror therapy for improving proprioception.	1	Lee et al. (2015a)
1b	Mirror therapy may produce greater improvements in proprioception than Passive mobilization.	1	Colomer et al. (2016)
1b	Unilateral mirror therapy with Unimanual training may not have a difference in efficacy when compared to Mirror therapy for improving proprioception.	1	Lee et al. (2024b)
1b	Unilateral mirror therapy with Unimanual training may not have a difference in efficacy when compared to Unilateral mirror therapy with Bimanual training for improving proprioception.	1	Lee et al. (2024b)
1b	Unilateral mirror therapy with Bimanual training may not have a difference in efficacy when compared to Bilateral mirror therapy with Bimanual training for improving proprioception.	1	Lee et al. (2024b)
1b	Robotic Priming with mirror therapy (RMT) may not have a difference in efficacy when compared to Robotic Priming with Bilateral Upper Limb Training (RBULT) for improving proprioception.	1	Li Y.-C. et al. (2021)
1b	Mirror therapy with usual care may not have a difference in efficacy when compared to Lower-limb exercise with usual care for improving proprioception.	1	Tyson et al. (2015)
1b	Bilateral electromyography-triggered multi-channel electrostimulation with mirror therapy may not have a difference in efficacy when compared to bilateral electromyography-triggered multi-channel electrostimulation for improving proprioception.	1	Schick et al. (2017)

2. Activities

ACTIVITIES OF DAILY LIVING			
LoE	**Conclusion Statement**	**RCTs**	**References**
1a	Mirror Therapy may produce greater improvements in performance of activities of daily living than conventional therapy.	16	Ding L. et al. (2024); Arfianti et al. (2022); Geller et al. (2022); Wen et al. (2022); Saha et al. (2021); Xiang Zhang et al. (2021); Chinnavan et al. (2020); Bai et al. (2019); Ding et al. (2019); Ding et al. (2018); Gurbuz et al. (2016); Kim et al. (2016a); PervaneVural et al. (2016); Radajewska et al. (2013); Michielsen et al. (2011); Dohle et al. (2009)
1a	Mirror Therapy may produce greater improvements in performance of activities of daily living than sham.	10	Madhoun et al. (2020); Antoniotti et al. (2019); Lim et al. (2016); Park et al. (2015b); Park et al. (2015d); Invernizzi et al. (2013); Thieme et al. (2013); Nookala & Vadlamudi (2011); Cacchio et al. (2009); Yavuzer et al. (2008b)

1b	Individual mirror therapy may not have a difference in efficacy when compared to Group mirror therapy for improving performance of activities of daily living.	1	Thieme et al. (2013)
1a	Mirror Therapy combined with other interventions may not have a difference in efficacy when compared to task-specific training for improving performance of activities of daily living.	2	Lin et al. (2014a); Wu et al. (2013b)
1b	Mirror therapy with Mesh glove (afferent stimulation, primarily neuromuscular electrical stimulation) may not have a difference in efficacy when compared to Mirror therapy for improving performance of activities of daily living.	1	Lin et al. (2014a)
1a	Different approaches to mirror Therapy combined with other interventions may not have a difference in efficacy when compared with one another for improving performance of activities of daily living.	2	Li et al. (2019); Lee et al. (2015a)
2	Home-based mirror therapy and task specific training may not have a difference in efficacy when compared to Clinic-based mirror therapy and task specific training for improving performance of activities of daily living.	1	Hsieh et al. (2018a)
1b	Functional Electrical Stimulation may not have a difference in efficacy when compared to Mirror Therapy for improving performance of activities of daily living.	1	Mathieson et al. (2018)
1b	Functional Electrical Stimulation may not have a difference in efficacy when compared to Functional Electrical Stimulation with Mirror Therapy for improving performance of activities of daily living.	1	Mathieson et al. (2018)
1b	Mirror Therapy may not have a difference in efficacy when compared to Functional Electrical Stimulation with Mirror Therapy for improving performance of activities of daily living.	1	Mathieson et al. (2018)
1b	Mirror therapy with Mesh glove afferent stimulation may produce greater improvements in performance of activities of daily living than Mirror therapy.	1	Lee et al. (2015a)
1a	Mirror Therapy: some approaches may produce greater improvements in performance of activities of daily living than others.	3	Tesio et al. (2023); Gamez Santiago et al. (2022); Lee et al. (2020a)
1b	Mirror Therapy combined with other interventions may produce greater improvements in performance of activities of daily living than bilateral arm training.	1	Zhuang et al. (2021)
1a	Mirror Therapy combined with other interventions may not have a difference in efficacy when compared to sham or robotics for improving performance of activities of daily living.	2	Chen et al. (2023c); Rong J. et al. (2021)
1b	Virtual reality-based mirror therapy (virtual reality-mirror therapy) with conventional occupational therapy may not have a difference in efficacy when compared to conventional occupational therapy for improving performance of activities of daily living.	1	Hsu et al. (2022b)
1b	Unilateral mirror therapy with Unimanual training may not have a difference in efficacy when compared to Mirror therapy for improving performance of activities of daily living.	1	Lee et al. (2024b)
1b	Unilateral mirror therapy with Unimanual training may not have a difference in efficacy when compared to Unilateral mirror therapy with Bimanual training for improving performance of activities of daily living.	1	Lee et al. (2024b)
1b	There is conflicting evidence about the effect of Unilateral mirror therapy with Bimanual training when compared to Bilateral mirror therapy with Bimanual training for improving performance of activities of daily living.	1	Lee et al. (2024b)

2	Motor learning program may produce greater improvements in performance of activities of daily living than Mirror therapy.	1	Jan et al. (2019)
1b	Bilateral electromyography-triggered multi-channel electrostimulation with mirror therapy may not have a difference in efficacy when compared to bilateral electromyography-triggered multi-channel electrostimulation for improving performance of activities of daily living.	1	Schick et al. (2017)
1b	Robotic Priming with mirror therapy (RMT) may not have a difference in efficacy when compared to Robotic Priming with Bilateral Upper Limb Training (RBULT) for improving performance of activities of daily living.	1	Li Y.-C. et al. (2021)
2	Functional electrical stimulation-Biofeedback mirror therapy with conventional may not have a difference in efficacy when compared to Mirror therapy with conventional rehab for improving performance of activities of daily living.	1	Kim et al. (2023a)
1b	Bilateral robotic priming training with mirror training (R-mirr) may not have a difference in efficacy when compared to Bilateral robotic priming training with movement oriented training for improving performance of activities of daily living.	1	Li et al. (2023)
1b	Contralaterally controlled functional electrical stimulation with CT may not have a difference in efficacy when compared to Conventional therapy for improving performance of activities of daily living.	1	Zhang et al. (2024b)
1b	Mental practice combined with other interventions may not have a difference in efficacy when compared to mirror therapy for improving performance of activities of daily living.	1	Won-Gi Choi et al. (2023)
1b	Movement based mirror therapy with conventional therapy may not have a difference in efficacy when compared to Task based mirror therapy with conventional therapy for improving performance of activities of daily living.	1	Bai et al. (2019)
2	Mirror Therapy combined with other interventions may produce greater improvements in performance of activities of daily living than conventional therapy.	1	Kim et al. (2015c)
2	Functional electrical stimulation with biofeedback with mirror therapy may not have a difference in efficacy when compared to FES with mirror therapy for improving performance of activities of daily living.	1	Kim et al. (2015c)
1b	Mirror Therapy combined with other interventions may not have a difference in efficacy when compared to mirror therapy for improving performance of activities of daily living.	1	Lin et al. (2014b)
1b	Robot-assisted training (Bi-Manu-Track BMT robotic arm) with BoNT-A injection and functional practice may not have a difference in efficacy when compared to conventional task-oriented movement training with BoNT-A injection and functional practice for improving performance of activities of daily living.	1	Hung et al. (2022)
1b	Mirror therapy with BoNT-A injection and functional practice may not have a difference in efficacy when compared to conventional task-oriented movement training with BoNT-A injection and functional practice for improving performance of activities of daily living.	1	Hung et al. (2022)
1b	Sequential Combination of Anodal tDCS with Mirror Therapy may produce greater improvements in performance of activities of daily living than Sham tDCS with Mirror Therapy.	1	Liao et al. (2020)
1b	Mirror and strength training therapy may not have a difference in efficacy when compared to Strength training for improving performance of activities of daily living.	1	Ehrensberger et al. (2019)

1b	Concurrent Combination of tDCS with Mirror Therapy may not have a difference in efficacy when compared to Sham tDCS with Mirror Therapy for improving performance of activities of daily living.	1	Liao et al. (2020)

DEXTERITY			
LoE	**Conclusion Statement**	**RCTs**	**References**
1a	Mirror Therapy may produce greater improvements in dexterity than conventional therapy.	3	Kim et al. (2023d); Kim et al. (2016a); Samuelkamaleshkumar et al. (2014)
1b	Video augmented mirror therapy with conventional therapy may not have a difference in efficacy when compared to traditional mirror therapy with conventional therapy for improving dexterity.	1	Kim et al. (2023d)
2	Mirror Therapy may produce greater improvements in dexterity than sham.	1	Park et al. (2015b)
1b	Mirror Therapy combined with other interventions may produce greater improvements in dexterity than sham.	1	Ji et al. (2014)
1b	Mirror therapy with high frequency repetitive transcranial magnetic stimulation and Traditional physical therapy may produce greater improvements in dexterity than Mirror therapy with Traditional physical therapy.	1	Ji et al. (2014)
1b	Mirror Therapy combined with other interventions may result in lesser improvements in dexterity when compared to task-specific training.	1	Lin et al. (2014a)
1b	Mirror therapy with Mesh glove (afferent stimulation, primarily neuromuscular electrical stimulation) may produce greater improvements in dexterity than Mirror therapy.	1	Lin et al. (2014a)
1b	Different approaches to mirror Therapy combined with other interventions may not have a difference in efficacy when compared with one another for improving dexterity.	1	Lee et al. (2015a)
2	Home-based mirror therapy and task specific training may not have a difference in efficacy when compared to Clinic-based mirror therapy and task specific training for improving dexterity.	1	Hsieh et al. (2018a)
1b	Mirror therapy with Mesh glove afferent stimulation may produce greater improvements in dexterity than Mirror therapy.	1	Lee et al. (2015a)
1b	Mirror therapy with usual care may not have a difference in efficacy when compared to Lower-limb exercise with usual care for improving dexterity.	1	Tyson et al. (2015)
1b	Different approaches to mirror Therapy may not have a difference in efficacy when compared with one another for improving dexterity.	1	Tesio et al. (2023)
1b	Mirror Therapy combined with other interventions may not have a difference in efficacy when compared to bilateral arm training for improving dexterity.	1	Zhuang et al. (2021)
1b	Virtual reality-based mirror therapy (virtual reality-mirror therapy) with conventional occupational therapy may not have a difference in efficacy when compared to conventional occupational therapy for improving dexterity.	1	Hsu et al. (2022b)
1b	Virtual reality-based mirror therapy (virtual reality-mirror therapy) with conventional occupational therapy may produce greater improvements in dexterity than mirror therapy with conventional occupational therapy.	1	Hsu et al. (2022b)
2	High-frequency repetitive transcranial magnetic stimulation with Task-oriented mirror therapy may not have a difference in efficacy	1	Kim & Yim et al. (2018)

	when compared to High-frequency repetitive transcranial magnetic stimulation for improving dexterity.		
1b	Functional Electrical Stimulation with Mirror Therapy may not have a difference in efficacy when compared to Functional Electrical Stimulation with Sham Mirror Therapy for improving dexterity.	1	Kim et al. (2014a)
1b	Bilateral electromyography-triggered multi-channel electrostimulation with mirror therapy may not have a difference in efficacy when compared to bilateral electromyography-triggered multi-channel electrostimulation for improving dexterity.	1	Schick et al. (2017)
1b	Virtual reality-based mirror therapy with conventional physical therapy may produce greater improvements in dexterity than Conventional physical therapy.	1	Jo et al. (2024)
1b	Virtual reality-based mirror therapy with conventional physical therapy may produce greater improvements in dexterity than Traditional mirror therapy with conventional physical therapy.	1	Jo et al. (2024)
2	There is conflicting evidence about the effect of Mirror Therapy combined with other interventions when compared to conventional therapy for improving dexterity.	2	Amasyali et al. (2016); Kim et al. (2015c)
2	Mirror therapy may not have a difference in efficacy when compared to EMG-triggered neuromuscular stimulation for improving dexterity.	1	Amasyali et al. (2016)
2	Functional electrical stimulation with biofeedback with mirror therapy may produce greater improvements in dexterity than FES with mirror therapy.	1	Kim et al. (2015c)
1b	Mirror Therapy combined with other interventions may produce greater improvements in dexterity than mirror therapy.	1	Lin et al. (2014b)
1b	Bilateral tDCS before mirror therapy may not have a difference in efficacy when compared to tDCS during mirror therapy for improving dexterity.	1	Jin et al. (2019)
1b	Bilateral tDCS before mirror therapy may not have a difference in efficacy when compared to Sham tDCS with mirror therapy for improving dexterity.	1	Jin et al. (2019)
1b	TDCS during mirror therapy may not have a difference in efficacy when compared to Sham tDCS with mirror therapy for improving dexterity.	1	Jin et al. (2019)
2	Dual tDCS with Mirror therapy may produce greater improvements in dexterity than tDCS with Sham mirror.	1	Cho & Cha (2015)

Key Points

- Mirror Therapy may be beneficial for improving motor function, stroke severity, performance of activities of daily living, and dexterity, but not muscle strength and spasticity, after stroke when compared to conventional therapy; the literature is mixed regarding proprioception.
- Video augmented mirror therapy with conventional therapy may not be beneficial for improving dexterity after stroke when compared to traditional mirror therapy with conventional therapy; the literature is mixed regarding motor function.
- Mirror Therapy may be beneficial for improving motor function, muscle strength, performance of activities of daily living, and dexterity, but not spasticity, after stroke when compared to sham; the literature is mixed regarding stroke severity.
- Individual mirror therapy may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Group mirror therapy; the literature is mixed regarding spasticity.
- Mirror Therapy combined with other interventions may be beneficial for improving motor function and dexterity after stroke when compared to sham.

- Leap motion virtual reality with mirror therapy may be beneficial for improving motor function after stroke when compared to Mirror therapy.
- Mirror therapy with high frequency repetitive transcranial magnetic stimulation and Traditional physical therapy may be beneficial for improving motor function and dexterity after stroke when compared to Mirror therapy with Traditional physical therapy.
- Mirror Therapy combined with other interventions may be beneficial for improving motor function, but not performance of activities of daily living and proprioception, after stroke when compared to task-specific training.
- Mirror Therapy combined with other interventions may be less beneficial than task-specific training for improving dexterity after stroke.
- Mirror therapy with Mesh glove (afferent stimulation, primarily neuromuscular electrical stimulation) may be beneficial for improving dexterity, but not motor function and performance of activities of daily living, after stroke when compared to Mirror therapy.
- Home-based mirror therapy and task specific training may not be beneficial for improving motor function, dexterity, performance of activities of daily living, and proprioception after stroke when compared to Clinic-based mirror therapy and task specific training.
- Functional Electrical Stimulation may be beneficial for improving motor function, but not performance of activities of daily living, after stroke when compared to Mirror Therapy.
- Functional Electrical Stimulation may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Functional Electrical Stimulation with Mirror Therapy.
- Mirror Therapy may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Functional Electrical Stimulation with Mirror Therapy.
- Mirror therapy with Mesh glove afferent stimulation may be beneficial for improving dexterity and performance of activities of daily living, but not motor function, spasticity, and proprioception, after stroke when compared to Mirror therapy.
- Mirror therapy with usual care may not be beneficial for improving motor function, dexterity, spasticity, proprioception, and muscle strength after stroke when compared to Lower-limb exercise with usual care.
- Mirror therapy may be beneficial for improving proprioception after stroke when compared to Passive mobilization; the literature is mixed regarding motor function.
- Mirror Therapy combined with other interventions may be beneficial for improving motor function and performance of activities of daily living, but not dexterity, after stroke when compared to bilateral arm training.
- Mirror Therapy combined with other interventions may be beneficial for improving muscle strength, but not motor function and performance of activities of daily living, after stroke when compared to sham or robotics.
- Virtual reality-based mirror therapy (virtual reality-mirror therapy) with conventional occupational therapy may not be beneficial for improving motor function, dexterity, and performance of activities of daily living after stroke when compared to conventional occupational therapy.
- Virtual reality-based mirror therapy (virtual reality-mirror therapy) with conventional occupational therapy may be beneficial for improving dexterity, but not motor function and spasticity, after stroke when compared to mirror therapy with conventional occupational therapy.
- Mirror therapy with TOT may be beneficial for improving motor function after stroke when compared to Conventional therapy (TOT).
- Mirror therapy with TOT may not be beneficial for improving motor function after stroke when compared to Cognitive therapeutic exercise with TOT.
- Unilateral mirror therapy with Unimanual training may not be beneficial for improving motor function, performance of activities of daily living, and proprioception after stroke when compared to Mirror therapy.
- Unilateral mirror therapy with Unimanual training may not be beneficial for improving motor function, performance of activities of daily living, and proprioception after stroke when compared to Unilateral mirror therapy with Bimanual training.

- Unilateral mirror therapy with Bimanual training may not be beneficial for improving motor function and proprioception after stroke when compared to Bilateral mirror therapy with Bimanual training; the literature is mixed regarding performance of activities of daily living.
- Mirror Therapy combined with other interventions may be beneficial for improving motor function after stroke when compared to constraint-induced movement therapy.
- Functional Electrical Stimulation with Mirror Therapy may not be beneficial for improving dexterity after stroke when compared to Functional Electrical Stimulation with Sham Mirror Therapy; the literature is mixed regarding motor function and stroke severity.
- Bilateral electromyography-triggered multi-channel electrostimulation with mirror therapy may not be beneficial for improving motor function, dexterity, performance of activities of daily living, and proprioception after stroke when compared to bilateral electromyography-triggered multi-channel electrostimulation.
- Immediate Mirror therapy with electromyography-triggered neuromuscular electrical stimulation and Physical and Occupational therapy may be beneficial for improving motor function and range of motion after stroke when compared to delayed Mirror therapy with electromyography-triggered neuromuscular electrical stimulation and Physical and Occupational therapy.
- Bilateral arm training; visual fb mirror therapy may not be beneficial for improving motor function after stroke when compared to bilateral arm training without mirror therapy.
- Robotic Priming with mirror therapy (RMT) may not be beneficial for improving motor function, proprioception, and performance of activities of daily living after stroke when compared to Robotic Priming with Bilateral Upper Limb Training (RBULT).
- RMT may not be beneficial for improving motor function and muscle strength after stroke when compared to mirror therapy.
- Functional electrical stimulation-Biofeedback mirror therapy with conventional may be beneficial for improving motor function and range of motion, but not performance of activities of daily living and stroke severity, after stroke when compared to Mirror therapy with conventional rehab.
- Bilateral robotic priming training with mirror training (R-mirr) may be beneficial for improving motor function, but not performance of activities of daily living and muscle strength, after stroke when compared to Bilateral robotic priming training with movement oriented training.
- Virtual reality-based mirror therapy with conventional physical therapy may be beneficial for improving motor function and dexterity after stroke when compared to Conventional physical therapy.
- Virtual reality-based mirror therapy with conventional physical therapy may be beneficial for improving motor function and dexterity after stroke when compared to Traditional mirror therapy with conventional physical therapy.
- Contralaterally controlled functional electrical stimulation with CT may not be beneficial for improving motor function, performance of activities of daily living, and muscle strength after stroke when compared to Conventional therapy.
- Mirror therapy with conventional therapy may be beneficial for improving motor function and spasticity after stroke when compared to conventional therapy alone.
- Brunnstrom movement therapy with conventional therapy may be beneficial for improving motor function and stroke severity after stroke when compared to mirror therapy with conventional therapy.
- Mental practice combined with other interventions may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to mirror therapy.
- High-frequency repetitive transcranial magnetic stimulation with Task-oriented mirror therapy may not be beneficial for improving dexterity after stroke when compared to High-frequency repetitive transcranial magnetic stimulation; the literature is mixed regarding muscle strength.
- Motor learning program may be beneficial for improving performance of activities of daily living after stroke when compared to Mirror therapy.
- Mirror Therapy with Conventional Therapy may be beneficial for improving stroke severity after stroke when compared to Conventional Therapy.
- Mirror therapy may be beneficial for improving motor function after stroke when compared to No treatment/not mentioned.

- Virtual Reality Mirror Therapy may not be beneficial for improving motor function after stroke when compared to Standard Mirror Therapy.
- Movement based mirror therapy with conventional therapy may not be beneficial for improving spasticity and performance of activities of daily living after stroke when compared to Task based mirror therapy with conventional therapy; the literature is mixed regarding motor function.
- Mirror therapy may not be beneficial for improving motor function after stroke when compared to Vibration therapy.
- Mirror therapy may not be beneficial for improving motor function, muscle strength, and dexterity after stroke when compared to EMG-triggered neuromuscular stimulation.
- Functional electrical stimulation with biofeedback with mirror therapy may be beneficial for improving motor function, muscle strength, and dexterity, but not range of motion and performance of activities of daily living, after stroke when compared to FES with mirror therapy.
- Mirror Therapy combined with other interventions may be beneficial for improving motor function and performance of activities of daily living, but not muscle strength, spasticity, and range of motion, after stroke when compared to conventional therapy; the literature is mixed regarding dexterity.
- Mirror Therapy combined with other interventions may be beneficial for improving motor function and dexterity, but not spasticity and performance of activities of daily living, after stroke when compared to mirror therapy.
- Robot-assisted training (Bi-Manu-Track BMT robotic arm) with BoNT-A injection and functional practice may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to conventional task-oriented movement training with BoNT-A injection and functional practice.
- Mirror therapy with BoNT-A injection and functional practice may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to conventional task-oriented movement training with BoNT-A injection and functional practice.
- Sequential Combination of Anodal tDCS with Mirror Therapy may be beneficial for improving performance of activities of daily living, but not motor function, after stroke when compared to Sham tDCS with Mirror Therapy.
- Mirror and strength training therapy may not be beneficial for improving performance of activities of daily living after stroke when compared to Strength training.
- Bilateral tDCS before mirror therapy may not be beneficial for improving dexterity after stroke when compared to tDCS during mirror therapy.
- Bilateral tDCS before mirror therapy may not be beneficial for improving motor function and dexterity after stroke when compared to Sham tDCS with mirror therapy.
- TDCS during mirror therapy may not be beneficial for improving dexterity after stroke when compared to Sham tDCS with mirror therapy; the literature is mixed regarding motor function.
- Dual tDCS with Mirror therapy may be beneficial for improving muscle strength and dexterity, but not motor function, after stroke when compared to tDCS with Sham mirror.
- Mirror Therapy: some approaches may be more beneficial than others for improving motor function and performance of activities of daily living; different approaches to Mirror Therapy may not have a difference in efficacy when compared with one another for improving dexterity; the literature is mixed regarding muscle strength.
- Different approaches to mirror Therapy combined with other interventions may not have a difference in efficacy when compared with one another for improving motor function, spasticity, proprioception, performance of activities of daily living, and dexterity.
- Bilateral tDCS before mirror therapy may be less beneficial than tDCS during mirror therapy for improving motor function after stroke.
- Concurrent Combination of tDCS with Mirror Therapy may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Sham tDCS with Mirror Therapy.

Summary of Key Points: Mirror Therapy

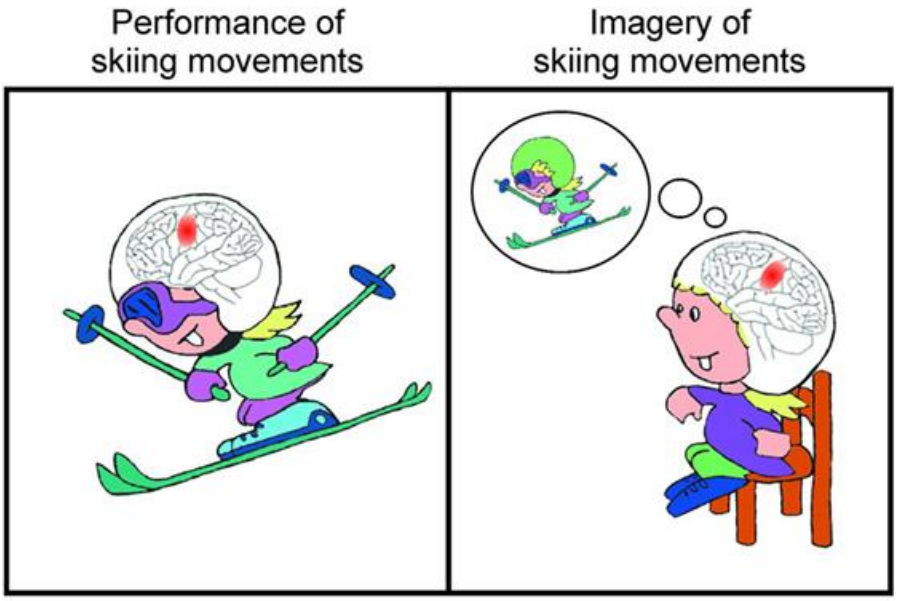
Intervention	Control(s)	Function domain(s)	Effect
Mirror Therapy	conventional therapy	Motor function, stroke severity, performance of activities of daily living, dexterity	+
Mirror Therapy	conventional therapy	Muscle strength, spasticity	−
Mirror Therapy	conventional therapy	Proprioception	=
Video augmented mirror therapy with conventional therapy	traditional mirror therapy with conventional therapy	Dexterity	−
Video augmented mirror therapy with conventional therapy	traditional mirror therapy with conventional therapy	Motor function	=
Mirror Therapy	sham	Motor function, muscle strength, performance of activities of daily living, dexterity	+
Mirror Therapy	sham	Spasticity	−
Mirror Therapy	sham	Stroke severity	=
Individual mirror therapy	Group mirror therapy	Motor function, performance of activities of daily living	−
Individual mirror therapy	Group mirror therapy	Spasticity	=
Mirror Therapy combined with other interventions	sham	Motor function, dexterity	+
Leap motion virtual reality with mirror therapy	Mirror therapy	Motor function	+
Mirror therapy with high frequency repetitive transcranial magnetic stimulation and Traditional physical therapy	Mirror therapy with Traditional physical therapy	Motor function, dexterity	+
Mirror Therapy combined with other interventions	task-specific training	Motor function	+
Mirror Therapy combined with other interventions	task-specific training	Dexterity, performance of activities of daily living, proprioception	−
Mirror therapy with Mesh glove (afferent stimulation, primarily neuromuscular electrical stimulation)	Mirror therapy	Dexterity	+
Mirror therapy with Mesh glove (afferent stimulation, primarily neuromuscular electrical stimulation)	Mirror therapy	Motor function, performance of activities of daily living	−
Mirror Therapy combined with other interventions	One another (different approaches compared)	Motor function, dexterity, performance of activities of daily living, spasticity, proprioception	−
Home-based mirror therapy and task specific training	Clinic-based mirror therapy and task specific training	Motor function, dexterity, performance of activities of daily living, proprioception	−
Functional Electrical Stimulation	Mirror Therapy	Motor function	+
Functional Electrical Stimulation	Mirror Therapy	Performance of activities of daily living	−

Functional Electrical Stimulation	Functional Electrical Stimulation with Mirror Therapy	Motor function, performance of activities of daily living	–
Mirror Therapy	Functional Electrical Stimulation with Mirror Therapy	Motor function, performance of activities of daily living	–
Mirror therapy with Mesh glove afferent stimulation	Mirror therapy	Dexterity, performance of activities of daily living	+
Mirror therapy with Mesh glove afferent stimulation	Mirror therapy	Motor function, spasticity, proprioception	–
Mirror therapy with usual care	Lower-limb exercise with usual care	Motor function, dexterity, spasticity, proprioception, muscle strength	–
Mirror Therapy	One another (different approaches compared)	Motor function, performance of activities of daily living	+
Mirror therapy	Passive mobilization	Proprioception	+
Mirror therapy	Passive mobilization	Motor function	=
Mirror Therapy combined with other interventions	bilateral arm training	Motor function, performance of activities of daily living	+
Mirror Therapy combined with other interventions	bilateral arm training	Dexterity	–
Mirror Therapy combined with other interventions	sham or robotics	Muscle strength	+
Mirror Therapy combined with other interventions	sham or robotics	Motor function, performance of activities of daily living	–
Virtual reality-based mirror therapy (virtual reality-mirror therapy) with conventional occupational therapy	conventional occupational therapy	Motor function, dexterity, performance of activities of daily living	–
Virtual reality-based mirror therapy (virtual reality-mirror therapy) with conventional occupational therapy	mirror therapy with conventional occupational therapy	Dexterity	+
Virtual reality-based mirror therapy (virtual reality-mirror therapy) with conventional occupational therapy	mirror therapy with conventional occupational therapy	Motor function, spasticity	–
Mirror therapy with TOT	Conventional therapy (TOT)	Motor function	+
Mirror therapy with TOT	Cognitive therapeutic exercise with TOT	Motor function	–
Unilateral mirror therapy with Unimanual training	Mirror therapy	Motor function, performance of activities of daily living, proprioception	–
Unilateral mirror therapy with Unimanual training	Unilateral mirror therapy with Bimanual training	Motor function, performance of activities of daily living, proprioception	–
Unilateral mirror therapy with Bimanual training	Bilateral mirror therapy with Bimanual training	Motor function, proprioception	–
Unilateral mirror therapy with Bimanual training	Bilateral mirror therapy with Bimanual training	Performance of activities of daily living	=
Mirror Therapy combined with other interventions	constraint-induced movement therapy	Motor function	+
Functional Electrical Stimulation with Mirror Therapy	Functional Electrical Stimulation with Sham Mirror Therapy	Dexterity	–
Functional Electrical Stimulation with Mirror Therapy	Functional Electrical Stimulation with Sham Mirror Therapy	Motor function, stroke severity	=

Bilateral electromyography-triggered multi-channel electrostimulation with mirror therapy	bilateral electromyography-triggered multi-channel electrostimulation	Motor function, dexterity, performance of activities of daily living, proprioception	–
Immediate Mirror therapy with electromyography-triggered neuromuscular electrical stimulation and Physical and Occupational therapy	delayed Mirror therapy with electromyography-triggered neuromuscular electrical stimulation and Physical and Occupational therapy	Motor function, range of motion	+
Bilateral arm training; visual fb mirror therapy	bilateral arm training without mirror therapy	Motor function	–
Robotic Priming with mirror therapy (RMT)	Robotic Priming with Bilateral Upper Limb Training (RBULT)	Motor function, proprioception, performance of activities of daily living	–
RMT	mirror therapy	Motor function, muscle strength	–
Functional electrical stimulation-Biofeedback mirror therapy with conventional	Mirror therapy with conventional rehab	Motor function, range of motion	+
Functional electrical stimulation-Biofeedback mirror therapy with conventional	Mirror therapy with conventional rehab	Performance of activities of daily living, stroke severity	–
Bilateral robotic priming training with mirror training (R-mirr)	Bilateral robotic priming training with movement oriented training	Motor function	+
Bilateral robotic priming training with mirror training (R-mirr)	Bilateral robotic priming training with movement oriented training	Performance of activities of daily living, muscle strength	–
Virtual reality-based mirror therapy with conventional physical therapy	Conventional physical therapy	Motor function, dexterity	+
Virtual reality-based mirror therapy with conventional physical therapy	Traditional mirror therapy with conventional physical therapy	Motor function, dexterity	+
Contralaterally controlled functional electrical stimulation with CT	Conventional therapy	Motor function, performance of activities of daily living, muscle strength	–
Mirror therapy with conventional therapy	conventional therapy alone	Motor function, spasticity	+
Brunnstrom movement therapy with conventional therapy	mirror therapy with conventional therapy	Motor function, stroke severity	+
Mental practice combined with other interventions	mirror therapy	Motor function, performance of activities of daily living	–
Mirror Therapy	One another (different approaches compared)	Dexterity	–
Mirror Therapy	One another (different approaches compared)	Muscle strength	=
High-frequency repetitive transcranial magnetic stimulation with Task-oriented mirror therapy	High-frequency repetitive transcranial magnetic stimulation	Muscle strength	=
High-frequency repetitive transcranial magnetic stimulation with Task-oriented mirror therapy	High-frequency repetitive transcranial magnetic stimulation	Dexterity	–
Motor learning program	Mirror therapy	Performance of activities of daily living	+
Mirror Therapy with Conventional Therapy	Conventional Therapy	Stroke severity	+
Mirror therapy	No treatment/not mentioned	Motor function	+

Virtual Reality Mirror Therapy	Standard Mirror Therapy	Motor function	–
Movement based mirror therapy with conventional therapy	Task based mirror therapy with conventional therapy	Spasticity, performance of activities of daily living	–
Movement based mirror therapy with conventional therapy	Task based mirror therapy with conventional therapy	Motor function	=
Mirror therapy	Vibration therapy	Motor function	–
Mirror therapy	EMG-triggered neuromuscular stimulation	Motor function, muscle strength, dexterity	–
Functional electrical stimulation with biofeedback with mirror therapy	FES with mirror therapy	Motor function, muscle strength, dexterity	+
Functional electrical stimulation with biofeedback with mirror therapy	FES with mirror therapy	Range of motion, performance of activities of daily living	–
Mirror Therapy combined with other interventions	conventional therapy	Motor function, performance of activities of daily living	+
Mirror Therapy combined with other interventions	conventional therapy	Muscle strength, spasticity, range of motion	–
Mirror Therapy combined with other interventions	conventional therapy	Dexterity	=
Mirror Therapy combined with other interventions	mirror therapy	Motor function, dexterity	+
Mirror Therapy combined with other interventions	mirror therapy	Spasticity, performance of activities of daily living	–
Robot-assisted training (Bi-Manu-Track BMT robotic arm) with BoNT-A injection and functional practice	conventional task-oriented movement training with BoNT-A injection and functional practice	Motor function, performance of activities of daily living	–
Mirror therapy with BoNT-A injection and functional practice	conventional task-oriented movement training with BoNT-A injection and functional practice	Motor function, performance of activities of daily living	–
Sequential Combination of Anodal tDCS with Mirror Therapy	Sham tDCS with Mirror Therapy	Performance of activities of daily living	+
Sequential Combination of Anodal tDCS with Mirror Therapy	Sham tDCS with Mirror Therapy	Motor function	–
Mirror and strength training therapy	Strength training	Performance of activities of daily living	–
Bilateral tDCS before mirror therapy	tDCS during mirror therapy	Motor function, dexterity	–
Bilateral tDCS before mirror therapy	Sham tDCS with mirror therapy	Motor function, dexterity	–
TDCS during mirror therapy	Sham tDCS with mirror therapy	Dexterity	–
TDCS during mirror therapy	Sham tDCS with mirror therapy	Motor function	=
Dual tDCS with Mirror therapy	tDCS with Sham mirror	Muscle strength, dexterity	+
Dual tDCS with Mirror therapy	tDCS with Sham mirror	Motor function	–
Concurrent Combination of tDCS with Mirror Therapy	Sham tDCS with Mirror Therapy	Motor function, performance of activities of daily living	–

Mental Practice



Adapted from: https://www.ucbmsh.com/motor-imagery-for-improvement-of-gait-in-stroke-patient/

A total of 43 RCTs were found that evaluated mental practice for upper extremity motor rehabilitation. Three RCTs compared mental practice combined with other interventions with fes (Su-jeonYOU et al. (2013); Hong et al. (2012); Hemmen et al. (2007)). Two RCTs compared mental practice combined with other interventions with sham or exercise and custom physiotherapy protocols (Mihara et al. (2013); Page et al. (2007)). Three RCTs compared mental practice combined with other interventions with conventional therapy (Park et al. (2017b); Liu et al. (2014a); Page et al. (2000)). Four RCTs compared mental practice with sham (Liepert et al. (2020); Nilsen et al. (2012); Page et al. (2011); Page et al. (2005a)). Fourteen RCTs compared mental practice with conventional therapy (Liu et al. (2024a); Choi, W et al. (2022); Dai Y. et al. (2022); Nam et al. (2019); Wang et al. (2019a); Li et al. (2018a); Oh et al. (2016); Kim & Lee (2015); Park et al. (2015c); Sun et al. (2013); Timmermans et al. (2013); Riccio et al. (2010); Liu et al. (2009a); Muller et al. (2007)). One RCT compared mental practice combined with other interventions with meridian acupressure and massage therapy or reaching and reach-to-grasp task training (O'Brien et al. (2011)). Four RCTs compared mental practice combined with other interventions with mental practice (Jia et al. (2024); Chen et al. (2020b); Schiavo et al. (2020); Pichiorri et al. (2015)). Two RCTs compared mental practice combined with other interventions with low-frequency rtms or sham (Kang et al. (2021); Pan et al. (2019)). One RCT compared mental practice with conventional therapy or sham (Ietswaart et al. (2011)). One RCT compared mental practice combined with other interventions with emg-triggered nmes (Park et al. (2020a)). One RCT compared mental practice combined with other interventions with action observation (Choi et al. (2022a)). Three RCTs compared mental practice combined with other interventions with task-specific training (Green et al. (2023); Stuerner et al. (2023); Liu et al. (2004)). One RCT compared mental practice combined with other interventions with education (Wang et al. (2023b)). Two RCTs compared mental practice combined with other interventions with exercise and custom physiotherapy protocols (Ji et al. (2021); Page et al. (2001a)). One RCT compared mental practice combined with other interventions with mirror therapy (Won-Gi Choi et al. (2023)).

In addition, 22 RCTs in which mental practice formed part of a combined or comparative intervention are cross-referenced at the end of Table 11; their primary listings appear in other tables.

The methodological details and results of all 43 RCTs are presented in Table 11.

Table 11. RCTs Evaluating Mental Practice for Upper Extremity Motor Rehabilitation

Authors (Year) Study Design (PEDro Score) Sample Size start Sample Size end Time post stroke category Study design	Interventions Duration: Session length, frequency per week for total number of weeks	Outcome Measures Result (direction of effect)

Mental practice combined with other interventions compared to fes		
Su-jeonYOU et al. (2013) Pilot RCT (6) NStart=18 NEnd=16 TPS=Chronic A + B vs C *Also in Table 22 (Neuromuscular Electrical Stimulation (NMES))*	E: Mental training linked with EMG triggered stimulation C: FES Duration: 40 min/d, 2d/wk, 4wk	E vs C: Range of Motion- wrist joint (-) Modified Ashworth Scale (-) Fugl-Meyer Assessment-UE (+exp) shoulder (+exp) wrist (+exp) hand (-) coordination (-) Motor Activity Log AOU (-) QOM (-) Modified Barthel Index (-) Root mean square of extensor muscles of forearm (-)
Hong et al. (2012) RCT (8) NStart=14 NEnd=14 TPS=Chronic A + B vs C *Also in Table 22 (Neuromuscular Electrical Stimulation (NMES))*	E: Mental Imagery Training + EMG-Triggered Electrical Stimulation C: Generalized Functional Electric Stimulation Duration: 20min/d, 2x/d, 5d/wk, 4wks	E vs C: Fugl-Meyer Assessment- Upper Extremity (+exp) MAL Amount of Use (-) Modified Ashworth Scale (-) MAL Quality of Movement (-) Modified Barthel Index (-)
Hemmen et al. (2007) RCT (5) NStart=27 NEnd=22 TPS=Subacute A + B vs C *Also in Table 22 (Neuromuscular Electrical Stimulation (NMES))*	E: Arm hand function training (EMG triggered biofeedback + movement imagery)+usual therapy C: Electrical stimulation (without the EMG-triggered feedback function) + usual therapy Duration: 30min/d, 5d/wk, 3mo	E vs C: Fugl-Meyer Assessment (-) Action Research Arm test (-)
Mental practice combined with other interventions compared to sham or exercise and custom physiotherapy protocols		
Mihara et al. (2013) Pilot RCT (8) NStart=20 NEnd=20 TPS=Subacute A + B vs A/B	E: Motor imagery + Neurofeedback C: Motor imagery + Sham feedback Duration: 20min/d, 3d/wk, 2wk	E vs C: FMA(+exp) ARAT(-) MAL (-) KVIQ (-)
Page et al. (2007) RCT (5) NStart=32 NEnd=32 TPS=Chronic A + B vs 0 *Also in Table 3 (Exercise and Strength Training)*	E: Mental Practice+ ADL training session C: Sham Relaxation Exercise+ ADL training session Duration: 60min (30min ADL training + 30min MP)/d, 2d/wk, 6wks	E vs C: Fugl-Meyer Assessment (+exp) Action Research Arm Test (+exp)
Mental practice combined with other interventions compared to conventional therapy		
Park et al. (2017b) RCT (3) NStart=40 NEnd=32	E: Mental Practice + EMG NMES + Conventional Rehab C: Conventional Rehab Duration: 30min/d, 5d/wk for 4wk	E vs C: Fugl-Meyer Assessment (+exp) Motor Activity Log (+exp)

TPS=Not Reported A + B vs 0 *Also in Table 22 (Neuromuscular Electrical Stimulation (NMES))*		
Liu et al. (2014a) RCT (5) NStart=20 NEnd=20 TPS=Subacute A + B vs A/B	E: Motor imagery/mental practice of hand movement + Bobath C: Bobath Duration: 45min/d, 5d/wk for 4wk	E vs C: Action Research Arm test (+exp) fMRI
Page et al. (2000) Pilot RCT (4) NStart=16 NEnd=16 TPS=Chronic A vs B	E: Imagery training + conventional occupational therapy C: Occupational therapy + listening to recording on stroke education Duration: 30 min/d, 3d/wk for 4 wk	E vs C: Fugl-Meyer Assessment (+exp)
Mental practice compared to sham		
Liepert et al. (2020) RCT Crossover (7) NStart=33 NEnd=33 TPS=Subacute A vs 0	E: Mental Imagery Training C: Hand Identification Task (sham) Duration: Single session/condition, 30min, 3d washout	E vs C: Mental Chronometry (+exp) Box and Block Test (-) TMS OM: MEP amplitude, MEP resting motor threshold, cortical silent period
Nilsen et al. (2012) RCT (6) NStart=19 NEnd=16 TPS=Chronic A1 vs A2 vs 0	E1: Mental Imagery internal E2: Mental imagery external C: Relaxation imagery Duration: ~20min, 2x/wk, 6wk	E1 vs C: Fugl-Meyer Assessment Upper Extremity (+exp1) Jebsen Hand Function Test (+exp1) Canadian Occupational Performance Measure Performance (-) Satisfaction (-) E2 vs C: Fugl-Meyer Assessment Upper Extremity (+exp2) Jebsen Hand Function Test (+exp2) Canadian Occupational Performance Measure Performance (-) Satisfaction (-) E1 vs E2: Fugl-Meyer Assessment Upper Extremity (-) Jebsen Hand Function Test: (-) Canadian Occupational Performance Measure Performance (-) Satisfaction (-)
Page et al. (2011) RCT (7) NStart=32 NEnd=29 TPS=Chronic A1 vs A2 vs 0	E1: 20min Mental Practice + Standard Rehab E2: 40min Mental Practice + Standard Rehab E3: 60min Mental Practice + Standard Rehab C: Sham Mental Practice + Standard Rehab	E1/E2/E3 vs C: Fugl-Meyer Assessment (+exp) Action Research Arm Test (-)

	Duration: E1: 20min, 3d/wk for 10wk + 30min Standard Rehab; E2: 40min, 3d/wk for 10wk + 30min Standard Rehab; E3: 60min, 3d/wk for 10wk + 30min Standard Rehab; C: 20min, 3d/wk for 10wk + 30min Standard Rehab	
Page et al. (2005a) RCT (5) NStart=11 NEnd=11 TPS=Chronic A vs 0	E: Mental Practice C: Relaxation techniques Duration: 30min, 2d/wk for 6 wk	E vs C: Motor Activity Log (no stat) Action Research Arm Test (+exp)
Mental practice compared to conventional therapy		
Liu et al. (2024a) RCT (4) NStart=26 NEnd=20 TPS=Subacute A vs 0	E: Motor imagery + Conventional therapy C: Conventional therapy Duration: Motor imagery group: 150 mins/d (120 mins of conventional therapy + 30 mins of motor therapy), 5 ds/wk, 4wks; Conventional therapy group: 120mins/d, 5ds/wk, 4wks	E vs C: FMA-UE (+exp) mBI (+exp) Functional Connectivity ipsilesional hippocampal gyrus (+exp) ipsilesional middle frontal gyrus (+exp) Contralesional anterior cingulate cortex (+exp)
Choi, W et al. (2022) RCT (6) NStart=30 NEnd=30 TPS=Chronic A vs 0	E: Cognitive exercise therapy + conventional rehab C: Conventional rehab Duration: 1hr/d(30min conventional, 30min cognitive), 5d/wk, 4wks	E vs C: MFT (-) SFT (+exp) MBI (-)
Dai Y. et al. (2022) RCT (4) NStart=84 NEnd=84 TPS=Acute A vs 0	E: Motor Imagery + conventional rehab C: conventional rehab Duration: 45min/d, 5d/wk, 8wks	E vs C: FMA-UE (+exp) fNIRS hemoglobin concentration (+exp)
Nam et al. (2019) Pilot RCT (6) NStart=24 NEnd=20 TPS=Subacute A vs 0	E: Mental practice C: Conventional therapy Duration: 20min, 5x/wk for 4wk, +30min rehab	E vs C: Fugl-Meyer Upper Extremity (-) Manual Function Test (-) Functional Independence Measure (-)
Wang et al. (2019a) RCT (7) NStart=34 NEnd=31 TPS=Subacute A vs 0	E: Motor Imagery Training + Conventional Rehabilitation Therapy C: Conventional Rehabilitation Therapy + health education Duration: 3h/d, 5d/wk, 4wks; Motor imagery: 30 mins/d, 5d/wk, 4wks; Health education: 30 mins/d, 5d/wk, 4wks	E vs C: FMA-UE (+exp) fMRI findings (+exp)
Li et al. (2018a) RCT (4) NStart=20 NEnd=20 TPS=Subacute A vs 0	E: Motor Imagery training + traditional rehabilitation program C: Traditional rehabilitation program Duration: 45min/d traditional rehabilitation + 45min/d motor imagery training, 5d/wk, 4wks	E vs C: ARAT (+exp) FMA-UE (+exp) MEP amplitude (+exp) MEP latency (-) fMRI (-)

Oh et al. (2016) RCT Crossover (4) NStart=10 NEnd=10 TPS=Subacute A vs 0	E: Mental Practice C: Conventional Therapy Duration: 20min/d, 3d/wk for 3wk	E vs C: Fugl-Meyer Assessment (-) Motor Activity Log (-)
Kim & Lee (2015) RCT (5) NStart=24 NEnd=24 TPS=Chronic A vs 0	E: Motor Imagery C: Conventional Therapy Duration: 30min/session 3d/wk, 4wks MI or conventional therapy + conventional physical therapy 30min/d, 5d/wk, 4wks	E vs C: Fugl-Meyer Assessment (+exp): Shoulder (+exp) Wrsit (+exp) Hand (-) Coordination (-) Wolf Motor Function Test (-)
Park et al. (2015c) RCT (5) NStart=29 NEnd=29 TPS=Chronic A vs 0	E: Mental practice + Conventional rehab C: Conventional rehab Duration: 10min/d, 5d/wk for 2wk	E vs C: Fugl-Meyer Assessment (+exp) Action Research Arm Test (+exp) Modified Barthel Index (+exp)
Sun et al. (2013) RCT (6) NStart=20 NEnd=18 TPS=Subacute A vs 0	E: Motor imagery training (MIT) + Conventional rehab C: Conventional rehab Duration: 3hr rehab & 30min MIT, 5d/wk, 4wk	E vs C: Fugl-Meyer Upper Extremity: (+exp) Cortical activation change (-)
Timmermans et al. (2013) RCT (7) NStart=42 NEnd=42 TPS=Subacute A vs 0	E: Mental Practice C: Bobath concept Duration: 30min/d, 3d/wk for 6wk	E vs C: Frenchay Arm Test (-) Wolf Motor Function Test (-) Barthel Index (-) Frenchay Activities Index (-) Fugl-Meyer Assessment (-)
Riccio et al. (2010) RCT Crossover (5) NStart=36 NEnd=36 TPS=Subacute A vs 0	E: Mental practice + Conventional neurorehabilitation C: Conventional neurorehabilitation Duration: 60min Mental practice, 3h/d, 5d/wk, for 3wks Conventional	E vs C: Motricity index (+exp) Arm function test FAS (+exp) Time (+exp)
Liu et al. (2009a) RCT (4) NStart=35 NEnd=33 TPS=Acute A vs 0	E: Mental imagery C: Conventional rehabilitation therapy Duration: 1hr, 5d/wk for 3wk	E vs C: Improvement in trained task (+exp)- like fry vegetable with meat, tidy table after meal, go to park
Muller et al. (2007) RCT (4) NStart=17 NEnd=17 TPS=Acute A vs B vs 0	E1: Mental practice; E2: Motor Task-specific Training C: Conventional Physiotherapy Duration: 30min/d, 5d/wk for 4wk	E1/E2 vs C: JTHFT(+exp1,+exp2) Pinch grip test - assess force during pinch in 3 different ways(+exp1,+exp1)

Mental practice combined with other interventions compared to meridian acupressure and massage therapy or reaching and reach-to-grasp task training		
O'Brien et al. (2011) RCT (4) NStart=10 NEnd=10 TPS=Subacute A + B vs A + C *Also in Table 4 (Task-Specific Training); Table 46 (Meridian Acupressure and Massage Therapy)*	E: Kinaesthetic Motor Imagery + Task specific training (Grasp) C: Relaxation + Task Specific Training (Grasp) Duration: 3 sessions	E vs C: Grasp Movement Time (-) Magnitude of extension of index finger (+exp) Angular displacement of proximal phalageal joints (+exp) Angular displacement of metacarpophalangeal joints (+exp)
Mental practice combined with other interventions compared to mental practice		
Jia et al. (2024) RCT (8) NStart=56 NEnd=56 TPS=Acute A + B vs A/B *Also in Table 29 (Repetitive Transcranial Magnetic Stimulation (rTMS))*	E1: Graded motor imagery + rTMS + conventional rehabilitation E2: rTMS + conventional rehabilitation C: Graded motor imagery + conventional rehabilitation Duration: 20min/d 5d/wk for 4wks stimulation + 30min/d MI	E1/E2 vs C: FMA-UE (+exp1) ARAT (+exp1) mBI (+exp1) Motor Activity Log amount of use (-) quality of movement (+exp1) MEPs (+exp1) E1 vs E2: FMA-UE (+exp1) ARAT (-) mBI (-) Motor Activity Log amount of use (+exp1) quality of movement (-) MEPs (-)
Chen et al. (2020b) Pilot RCT (6) NStart=14 NEnd=14 TPS=Subacute A + B vs C	E: EEG Brain-Computer Inferface + Hand Robotic Orthosis (Omega 3) C: Motor Imagery Tasks Duration: approx15min, 3x/wk, 4wks	E vs C: Fugl-Meyer Assessment (-) EEG parameters
Schiavo et al. (2020) Pilot RCT (6) NStart=27 NEnd=21 TPS=Not Reported A + B + C vs A/A + B	E: Hyperbaric Oxygen Therapy + Graded Repetitive Arm Supplementary Program (GRASP) and mental imagery instructions C: Graded Repetitive Arm Supplementary Program (GRASP) and mental imagery instructions Duration: 90min, 5d/wk, 8wks	E vs C: Box and Block Test (-) Wolf Motor Function Test (-) Chedoke-McMaster Stroke Assessment Scale (-) Stroke Impact Scale (-) Numeric Pain Rating Scale (-) Visual Analog Fatigue Scale (-)
Pichiorri et al. (2015) RCT (6) NStart=32 NEnd=28 TPS=Subacute A + B vs A/B *Also in Table 18 (Brain Computer Interfaces)*	E: motor imagery with Brain-computer interface+ standard stroke treatment C: Motor imagery+ standard stroke treatment Duration: 30min/d, 3x/wk, for 4wks	E vs C: FMA (+exp) Medical research council scale (+exp) NIHSS (+exp) high density EEG assessment

Mental practice combined with other interventions compared to low-frequency rtms or sham		
Kang et al. (2021) Pilot RCT (6) NStart=20 NEnd=17 TPS=Acute A + B + C vs A/A + B	E: Low frequency (Inhibitory) rTMS+ Motor Imagery + electrical stimulation + conventional rehabilitation C: LF-rTMS + Motor imagery + sham ES + conventional rehabilitation Duration: 20min/d 5d/wk, 2wk; Conventional rehabilitation: 2hr/d, 2wks	E vs C: FMA-UE(+exp) SAFE(-) MBI(-) Purdue Pegboard(-) Finger Tapping(-)
Pan et al. (2019) RCT (7) NStart=44 NEnd=42 TPS=Subacute A + B vs A/B *Also in Table 29 (Repetitive Transcranial Magnetic Stimulation (rTMS))*	E: Low frequence rTMS (1Hz) + mental practice C: rTMS (1Hz) + audiotape-led relaxation Duration: 30min, 5d/wk, for 2wks rTMS + 2hr/d, 5d/wk, for 2 wks MI/Audiotaped-led relaxation	E vs C: WMFT (+exp) FMAUE (+exp) mod BI (+exp) BBT (+exp)
Mental practice compared to conventional therapy or sham		
Ietswaart et al. (2011) RCT (7) NStart=121 NEnd=103 TPS=Subacute A vs 0	E: Motor Imagery & mental practice C1: Attention-placebo control C2: Normal care Duration: 45min/d, 3d/wk one-on-one training & 30min/d, 2d/wk independent training for 4wks	E vs C1 vs C2: ARAT (-) grip strength (-) hand function through timed manual dexterity performance (-) Barthel Index (-) Functional Limitations Profile (-)
Mental practice combined with other interventions compared to emg-triggered nmes		
Park et al. (2020a) RCT (8) NStart=68 NEnd=68 TPS=Chronic A + B vs A/B *Also in Table 22 (Neuromuscular Electrical Stimulation (NMES))*	E: EMG NMES + mental imagery training C: EMG NMES Duration: 30min/d, 5d/wk, 6wk	E vs C: Action Research Arm Test (-) Fugl Meyer Assessment (-) modified Barthel Index (-)
Mental practice combined with other interventions compared to action observation		
Choi et al. (2022a) RCT (4) NStart=45 NEnd=45 TPS=Subacute A + B vs A/B *Also in Table 12 (Action Observation)*	E: Motor Imagery (MI) + Action Observation (AO) +OT C: Action Observation + OT Duration: 25min/d, 5d/wk, 8wks	E vs C: MEP amplitude (-) FMA-UE (+exp) WMFT (-) MAL: AOU (+exp) QOM (-)
Mental practice combined with other interventions compared to task-specific training		
Green et al. (2023) RCT (3) NStart=19 NEnd=18 TPS=Acute A + B1 vs A + B2 vs C *Also in Table 20 (Feedback-Based Training); Table 4 (Task-Specific Training)*	E1: Mental Practice + Visual feedback E2: Mental Practice + Audio feedback C: Repititive task-specific training Duration: 30 repititions/d (20 mental practice, 10 physical practice), 3 days a week; 20 repititions of only mental training/d, 2 days a week; until patient is discharged	E1 vs E2 vs C1 vs C2: FMA-UE (no stat) WMFT (no stat)

Stuerner et al. (2023) RCT (7) NStart=60 NEnd=60 TPS=Subacute A + B + C vs A/A + B vs 0 *Also in Table 21 (Wearable Cueing and Reminder Devices); Table 4 (Task-Specific Training)*	E1: Motor Imagery + Audio Feedback + Task Specific Training E2: Motor imagery + TST C: Task-specific Training Duration: 30min/1 session	E1 vs C: Mental chronometry MC (motor execution time- motor imagery time / motor execution time while doing BBT) (+exp1) BBT (-) E2 vs C: Mental chronometry MC (-) BBT (-) E1 vs E2: Mental chronometry MC (+exp1) BBT (-)
Liu et al. (2004) RCT (7) NStart=49 NEnd=46 TPS=Acute A vs B	E: Mental imagery C: Functional training Duration: 1hr/d, 5d/wk for 3wk	E vs C: FMA(-) Study specific activities of daily living + color trail test
Mental practice combined with other interventions compared to education		
Wang et al. (2023b) RCT (8) NStart=39 NEnd=39 TPS=Subacute A vs B	E: Motor imagery + conventional therapy C: Health education on stroke + conventional therapy Duration: 210 min/d (30 minutes of motor imagery/education; 180 minutes of conventional therapy), 5d/wk, 4wks	E vs C: FMA-UE (+exp) BI (+exp) Task fMRI activation (+exp) Functional connectivity (+exp)
Mental practice combined with other interventions compared to exercise and custom physiotherapy protocols		
Ji et al. (2021) RCT (5) NStart=42 NEnd=37 TPS=Chronic A vs B *Also in Table 3 (Exercise and Strength Training)*	E: Graded Motor Imagery (included implicit and explicit motor imagery plus mirror therapy) + conventional rehabilitation C: Upper limb exercise + conventional rehabilitation Duration: 30min/d, 8 wks	E vs C: FMA-UE (-) MFT (-) Arm motion (+exp) MBI (-)
Page et al. (2001a) Pilot RCT (5) NStart=13 NEnd=13 TPS=Chronic A + B vs A/B *Also in Table 3 (Exercise and Strength Training); Table 13 (Cognitive and Dual-Task Training)*	E: Guided Motor Imagery (tape) + OT exercises C: Stroke-information tape + OT exercises Duration: 60 min of OT 3x/wk for 6 wks, 10-minute tape (imagery or stroke information) after each session and at home 2x/wk.	E vs C: Fugl-Meyer Assessment (No stats) Action Research Arm Test (No stats)
Mental practice combined with other interventions compared to mirror therapy		
Won-Gi Choi et al. (2023) Pilot RCT (6) NStart=25 NEnd=25 TPS=Chronic A + B + C vs A/A + B *Also in Table 10 (Mirror Therapy)*	E1: Mental practice + Task-specific training E2: Mirror therapy E3: Mental practice + Mirror Therapy + Task specific training Duration: 30 mins/d, 5d/wk, 4wks (E1 - 15 mins of mental practice, 15 mins of task-specific training); (E2 - 30 mins of mirror therapy); (E3 - 10 mins of mental practice, 10 mins of task-specific training, 10 mins of mirror therapy)	E1 vs E2 vs E3: FMA (-) ARAT (-) mBI (-) MAL (-)

Cross-Referenced RCTs: Combined or Comparative Interventions Involving Mental Practice (results included in this table's levels of evidence)		
Valadez-Roque et al. (2024) RCT (5) NStart=11 NEnd=11 TPS=Chronic A + B vs 0 *Primary listing: Table 12 (Action Observation)*	E: Action observation + Motor imagery + Conventional therapy C: Conventional therapy + passive video exposure (without guided AO or MI) Duration: 35-42 mins (25-30 mins of Action observation and motor imagery or passive viewing of videos, 10-12 mins of physical therapy), 2ds/wk, 6wks	E vs C: FMA-UE (-) AMADEO Robot Finger Force (+exp) AMADEO Robot Range of motion (-) Alpha desynchonization (+exp)
Liu et al. (2023) RCT (8) NStart=60 NEnd=57 TPS=Acute A + B vs C *Primary listing: Table 18 (Brain Computer Interfaces)*	E: Motor imagery BCI + conventional rehab C: FES + conventional rehab Duration: 20min/d, 5d/wk, 3wks	E vs C: FMA-UE (+exp) WMFT (+exp) MBI (+exp) Attention Network test ANT (+exp) Shulte grid test (+exp) Symbol digit modalities test (+exp)
Zanona A.D.F. et al. (2023) RCT (7) NStart=44 NEnd=44 TPS=Subacute A + B + C vs 0 *Primary listing: Table 18 (Brain Computer Interfaces)*	E: BCI controlled hand exoskeleton + Mental practice + Occupational therapy C: Occupational therapy Duration: 80 mins/d (Experimental group - 30 mins BCI + 15 mins mental practice + 35 mins of OT; Control group 80 minutes of OT) 5d/wk for 2wks	E vs C: FMA-UE sensory function (-) motor function (-) FIM (-) MAL amount of movement (-) quality of movement (-) BBT (-) Jebson Hand function test (-)
Brihmat et al. (2023) RCT Crossover (6) NStart=25 NEnd=24 TPS=Chronic A + B + C vs A/A + B *Primary listing: Table 27 (Additional Afferent and Peripheral Stimulation Methods)*	E1: Paired associative stimulation (PAS) + Motor imagery (MI) E2: PAS C: Sham PAS + MI Duration: 15min/d, 1d/wk for 3wks - 1wks washout between sessions	E1/E2 vs C: MEPs (-) aROM (-)
Ma Z.-Z. et al. (2023) RCT (6) NStart=46 NEnd=40 TPS=Chronic A + B vs 0 *Primary listing: Table 18 (Brain Computer Interfaces)*	E: BCI-motor imagery system + Conventional therapy C: Conventional therapy Duration: BCI (40 mins/d, 5d/wk, 2wks) + conventional therapy (5d/wk, 2wks)	E vs C: FMA-UE (+exp) rs-fMRI Subnetwork metrics Visual network γ (+con) Visual network σ (+con) Dorsal attention network assortativity (+exp)
Kashoo et al. (2022) RCT (8) NStart=64 NEnd=64 TPS=Chronic A + B + C vs A/A + B *Primary listing: Table 31 (Transcranial Direct Current Stimulation (tDCS))*	E: anodal tDCS + motor imagery (MI) + upper-limb functional training C: sham tCDS + motor imagery (MI) + upper-limb functional training Duration: 30min/d, 5d/wk, 2wks (10 sessions)	E vs C: FMA (+exp) ARAT (+exp)

Park, JuHyung et al. (2022) RCT (9) NStart=37 NEnd=34 TPS=Chronic A + B vs A/B *Primary listing: Table 4 (Task-Specific Training)*	E: Task oriented training + mental practice C: Task oriented training Duration: 15min/d(5min mental practice, 10min task training), 5d/wk, 3wks	E vs C: FMA-UE Total (+exp) Wrist (-) Hand (-) Shoulder (-) EMG-Coordination (-)
Li et al. (2022c) RCT (6) NStart=24 NEnd=24 TPS=Subacute A + B vs 0 *Primary listing: Table 18 (Brain Computer Interfaces)*	E: BCI motor imagery training + conventional rehab C: Conventional rehab Duration: 3hrs/d(1hr BCI, 2hr Conventional rehab), 5d/wk, 2wks	E vs C: FMA-UE (-) WMFT (-) MBI (-) EEG (no stat)
Haire et al. (2021) Pilot RCT (8) NStart=30 NEnd=30 TPS=Chronic A + B + C vs A/A + B *Primary listing: Table 14 (Music Therapy and Rhythmic Auditory Stimulation)*	E1: Therapeutic Instrumental Music Performance (TIMP) ; E2: TIMP + Metronome-cued Motor Imagery; E3: TIMP + Motor Imagery without cues Duration: 45min/d, 3d/wk, 3wks	E1/E3 vs E2: FMA (+exp1), WMFT (-), MAL(-), trunk impairment scale(-) E1 vs E3: FMA(-), WMFT(-), MAL(-), trunk impairment(-)
Hu Y.-Q. et al. (2021) RCT (6) NStart=12 NEnd=12 TPS=Chronic A + B vs A/B *Primary listing: Table 18 (Brain Computer Interfaces)*	E: Motor Imagery based BCI + conventional rehab C: Motor Imagery + conventional rehab Duration: 30min/d	E vs C: FMA-UE (-) ARAT (-) MSS (-) BI (-) sEMG (-)
Kim et al. (2018a) RCT (6) NStart=16 NEnd=14 TPS=Chronic A + B vs A/B *Primary listing: Table 6 (Constraint-Induced Movement Therapy (CIMT))*	E: Mental practice + modified constraint-induced movement (mCIMT) therapy C: mCIMT therapy Duration: 6hr plus 10 min for experimental group, 5x/wk for 2wks	E vs C: 3D motion analysis for movement quality Speed: (-) Time: (-) Smoothness: (-) Jebsen –Taylor Hand Function Test Writing: (+exp) Page turning: (+exp) Small objects: (-) Feeding: (-) Stacking: (-) Large lightweight objects: (-) Large heavy objects: (-) Motor activity log Amount of Use: (+exp) Quality of Movement: (+exp) MEP latency and amplitude
Alves et al. (2018) RCT (5) NStart=60 NEnd=42 TPS=Chronic	E1: Virtual Reality (Wii) E2: Motor Imagery Training C: Conventional therapy Duration: 75min/d, 5d/wk, 2 wks	E1 vs C: Fugl-Meyer Assessment (+exp1) E2 vs C: Fugl-Meyer Assessment (-) E1 vs E2:

A vs B vs 0 *Primary listing: Table 17 (Virtual Reality)*		Fugl-Meyer Assessment (-)
Kim et al. (2017c) RCT (7) NStart=33 NEnd=30 TPS=Chronic A + B1 vs A + B2 *Primary listing: Table 16 (Robotics)*	E1: External focus with robotic arm E2: Internal focus with robot Duration: 45min/d, 3d/wk for 4wk	E1 vs E2: FMA (-) WMFT (-) Joint independence (-) Manipulation check questionnaire
Park et al. (2016) RCT (8) NStart=30 NEnd=30 TPS=Chronic A + B vs A/B *Primary listing: Table 17 (Virtual Reality)*	E: VR game (Wii) + mental practice C: VR game (Wii) Duration: 30min/d, 5d/wk for 4wks Wii, 5 min/d, 5d/wk for 4 wks mental practice	E vs C: FMA (+exp) Motor activity log (+exp) BBT (+exp)
Ang et al. (2015a) RCT (7) NStart=19 NEnd=19 TPS=Chronic A + B + C vs A/A + B *Primary listing: Table 31 (Transcranial Direct Current Stimulation (tDCS))*	E: Bilateral tDCS + motor imagery brain-computer interface C: Sham tDCS + motor imagery brain-computer interface Duration: 80min/d, 5d/wk for 4wk	E vs C: Fugl-Meyer Assessment Upper Extremity (-) EEG laterality coefficient (ERD) Resting Motor Threshold Ipsilesional M1 (+exp) Contralesional M1 (-) Neurophysiological Outcomes Short Intra-cortical inhibition and Short Intra-cortical Facilitation in Contralesional M1 (-) Cerebral blood flow (+exp1)
Ang et al. (2015b) RCT (6) NStart=26 NEnd=25 TPS=Chronic A + B + C vs A/A + B *Primary listing: Table 18 (Brain Computer Interfaces)*	E: Brain computer interface motor imagery+ MITManus robotic training C: MIT-Manus robotic training Duration: 90min/d, 3d/wk for 4wk	E vs C: Fugl-Meyer Assessment Upper Extremity (-)
Park et al. (2015a) RCT (5) NStart=26 NEnd=26 TPS=Chronic A + B vs A/B *Primary listing: Table 6 (Constraint-Induced Movement Therapy (CIMT))*	E: Mental practice + mCIMT C: mCIMT Duration: 30min/d, 5d/wk for 6wk	E vs C: FMA (+exp) ARAT (+exp) mBI (+exp)
Li et al. (2014) RCT (5) NStart=15 NEnd=14 TPS=Subacute A + B + C vs A/A + B *Primary listing: Table 22 (Neuromuscular Electrical Stimulation (NMES))*	E: Motor Imagery-based Brain-computer Interface (BCI) + FES C: FES Duration: 1-1.5hr/d, 3d/wk BCI + FES & 20min/d, 3d/wk FES only & 5d/wk conventional therapy, 8wks	E vs C: ARAT (+exp) FMA UE (-), Event related desynchronization of sensorimotor cortex EEG

Ang et al. (2014) RCT (6) NStart=22 NEnd=21 TPS=Chronic A + B + C vs A/A + B vs 0 *Primary listing: Table 18 (Brain Computer Interfaces)*	E1: EEG-based motor imargery brain-computer interface with Haptic Knob robotic arm rehabilitation E2: Haptic Knob robot-based arm rehabilitation C: Standard arm therapy Duration: 90min/d, 3d/wk for 6wks	E1/E2 vs C: E1 vs E2/C: Fugl-Meyer Assessment (-)
Ahmad 2014 et al. (2014) Pilot RCT (7) NStart=40 NEnd=40 TPS=Subacute A + B1 vs A + B2 vs A *Primary listing: Table 4 (Task-Specific Training)*	E1: Auditory imagery + task specific training E2: Visual imagery+ task specific training E3: Cumulative imagery+ task specific training C: Task specific training Duration: Single Session 45-50mins	E1 vs C: Action Research Arm Test: (-) Motor Activity Log (-) Quality of Movement: (-) Amount of Use: (-) Barthel Index: (-) E2 vs C: Action Research Arm Test: (-) Motor Activity Log (-) Quality of Movement: (-) Amount of Use: (-) Barthel Index: (-) E3 vs C: Action Research Arm Test: (-) Motor Activity Log (-): Quality of Movement: (-) Amount of Use: (-) Barthel Index: (-) E1 vs E2 vs E3: Action Research Arm Test: (-) Motor Activity Log (-) Quality of Movement: (-) Amount of Use: (-) Barthel Index: (-)
Ang et al. (2010) RCT (5) NStart=26 NEnd=25 TPS=Chronic A + B + C vs A/A + B *Primary listing: Table 18 (Brain Computer Interfaces)*	E: EEG-based Motor Imagery Brain-Computer Interface with Robotic Feedback (MIT-MANUS) C: Traditional Robotic Therapy Duration: 60min, 12x, 4wks	E vs C: Fugl-Meyer Assessment (-) Wolf Motor Function Test (-) Active Range of Motion (-) Modified Barthel Index (-) Stroke Impact Scale (+exp)
Page et al. (2009) RCT (5) NStart=10 NEnd=10 TPS=Chronic A + B vs A/B *Primary listing: Table 6 (Constraint-Induced Movement Therapy (CIMT))*	E: Mental practice + Modified Constraint Induced Movement Therapy C: Modified Constraint Induced Movement Therapy Duration: CIMT 30 min/d,3d/wk,10wks	E vs C: Fugl-Meyer Assessment (+exp) Action Research Arm Test (+exp)

Abbreviations and table notes: C=control group; D=days; E=experimental group; H=hours; Min=minutes; RCT=randomized controlled trial; TPS=time post stroke category (Acute: less than 30 days, Subacute: more than 1 month but less than 6 months, Chronic: over 6 months); Wk=weeks.

+exp indicates a statistically significant between groups difference at α=0.05 in favour of the experimental group

+exp1/+exp2/+exp3 indicates a statistically significant between groups difference at α=0.05 in favour of the first, second or third experimental group

+con indicates a statistically significant between groups difference at α=0.05 in favour of the control group

- indicates no statistically significant between groups differences at α=0.05

1. Body Functions and Structures

MOTOR FUNCTION			
LoE	**Conclusion Statement**	**RCTs**	**References**
1a	Mental practice combined with other interventions may produce greater improvements in motor function than fes.	3	Su-jeonYOU et al. (2013); Hong et al. (2012); Hemmen et al. (2007)
2	Mental Practice with activities of daily living training session may produce greater improvements in motor function than Sham Relaxation Exercise with activities of daily living training session.	1	Page et al. (2007)
2	Mental Practice with electromyography neuromuscular electrical stimulation and Conventional Rehab may produce greater improvements in motor function than Conventional Rehab.	1	Park et al. (2017b)
1a	Mental practice may produce greater improvements in motor function than sham.	3	Nilsen et al. (2012); Page et al. (2011); Page et al. (2005a)
1b	Mental Imagery internal may not have a difference in efficacy when compared to Mental imagery external for improving motor function.	1	Nilsen et al. (2012)
1a	Mental practice may produce greater improvements in motor function than conventional therapy.	13	Liu et al. (2024a); Choi, W et al. (2022); Dai Y. et al. (2022); Nam et al. (2019); Wang et al. (2019a); Li et al. (2018a); Oh et al. (2016); Kim & Lee (2015); Park et al. (2015c); Sun et al. (2013); Timmermans et al. (2013); Riccio et al. (2010); Muller et al. (2007)
1a	There is conflicting evidence about the effect of Mental practice combined with other interventions when compared to mental practice for improving motor function.	3	Jia et al. (2024); Schiavo et al. (2020); Pichiorri et al. (2015)
1b	Graded motor imagery with repetitive transcranial magnetic stimulation and conventional rehabilitation may not have a difference in efficacy when compared to repetitive transcranial magnetic stimulation with conventional rehabilitation for improving motor function.	1	Jia et al. (2024)
1b	Low frequence repetitive transcranial magnetic stimulation with mental practice may produce greater improvements in motor function than repetitive transcranial magnetic stimulation with audiotape-led relaxation.	1	Pan et al. (2019)
1b	Motor Imagery & mental practice may not have a difference in efficacy when compared to Attention-placebo control or Normal care for improving motor function.	1	Ietswaart et al. (2011)
1b	Electromyography neuromuscular electrical stimulation with mental imagery training may not have a difference in efficacy when compared to electromyography neuromuscular electrical stimulation for improving motor function.	1	Park et al. (2020a)
2	There is conflicting evidence about the effect of Motor Imagery with Action Observation and occupational therapy when compared to Action Observation with occupational therapy for improving motor function.	1	Choi et al. (2022a)
1b	Motor imagery with conventional therapy may produce greater improvements in motor function than Health education on stroke with conventional therapy.	1	Wang et al. (2023b)
2	Graded Motor Imagery (included implicit and explicit motor imagery plus mirror therapy) with conventional rehabilitation may not have a	1	Ji et al. (2021)

	difference in efficacy when compared to Upper limb exercise with conventional rehabilitation for improving motor function.		
2	Mental practice with Modified Constraint Induced Movement Therapy may produce greater improvements in motor function than Modified Constraint Induced Movement Therapy.	1	Page et al. (2009)
2	There is conflicting evidence about the effect of Motor Imagery-based Brain-computer Interface with functional electrical stimulation when compared to functional electrical stimulation for improving motor function.	1	Li et al. (2014)
1b	Virtual reality game (Wii) with mental practice may produce greater improvements in motor function than virtual reality game (Wii).	1	Park et al. (2016)
1b	Mental practice with modified constraint-induced movement (modified constraint-induced movement therapy) therapy may not have a difference in efficacy when compared to modified constraint-induced movement therapy therapy for improving motor function.	1	Kim et al. (2018a)
1b	Bilateral transcranial direct current stimulation with motor imagery brain-computer interface may not have a difference in efficacy when compared to Sham transcranial direct current stimulation with motor imagery brain-computer interface for improving motor function.	1	Ang et al. (2015a)
1b	EEG-based motor imargery brain-computer interface with Haptic Knob robotic arm rehabilitation may not have a difference in efficacy when compared to arm therapy for improving motor function.	1	Ang et al. (2014)
2	EEG-based Motor Imagery Brain-Computer Interface with Robotic Feedback (MIT-MANUS) may not have a difference in efficacy when compared to Traditional Robotic Therapy for improving motor function.	1	Ang et al. (2010)
1b	Brain computer interface motor imagery with MITManus robotic training may not have a difference in efficacy when compared to MIT-Manus robotic training for improving motor function.	1	Ang et al. (2015b)
2	Mental practice with modified constraint-induced movement therapy may produce greater improvements in motor function than modified constraint-induced movement therapy.	1	Park et al. (2015a)
1b	External focus with robotic arm may not have a difference in efficacy when compared to Internal focus with robot for improving motor function.	1	Kim et al. (2017c)
2	There is conflicting evidence about the effect of Virtual Reality (Wii) when compared to Conventional therapy for improving motor function.	1	Alves et al. (2018)
2	Virtual Reality (Wii) may not have a difference in efficacy when compared to Motor Imagery Training for improving motor function.	1	Alves et al. (2018)
1b	Motor Imagery based brain-computer interface with conventional rehab may not have a difference in efficacy when compared to Motor Imagery with conventional rehab for improving motor function.	1	Hu Y.-Q. et al. (2021)
1b	Anodal transcranial direct current stimulation with motor imagery and upper-limb functional training may produce greater improvements in motor function than sham tCDS with motor imagery and upper-limb functional training.	1	Kashoo et al. (2022)
1b	Task oriented training with mental practice may not have a difference in efficacy when compared to Task oriented training for improving motor function.	1	Park, JuHyung et al. (2022)
1b	Brain-computer interface motor imagery training with conventional rehab may not have a difference in efficacy when compared to Conventional rehab for improving motor function.	1	Li et al. (2022c)

1b	Motor imagery brain-computer interface with conventional rehab may produce greater improvements in motor function than functional electrical stimulation with conventional rehab.	1	Liu et al. (2023)
1b	Brain-computer interface controlled hand exoskeleton with Mental practice and Occupational therapy may not have a difference in efficacy when compared to Occupational therapy for improving motor function.	1	Zanona A.D.F. et al. (2023)
2	Action observation with Motor imagery and Conventional therapy may not have a difference in efficacy when compared to Conventional therapy with passive video exposure (without guided action observation or motor imagery) for improving motor function.	1	Valadez-Roque et al. (2024)
1b	Brain-computer interface-motor imagery system with Conventional therapy may produce greater improvements in motor function than Conventional therapy.	1	Ma Z.-Z. et al. (2023)
1b	Mental imagery training may not have a difference in efficacy when compared to functional training for improving motor function.	1	Liu et al. (2004)
2	Mental practice of hand movement with Bobath therapy may produce greater improvements in motor function than Bobath therapy alone.	1	Liu et al. (2014a)
1b	Mental practice combined with other interventions may not have a difference in efficacy when compared to mirror therapy for improving motor function.	1	Won-Gi Choi et al. (2023)
1b	Low-frequency rTMS with motor imagery and electrical stimulation may produce greater improvements in motor function than low-frequency rTMS with motor imagery and sham electrical stimulation.	1	Kang et al. (2021)
1b	EEG brain-computer interface with hand robotic orthosis may not have a difference in efficacy when compared to motor imagery tasks for improving motor function.	1	Chen et al. (2020b)
1b	There is conflicting evidence about the effect of motor imagery with neurofeedback when compared to motor imagery with sham feedback for improving motor function.	1	Mihara et al. (2013)
2	Imagery training with conventional occupational therapy may produce greater improvements in motor function than conventional occupational therapy alone.	1	Page et al. (2000)
1b	Music therapy combined with motor imagery may not have a difference in efficacy when compared to music therapy alone for improving motor function.	1	Haire et al. (2021)
1b	Auditory imagery with task specific training may not have a difference in efficacy when compared to Task specific training for improving motor function.	1	Ahmad 2014 et al. (2014)
1b	Visual imagery with task specific training may not have a difference in efficacy when compared to Task specific training for improving motor function.	1	Ahmad 2014 et al. (2014)
1b	Cumulative imagery with task specific training may not have a difference in efficacy when compared to Task specific training for improving motor function.	1	Ahmad 2014 et al. (2014)
1b	Auditory imagery with task specific training may not have a difference in efficacy when compared to Cumulative imagery with task specific training for improving motor function.	1	Ahmad 2014 et al. (2014)
1b	Visual imagery with task specific training may not have a difference in efficacy when compared to Cumulative imagery with task specific training for improving motor function.	1	Ahmad 2014 et al. (2014)

STROKE SEVERITY			
LoE	**Conclusion Statement**	**RCTs**	**References**
1a	There is conflicting evidence about the effect of Mental practice combined with other interventions when compared to mental practice for improving stroke severity.	2	Schiavo et al. (2020); Pichiorri et al. (2015)

MUSCLE STRENGTH			
LoE	**Conclusion Statement**	**RCTs**	**References**
2	Mental practice may produce greater improvements in muscle strength than conventional therapy.	2	Riccio et al. (2010); Muller et al. (2007)
1b	Mental practice combined with other interventions may produce greater improvements in muscle strength than mental practice.	1	Pichiorri et al. (2015)
1b	Motor Imagery & mental practice may not have a difference in efficacy when compared to Attention-placebo control or Normal care for improving muscle strength.	1	Ietswaart et al. (2011)
2	Action observation with Motor imagery and Conventional therapy may produce greater improvements in muscle strength than Conventional therapy with passive video exposure (without guided action observation or motor imagery).	1	Valadez-Roque et al. (2024)

SPASTICITY			
LoE	**Conclusion Statement**	**RCTs**	**References**
1a	Mental practice combined with other interventions may not have a difference in efficacy when compared to fes for improving spasticity.	2	Su-jeonYOU et al. (2013); Hong et al. (2012)

RANGE OF MOTION			
LoE	**Conclusion Statement**	**RCTs**	**References**
1b	Paired associative stimulation (PAS) with Motor imagery may not have a difference in efficacy when compared to Sham PAS with motor imagery for improving range of motion.	1	Brihmat et al. (2023)
2	Action observation with Motor imagery and Conventional therapy may not have a difference in efficacy when compared to Conventional therapy with passive video exposure (without guided action observation or motor imagery) for improving range of motion.	1	Valadez-Roque et al. (2024)
1b	Mental practice combined with other interventions may not have a difference in efficacy when compared to fes for improving range of motion.	1	Su-jeonYOU et al. (2013)

PROPRIOCEPTION			
LoE	**Conclusion Statement**	**RCTs**	**References**
1b	Motor imagery with neurofeedback may not have a difference in efficacy when compared to motor imagery with sham feedback for improving proprioception.	1	Mihara et al. (2013)

2. Activities

ACTIVITIES OF DAILY LIVING			
LoE	**Conclusion Statement**	**RCTs**	**References**
1a	Mental practice combined with other interventions may not have a difference in efficacy when compared to fes for improving performance of activities of daily living.	2	Su-jeonYOU et al. (2013); Hong et al. (2012)
2	Mental Practice with electromyography neuromuscular electrical stimulation and Conventional Rehab may produce greater improvements in performance of activities of daily living than Conventional Rehab.	1	Park et al. (2017b)
1b	Mental practice may not have a difference in efficacy when compared to sham for improving performance of activities of daily living.	2	Nilsen et al. (2012); Page et al. (2005a)
1b	Mental Imagery internal may not have a difference in efficacy when compared to Mental imagery external for improving performance of activities of daily living.	1	Nilsen et al. (2012)
1a	There is conflicting evidence about the effect of Mental practice when compared to conventional therapy for improving performance of activities of daily living.	8	Liu et al. (2024a); Choi, W et al. (2022); Nam et al. (2019); Oh et al. (2016); Park et al. (2015c); Timmermans et al. (2013); Riccio et al. (2010); Liu et al. (2009a)
1a	There is conflicting evidence about the effect of Mental practice combined with other interventions when compared to mental practice for improving performance of activities of daily living.	2	Jia et al. (2024); Schiavo et al. (2020)
1b	There is conflicting evidence about the effect of Graded motor imagery with repetitive transcranial magnetic stimulation and conventional rehabilitation when compared to repetitive transcranial magnetic stimulation with conventional rehabilitation for improving performance of activities of daily living.	1	Jia et al. (2024)
1b	Low frequence repetitive transcranial magnetic stimulation with mental practice may produce greater improvements in performance of activities of daily living than repetitive transcranial magnetic stimulation with audiotape-led relaxation.	1	Pan et al. (2019)
1b	Motor Imagery & mental practice may not have a difference in efficacy when compared to Attention-placebo control or Normal care for improving performance of activities of daily living.	1	Ietswaart et al. (2011)
1b	Electromyography neuromuscular electrical stimulation with mental imagery training may not have a difference in efficacy when compared to electromyography neuromuscular electrical stimulation for improving performance of activities of daily living.	1	Park et al. (2020a)
2	There is conflicting evidence about the effect of Motor Imagery with Action Observation and occupational therapy when compared to Action Observation with occupational therapy for improving performance of activities of daily living.	1	Choi et al. (2022a)
1b	Motor imagery with conventional therapy may produce greater improvements in performance of activities of daily living than Health education on stroke with conventional therapy.	1	Wang et al. (2023b)
2	Graded Motor Imagery (included implicit and explicit motor imagery plus mirror therapy) with conventional rehabilitation may not have a difference in efficacy when compared to Upper limb exercise with conventional rehabilitation for improving performance of activities of daily living.	1	Ji et al. (2021)

1b	Virtual reality game (Wii) with mental practice may produce greater improvements in performance of activities of daily living than virtual reality game (Wii).	1	Park et al. (2016)
1b	Mental practice with modified constraint-induced movement (modified constraint-induced movement therapy) therapy may produce greater improvements in performance of activities of daily living than modified constraint-induced movement therapy therapy.	1	Kim et al. (2018a)
2	Mental practice with modified constraint-induced movement therapy may produce greater improvements in performance of activities of daily living than modified constraint-induced movement therapy.	1	Park et al. (2015a)
1b	Motor Imagery based brain-computer interface with conventional rehab may not have a difference in efficacy when compared to Motor Imagery with conventional rehab for improving performance of activities of daily living.	1	Hu Y.-Q. et al. (2021)
1b	Brain-computer interface motor imagery training with conventional rehab may not have a difference in efficacy when compared to Conventional rehab for improving performance of activities of daily living.	1	Li et al. (2022c)
1b	Motor imagery brain-computer interface with conventional rehab may produce greater improvements in performance of activities of daily living than functional electrical stimulation with conventional rehab.	1	Liu et al. (2023)
1b	Brain-computer interface controlled hand exoskeleton with Mental practice and Occupational therapy may not have a difference in efficacy when compared to Occupational therapy for improving performance of activities of daily living.	1	Zanona A.D.F. et al. (2023)
1b	Mental practice combined with other interventions may not have a difference in efficacy when compared to mirror therapy for improving performance of activities of daily living.	1	Won-Gi Choi et al. (2023)
1b	Low-frequency rTMS with motor imagery and electrical stimulation may not have a difference in efficacy when compared to low-frequency rTMS with motor imagery and sham electrical stimulation for improving performance of activities of daily living.	1	Kang et al. (2021)
1b	Motor imagery with neurofeedback may not have a difference in efficacy when compared to motor imagery with sham feedback for improving performance of activities of daily living.	1	Mihara et al. (2013)
1b	Music therapy combined with motor imagery may not have a difference in efficacy when compared to music therapy alone for improving performance of activities of daily living.	1	Haire et al. (2021)
1b	Auditory imagery with task specific training may not have a difference in efficacy when compared to Task specific training for improving performance of activities of daily living.	1	Ahmad 2014 et al. (2014)
1b	Visual imagery with task specific training may not have a difference in efficacy when compared to Task specific training for improving performance of activities of daily living.	1	Ahmad 2014 et al. (2014)
1b	Cumulative imagery with task specific training may not have a difference in efficacy when compared to Task specific training for improving performance of activities of daily living.	1	Ahmad 2014 et al. (2014)
1b	Auditory imagery with task specific training may not have a difference in efficacy when compared to Cumulative imagery with task specific training for improving performance of activities of daily living.	1	Ahmad 2014 et al. (2014)
1b	Visual imagery with task specific training may not have a difference in efficacy when compared to Cumulative imagery with task specific training for improving performance of activities of daily living.	1	Ahmad 2014 et al. (2014)

2	EEG-based Motor Imagery Brain-Computer Interface with Robotic Feedback (MIT-MANUS) may not have a difference in efficacy when compared to Traditional Robotic Therapy for improving performance of activities of daily living.	1	Ang et al. (2010)

DEXTERITY			
LoE	**Conclusion Statement**	**RCTs**	**References**
1b	Mental practice may not have a difference in efficacy when compared to sham for improving dexterity.	1	Liepert et al. (2020)
1b	Low frequence repetitive transcranial magnetic stimulation with mental practice may produce greater improvements in dexterity than repetitive transcranial magnetic stimulation with audiotape-led relaxation.	1	Pan et al. (2019)
1b	Motor Imagery & mental practice may not have a difference in efficacy when compared to Attention-placebo control or Normal care for improving dexterity.	1	Ietswaart et al. (2011)
1b	Mental practice combined with other interventions may not have a difference in efficacy when compared to task-specific training for improving dexterity.	1	Stuerner et al. (2023)
1b	Motor Imagery with Audio Feedback and Task Specific Training may not have a difference in efficacy when compared to Motor imagery with TST for improving dexterity.	1	Stuerner et al. (2023)
1b	Virtual reality game (Wii) with mental practice may produce greater improvements in dexterity than virtual reality game (Wii).	1	Park et al. (2016)
1b	Brain-computer interface controlled hand exoskeleton with Mental practice and Occupational therapy may not have a difference in efficacy when compared to Occupational therapy for improving dexterity.	1	Zanona A.D.F. et al. (2023)
1b	Low-frequency rTMS with motor imagery and electrical stimulation may not have a difference in efficacy when compared to low-frequency rTMS with motor imagery and sham electrical stimulation for improving dexterity.	1	Kang et al. (2021)
1b	Mental practice combined with other interventions may not have a difference in efficacy when compared to mental practice for improving dexterity.	1	Schiavo et al. (2020)

Key Points

- Mental practice combined with other interventions may be beneficial for improving motor function, but not spasticity, range of motion, and performance of activities of daily living, after stroke when compared to fes.
- Mental Practice with activities of daily living training session may be beneficial for improving motor function after stroke when compared to Sham Relaxation Exercise with activities of daily living training session.
- Mental Practice with electromyography neuromuscular electrical stimulation and Conventional Rehab may be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Conventional Rehab.
- Mental practice may be beneficial for improving motor function, but not dexterity and performance of activities of daily living, after stroke when compared to sham.
- Mental Imagery internal may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Mental imagery external.

- Mental practice may be beneficial for improving motor function and muscle strength after stroke when compared to conventional therapy; the literature is mixed regarding performance of activities of daily living.
- Mental practice combined with other interventions may be beneficial for improving muscle strength, but not dexterity, after stroke when compared to mental practice; the literature is mixed regarding motor function, stroke severity, and performance of activities of daily living.
- Graded motor imagery with repetitive transcranial magnetic stimulation and conventional rehabilitation may not be beneficial for improving motor function after stroke when compared to repetitive transcranial magnetic stimulation with conventional rehabilitation; the literature is mixed regarding performance of activities of daily living.
- Low frequence repetitive transcranial magnetic stimulation with mental practice may be beneficial for improving motor function, dexterity, and performance of activities of daily living after stroke when compared to repetitive transcranial magnetic stimulation with audiotape-led relaxation.
- Motor Imagery & mental practice may not be beneficial for improving motor function, dexterity, performance of activities of daily living, and muscle strength after stroke when compared to Attention-placebo control or Normal care.
- Electromyography neuromuscular electrical stimulation with mental imagery training may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to electromyography neuromuscular electrical stimulation.
- The literature is mixed regarding the effect of Motor Imagery with Action Observation and occupational therapy on improvement of motor function and performance of activities of daily living after stroke when compared to Action Observation with occupational therapy.
- Motor imagery with conventional therapy may be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Health education on stroke with conventional therapy.
- Graded Motor Imagery (included implicit and explicit motor imagery plus mirror therapy) with conventional rehabilitation may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Upper limb exercise with conventional rehabilitation.
- Mental practice with Modified Constraint Induced Movement Therapy may be beneficial for improving motor function after stroke when compared to Modified Constraint Induced Movement Therapy.
- The literature is mixed regarding the effect of Motor Imagery-based Brain-computer Interface with functional electrical stimulation on improvement of motor function after stroke when compared to functional electrical stimulation.
- Virtual reality game (Wii) with mental practice may be beneficial for improving motor function, dexterity, and performance of activities of daily living after stroke when compared to virtual reality game (Wii).
- Mental practice with modified constraint-induced movement (modified constraint-induced movement therapy) therapy may be beneficial for improving performance of activities of daily living, but not motor function, after stroke when compared to modified constraint-induced movement therapy therapy.
- Bilateral transcranial direct current stimulation with motor imagery brain-computer interface may not be beneficial for improving motor function after stroke when compared to Sham transcranial direct current stimulation with motor imagery brain-computer interface.
- EEG-based motor imargery brain-computer interface with Haptic Knob robotic arm rehabilitation may not be beneficial for improving motor function after stroke when compared to arm therapy.
- EEG-based Motor Imagery Brain-Computer Interface with Robotic Feedback (MIT-MANUS) may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Traditional Robotic Therapy.
- Brain computer interface motor imagery with MITManus robotic training may not be beneficial for improving motor function after stroke when compared to MIT-Manus robotic training.
- Mental practice with modified constraint-induced movement therapy may be beneficial for improving motor function and performance of activities of daily living after stroke when compared to modified constraint-induced movement therapy.
- External focus with robotic arm may not be beneficial for improving motor function after stroke when compared to Internal focus with robot.

- The literature is mixed regarding the effect of Virtual Reality (Wii) on improvement of motor function after stroke when compared to Conventional therapy.
- Virtual Reality (Wii) may not be beneficial for improving motor function after stroke when compared to Motor Imagery Training.
- Motor Imagery based brain-computer interface with conventional rehab may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Motor Imagery with conventional rehab.
- Anodal transcranial direct current stimulation with motor imagery and upper-limb functional training may be beneficial for improving motor function after stroke when compared to sham tCDS with motor imagery and upper-limb functional training.
- Task oriented training with mental practice may not be beneficial for improving motor function after stroke when compared to Task oriented training.
- Brain-computer interface motor imagery training with conventional rehab may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Conventional rehab.
- Motor imagery brain-computer interface with conventional rehab may be beneficial for improving motor function and performance of activities of daily living after stroke when compared to functional electrical stimulation with conventional rehab.
- Brain-computer interface controlled hand exoskeleton with Mental practice and Occupational therapy may not be beneficial for improving motor function, dexterity, and performance of activities of daily living after stroke when compared to Occupational therapy.
- Action observation with Motor imagery and Conventional therapy may be beneficial for improving muscle strength, but not motor function and range of motion, after stroke when compared to Conventional therapy with passive video exposure (without guided action observation or motor imagery).
- Brain-computer interface-motor imagery system with Conventional therapy may be beneficial for improving motor function after stroke when compared to Conventional therapy.
- Mental imagery training may not be beneficial for improving motor function after stroke when compared to functional training.
- Mental practice of hand movement with Bobath therapy may be beneficial for improving motor function after stroke when compared to Bobath therapy alone.
- Mental practice combined with other interventions may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to mirror therapy.
- Low-frequency rTMS with motor imagery and electrical stimulation may be beneficial for improving motor function, but not performance of activities of daily living and dexterity, after stroke when compared to low-frequency rTMS with motor imagery and sham electrical stimulation.
- EEG brain-computer interface with hand robotic orthosis may not be beneficial for improving motor function after stroke when compared to motor imagery tasks.
- Motor imagery with neurofeedback may not be beneficial for improving proprioception and performance of activities of daily living after stroke when compared to motor imagery with sham feedback; the literature is mixed regarding motor function.
- Imagery training with conventional occupational therapy may be beneficial for improving motor function after stroke when compared to conventional occupational therapy alone.
- Music therapy combined with motor imagery may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to music therapy alone.
- Mental practice combined with other interventions may not be beneficial for improving dexterity after stroke when compared to task-specific training.
- Motor Imagery with Audio Feedback and Task Specific Training may not be beneficial for improving dexterity after stroke when compared to Motor imagery with TST.
- Paired associative stimulation (PAS) with Motor imagery may not be beneficial for improving range of motion after stroke when compared to Sham PAS with motor imagery.
- Auditory imagery with task specific training may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Task specific training.

- Visual imagery with task specific training may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Task specific training.
- Cumulative imagery with task specific training may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Task specific training.
- Auditory imagery with task specific training may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Cumulative imagery with task specific training.
- Visual imagery with task specific training may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Cumulative imagery with task specific training.

Summary of Key Points: Mental Practice

Intervention	Control(s)	Function domain(s)	Effect
Mental practice combined with other interventions	fes	Spasticity, range of motion, performance of activities of daily living	−
Mental practice combined with other interventions	fes	Motor function	+
Mental Practice with activities of daily living training session	Sham Relaxation Exercise with activities of daily living training session	Motor function	+
Mental Practice with electromyography neuromuscular electrical stimulation and Conventional Rehab	Conventional Rehab	Motor function, performance of activities of daily living	+
Mental practice	sham	Motor function	+
Mental practice	sham	Dexterity, performance of activities of daily living	−
Mental Imagery internal	Mental imagery external	Motor function, performance of activities of daily living	−
Mental practice	conventional therapy	Motor function, muscle strength	+
Mental practice	conventional therapy	Performance of activities of daily living	=
Mental practice combined with other interventions	mental practice	Muscle strength	+
Mental practice combined with other interventions	mental practice	Dexterity	−
Mental practice combined with other interventions	mental practice	Motor function, stroke severity, performance of activities of daily living	=
Graded motor imagery with repetitive transcranial magnetic stimulation and conventional rehabilitation	repetitive transcranial magnetic stimulation with conventional rehabilitation	Motor function	−
Graded motor imagery with repetitive transcranial magnetic stimulation and conventional rehabilitation	repetitive transcranial magnetic stimulation with conventional rehabilitation	Performance of activities of daily living	=
Low frequence repetitive transcranial magnetic stimulation with mental practice	repetitive transcranial magnetic stimulation with audiotape-led relaxation	Motor function, dexterity, performance of activities of daily living	+
Motor Imagery & mental practice	Attention-placebo control or Normal care	Motor function, dexterity, performance of activities of daily living, muscle strength	−

Electromyography neuromuscular electrical stimulation with mental imagery training	electromyography neuromuscular electrical stimulation	Motor function, performance of activities of daily living	–
Motor Imagery with Action Observation and occupational therapy	Action Observation with occupational therapy	Motor function, performance of activities of daily living	=
Motor imagery with conventional therapy	Health education on stroke with conventional therapy	Motor function, performance of activities of daily living	+
Graded Motor Imagery (included implicit and explicit motor imagery plus mirror therapy) with conventional rehabilitation	Upper limb exercise with conventional rehabilitation	Motor function, performance of activities of daily living	–
Mental practice with Modified Constraint Induced Movement Therapy	Modified Constraint Induced Movement Therapy	Motor function	+
Motor Imagery-based Brain-computer Interface with functional electrical stimulation	functional electrical stimulation	Motor function	=
Virtual reality game (Wii) with mental practice	virtual reality game (Wii)	Motor function, dexterity, performance of activities of daily living	+
Mental practice with modified constraint-induced movement (modified constraint-induced movement therapy) therapy	modified constraint-induced movement therapy therapy	Performance of activities of daily living	+
Mental practice with modified constraint-induced movement (modified constraint-induced movement therapy) therapy	modified constraint-induced movement therapy therapy	Motor function	–
Bilateral transcranial direct current stimulation with motor imagery brain-computer interface	Sham transcranial direct current stimulation with motor imagery brain-computer interface	Motor function	–
EEG-based motor imargery brain-computer interface with Haptic Knob robotic arm rehabilitation	arm therapy	Motor function	–
EEG-based Motor Imagery Brain-Computer Interface with Robotic Feedback (MIT-MANUS)	Traditional Robotic Therapy	Motor function, performance of activities of daily living	–
Brain computer interface motor imagery with MITManus robotic training	MIT-Manus robotic training	Motor function	–
Mental practice with modified constraint-induced movement therapy	modified constraint-induced movement therapy	Motor function, performance of activities of daily living	+
External focus with robotic arm	Internal focus with robot	Motor function	–
Virtual Reality (Wii)	Conventional therapy	Motor function	=
Virtual Reality (Wii)	Motor Imagery Training	Motor function	–
Motor Imagery based brain-computer interface with conventional rehab	Motor Imagery with conventional rehab	Motor function, performance of activities of daily living	–
Anodal transcranial direct current stimulation with motor imagery and upper-limb functional training	sham tCDS with motor imagery and upper-limb functional training	Motor function	+
Task oriented training with mental practice	Task oriented training	Motor function	–

Brain-computer interface motor imagery training with conventional rehab	Conventional rehab	Motor function, performance of activities of daily living	−
Motor imagery brain-computer interface with conventional rehab	functional electrical stimulation with conventional rehab	Motor function, performance of activities of daily living	+
Brain-computer interface controlled hand exoskeleton with Mental practice and Occupational therapy	Occupational therapy	Motor function, dexterity, performance of activities of daily living	−
Action observation with Motor imagery and Conventional therapy	Conventional therapy with passive video exposure (without guided action observation or motor imagery)	Muscle strength	+
Action observation with Motor imagery and Conventional therapy	Conventional therapy with passive video exposure (without guided action observation or motor imagery)	Motor function, range of motion	−
Brain-computer interface-motor imagery system with Conventional therapy	Conventional therapy	Motor function	+
Mental imagery training	functional training	Motor function	−
Mental practice of hand movement with Bobath therapy	Bobath therapy alone	Motor function	+
Mental practice combined with other interventions	mirror therapy	Motor function, performance of activities of daily living	−
EEG brain-computer interface with hand robotic orthosis	motor imagery tasks	Motor function	−
motor imagery with neurofeedback	motor imagery with sham feedback	Motor function	=
Imagery training with conventional occupational therapy	conventional occupational therapy alone	Motor function	+
Music therapy combined with motor imagery	music therapy alone	Motor function, performance of activities of daily living	−
Mental practice combined with other interventions	task-specific training	Dexterity	−
Motor Imagery with Audio Feedback and Task Specific Training	Motor imagery with TST	Dexterity	−
Low-frequency rTMS with motor imagery and electrical stimulation	low-frequency rTMS with motor imagery and sham electrical stimulation	Performance of activities of daily living, dexterity	−
Low-frequency rTMS with motor imagery and electrical stimulation	low-frequency rTMS with motor imagery and sham electrical stimulation	Motor function	+
Motor imagery with neurofeedback	motor imagery with sham feedback	Performance of activities of daily living, proprioception	−
Paired associative stimulation (PAS) with Motor imagery	Sham PAS with motor imagery	Range of motion	−
Auditory imagery with task specific training	Task specific training	Motor function, performance of activities of daily living	−
Visual imagery with task specific training	Task specific training	Motor function, performance of activities of daily living	−

Cumulative imagery with task specific training	Task specific training	Motor function, performance of activities of daily living	–
Auditory imagery with task specific training	Cumulative imagery with task specific training	Motor function, performance of activities of daily living	–
Visual imagery with task specific training	Cumulative imagery with task specific training	Motor function, performance of activities of daily living	–

Action Observation



Adapted from: https://www.youtube.com/watch?v=QE3CUhmKi7U

Action observation is a form of therapy whereby an individual observes another individual performing a motor task, either on a video or a real demonstration, and then may attempt to perform the same task themselves. For example, the patient may be instructed to watch a video showing an adult stretching out his hand to pick up a cup, bringing the cup to his mouth, and then returning the cup to its initial position - the act of drinking. After observing the video sequence for a time, the participants may or may not be asked to perform the same action (Borges et al. 2018). The therapy is considered a multisensory approach designed to increase cortical excitability in the primary motor cortex by activating central representations of actions through the mirror neuron system (Kim and Kim, 2015). Although action observation has been evaluated mainly in healthy volunteers, a few studies have evaluated its benefit in motor relearning following stroke.

A total of nineteen RCTs were found that evaluated action observation for upper extremity motor rehabilitation. One RCT compared action observation combined with other interventions with exercise and custom physiotherapy protocols (Celnik et al. (2008)). Five RCTs compared action observation with sham (Kuk et al. (2016); Kim & Kim (2015a); Sale et al. (2014c); Franceschini et al. (2012); Ertelt et al. (2007)). Two RCTs compared action observation with conventional therapy (Fu et al. (2017); Cowles et al. (2013)). One RCT compared action observation combined with other interventions with action observation (Kim et al. (2020b)). One RCT compared action observation combined with other interventions with fes (Lee et al. (2020b)). Three RCTs compared action observation combined with other interventions with conventional therapy (Hsieh et al. (2020); Kim et al. (2016b); Zhu et al. (2015)). Two RCTs compared action observation combined with other interventions with sham or task-specific training (Shamili et al. (2022); Mancuso et al. (2021)). One RCT compared different approaches to action observation (Yu & Park (2022)). One RCT compared action observation combined with other interventions with sham (Valadez-Roque et al. (2024)). One RCT compared action observation combined with other interventions with cimt (Shaukat et al. (2022)). One RCT compared action observation combined with other interventions with task-specific training (Kim & Bang (2016)).

In addition, 5 RCTs in which action observation formed part of a combined or comparative intervention are cross-referenced at the end of Table 12; their primary listings appear in other tables.

The methodological details and results of all nineteen RCTs are presented in Table 12.

Table 12. RCTs Evaluating Action Observation for Upper Extremity Motor Rehabilitation

Authors (Year) Study Design (PEDro Score) Sample Size start Sample Size end Time post stroke category Study design	Interventions Duration: Session length, frequency per week for total number of weeks	Outcome Measures Result (direction of effect)
Action observation combined with other interventions compared to exercise and custom physiotherapy protocols		
Celnik et al. (2008) RCT Crossover (5) NStart=9 NEnd=8 TPS=Chronic A + B1 vs A + B2 vs A *Also in Table 3 (Exercise and Strength Training)*	E1: Physical Therapy + Action Observation Congruent E2: Physical Therapy + Action Observation Incongruent C: Physical Therapy Duration: 30min, 1x/condition, 7d washout period	E1/E2 vs C: E1 vs E2/C: motor memory formation (based on EMG, TMS-evoked thumb movements) (+exp1)
Action observation compared to sham		
Kuk et al. (2016) RCT (5) NStart=22 NEnd=20 TPS=Chronic A vs 0	E: Action observation therapy C: Sham AOT (landscape observation) Duration: 1min/session for 5 sessions	E vs C: BBT (+exp) EEG-based cortical activation
Kim & Kim (2015a) RCT (3) NStart=12 NEnd=12 TPS=Not Reported A vs 0	E: Action observation + occupational therapy C: Sham action observation + occupational therapy Duration: 30min/d, 5d/wk, 6wk	E vs C: WMFT (+exp)
Sale et al. (2014c) RCT (7) NStart=67 NEnd=67 TPS=Acute A vs 0	E: Action observation + Standard rehab C: Sham action observation + Standard rehab Duration: 3hr/d rehabilitation + 15min, 2x/d, 5d/wk, 4wk action observation or sham	E vs C: Fugl-Meyer Assessment all subjects (+exp) right hemiparetic subjects (-) left hemiparetic subjects (+exp) Box and Block Test all subjects (+exp) right hemiparetic subjects (-) left hemiparetic subjects (+exp)
Franceschini et al. (2012) RCT (6) NStart=102 NEnd=90 TPS=Acute A vs 0	E: Action observation C: Sham action observation Duration: 15min, 5d/wk, 4wk	E vs C: FMA (-) Frenchay Arm test BBT (+exp) Modified Ashworth scale (-) FIM (-)
Ertelt et al. (2007) RCT (5) NStart=16 NEnd=16 TPS=Chronic A vs 0	E: Action observation therapy C:Sham therapy Duration: 12min/d, 5d/wk for 18d	E vs C: Frenchay Arm Test (+exp) Wolf Motor Function Test (+exp) Stroke Impact Scale (+exp), fMRI Parameters

Action observation compared to conventional therapy		
Fu et al. (2017) RCT (5) NStart=70 NEnd=53 TPS=Subacute A vs 0	E: Action observation + conventional therapy C: conventional therapy Duration: 20min/time, 1x/d, 6d/wk, 8wks	E vs C: FMA (+exp) WMFT (+exp) mBI (+exp) MEP, latency, amplitude, center motion conduction time
Cowles et al. (2013) RCT (7) NStart=29 NEnd=22 TPS=Acute A vs 0	E: Action-observation Training + conventional therapy C: Conventional therapy Duration: 1h/d, 5d/wk for 3wk	E vs C: Motricity Index (-) Action Research Arm Test (-)
Action observation combined with other interventions compared to action observation		
Kim et al. (2020b) RCT (6) NStart=22 NEnd=22 TPS=Not Reported A + B vs A/B *Also in Table 22 (Neuromuscular Electrical Stimulation (NMES))*	E: Action observation training with intrinsic muscle stimulation + conventional therapy C: Action observation training + conventional therapy Duration: 40min/d, 3d/wk, 4wks action observation training + 30min/d, 5d/wk, 4wks conventional therapy	E vs C: Manual Function Test: (no stats) 2-point Discrimination: (no stats) Proprioception: (no stats) stereognosis
Action observation combined with other interventions compared to fes		
Lee et al. (2020b) RCT (6) NStart=28 NEnd=26 TPS=Chronic A + B + C vs A/A + B *Also in Table 18 (Brain Computer Interfaces); Table 22 (Neuromuscular Electrical Stimulation (NMES))*	E: Action Observation with EEG-Mediated Functional Electrical Stimulation Brain-Computer Interface C: Functional Electrical Stimulation Duration: 30min, 5x/wk, 4wks	E vs C: Fugl-Meyer Assessment (+exp) Wolf Motor Function Test (+exp) Motor Acitivty Log (+exp) Modified Barthel Index (+exp) EEG brain waves - Alpha prefrontal area left side (-) prefrontal area on the right side (-) frontal lobe left side (-) frontal lobe right side (-) central lobe left side (+exp) central lobe right side (no stat) EEG brain waves - beta prefrontal area left side (-) prefrontal area on the right side (-) frontal lobe left side (-) frontal lobe right side (-) central lobe left side (+exp) central lobe right side (no stat) EEG brain waves - concentration prefrontal area left side (-) prefrontal area on the right side (-) frontal lobe left side (+exp) frontal lobe right side (+exp) central lobe left side (no stat) central lobe right side (no stat) EEG brain waves - activation prefrontal area left side (-) prefrontal area on the right side (-)

		frontal lobe left side (-) frontal lobe right side (-) central lobe left side (-) central lobe right side (+exp)
Action observation combined with other interventions compared to conventional therapy		
Hsieh et al. (2020) Pilot RCT (6) NStart=21 NEnd=21 TPS=Subacute A vs B vs 0 *Also in Table 10 (Mirror Therapy)*	E1: Action Observation E2: Mirror Therapy C: Customary bilateral arm training (dose-matched execises) Duration: 60min/d, 5d/wk, 3wks	E1 vs C: Fugl-Meyer Assessment (No stats) Box and Block Test Functional Independence Measure (No stats) Stroke Impact Scale (No stats) E2 vs C: Fugl-Meyer Assessment (No stats) Box and Block Test Functional Independence Measure (No stats) Stroke Impact Scale (No stats) E1 vs E2: Fugl-Meyer Assessment (No stats) Box and Block Test Functional Independence Measure (No stats) Stroke Impact Scale (No stats)
Kim et al. (2016b) RCT (7) NStart=34 NEnd=30 TPS=Chronic A + B + C vs 0 *Also in Table 18 (Brain Computer Interfaces); Table 22 (Neuromuscular Electrical Stimulation (NMES))*	E: FES with Action observation training and brain computer interface C: Conventional therapy Duration: E: 30min/session, 3sessions/wk, 4wks; C: 30min/session, 1session/d, 4wks;	E vs C: FMA (+exp) Motor activity log (+exp) mod BI (+exp) wrist flexion (+exp)
Zhu et al. (2015) RCT (5) NStart=70 NEnd=61 TPS=Acute A vs 0	E: Upper Limb Action Observation Therapy + Routine Rehabilitation C: Routine Rehabilitation Duration: E: 30min/d, 6d/wk, for 8 wk; C: 8wk, 2-5h/d, 6d/wk, for 8wks	E vs C: Fugl-Meyer Assessment (+exp) Barthel Index(+exp) Modified Ashworth scale(+exp)
Action observation combined with other interventions compared to sham or task-specific training		
Shamili et al. (2022) RCT (7) NStart=27 NEnd=24 TPS=Chronic A + B vs A/B *Also in Table 4 (Task-Specific Training)*	E: Action observation with task-specific training C: Sham observation with task-specific training Duration: 45-60 min, 3d/wk, 4 wks	E vs C: COPM (+exp) FMA (-) ARAT (-) BBT (-) MEP abductor policis brevis (+exp) extensor indicis (-)
Mancuso et al. (2021) Pilot RCT (7) NStart=32 NEnd=32 TPS=Acute A vs B	E: Action Observation Therapy + conventional treatment C: Task-Oriented Training + conventional treatment Duration: 30min AOT or TOT/d, 5d/wk, 4wks	E vs C: Fugl-Meyer Assessment Upper Extremity (+exp) Box and Block Test (-) Functional Independence Measure (+exp) Modified Ashworth Scale (-)

Different approaches to action observation compared against one another		
Yu & Park (2022) RCT (6) NStart=20 NEnd=20 TPS=Chronic A1 vs A2	E: First-Person Action Observation Training + conventional OT C: Third-person Action Observation Training + conventional OT Duration: 60 min/d (30 min action observation + 30 min OT), 5d/wk, 4 wks	E vs C: ARAT (+exp) Grasp (+exp) Grip (+exp) Pinch (-) gross movement (+exp) K-MBI (+exp) MAL AOU (+exp) QOM (+exp)
Action observation combined with other interventions compared to sham		
Valadez-Roque et al. (2024) RCT (5) NStart=11 NEnd=11 TPS=Chronic A + B vs 0 *Also in Table 11 (Mental Practice)*	E: Action observation + Motor imagery + Conventional therapy C: Conventional therapy + passive video exposure (without guided AO or MI) Duration: 35-42 mins (25-30 mins of Action observation and motor imagery or passive viewing of videos, 10-12 mins of physical therapy), 2ds/wk, 6wks	E vs C: FMA-UE (-) AMADEO Robot Finger Force (+exp) AMADEO Robot Range of motion (-) Alpha desynchonization (+exp)
Action observation combined with other interventions compared to cimt		
Shaukat et al. (2022) Pilot RCT (7) NStart=22 NEnd=22 TPS=Not Reported A vs B	E: Same Arm Movement Therapy (SAME) C: CIMT Duration: E: 45min/d, 3d/wk supervised session + 2d/wk independent session for 8wks; C: 2hr/d, 5d/wk for 8wks	E vs C: WMFT (-) ARAT (-)
Action observation combined with other interventions compared to task-specific training		
Kim & Bang (2016) Pilot RCT (6) NStart=22 NEnd=22 TPS=Subacute A + B vs A/B *Also in Table 4 (Task-Specific Training)*	E: Action observation + task-specific training C: Task-specific training Duration: 40min/d, 5d/wk, 4wk	E vs C: FMA UE (+exp) BBT (+exp) mod BI (+exp) mod Ashworth scale (-)
Cross-Referenced RCTs: Combined or Comparative Interventions Involving Action Observation (results included in this table's levels of evidence)		
Choi et al. (2022a) RCT (4) NStart=45 NEnd=45 TPS=Subacute A + B vs A/B *Primary listing: Table 11 (Mental Practice)*	E: Motor Imagery (MI) + Action Observation (AO) +OT C: Action Observation + OT Duration: 25min/d, 5d/wk, 8wks	E vs C: MEP amplitude (-) FMA-UE (+exp) WMFT (-) MAL: AOU (+exp) QOM (-)
Noh et al. (2019) RCT (6) NStart=22 NEnd=22 TPS=Acute A + B vs A/B	E: Low frequency rTMS + Action Observation C: Low frequency rTMS Duration: Action observation: 20 mins, 10ds consecutive; LF-rTMS: 20 mins, 10ds consecutive	E vs C: Brunstomm Recovery Stages (-) Fugl-Meyer Assessment (-) Manual Function Test (-) Grip Power Test (-) MEP-rMT (+exp) MEP Latency (-)

Primary listing: Table 29 (Repetitive Transcranial Magnetic Stimulation (rTMS))		MEP amplitude (-)
Wang et al. (2018) RCT (7) NStart=24 NEnd=24 TPS=Chronic A + B vs A/B *Primary listing: Table 16 (Robotics)*	E: action observation (AO) with EEG-guided robot-hand training C: robot-hand training without AO and EEG guidance Duration: 90min/d, 3d/wk for 4wk	E vs C: Fugl Meyer Assessment Upper Extremity: (-) fMRI parameters
Harmsen et al. (2015) RCT (6) NStart=37 NEnd=37 TPS=Chronic A + B vs A/B *Primary listing: Table 10 (Mirror Therapy)*	E: Mirror therapy + action observation C: Action observation Duration: 20 repetitions	E vs C: Movement time (+exp)
Lee et al. (2013c) RCT (2) NStart=33 NEnd=33 TPS=Chronic A + B vs A vs B vs 0 *Primary listing: Table 4 (Task-Specific Training)*	E1: Task specific training + action observation E2: Task specific training E3: Action observation C: No treatment Duration: 10min/d, 3wk	E1/E2/E3 vs C: E1 v E2/E3/C: improvement in Drinking from a cup (+exp1)

Abbreviations and table notes: C=control group; D=days; E=experimental group; H=hours; Min=minutes; RCT=randomized controlled trial; TPS=time post stroke category (Acute: less than 30 days, Subacute: more than 1 month but less than 6 months, Chronic: over 6 months); Wk=weeks.

+exp indicates a statistically significant between groups difference at α=0.05 in favour of the experimental group

+exp1/+exp2/+exp3 indicates a statistically significant between groups difference at α=0.05 in favour of the first, second or third experimental group

+con indicates a statistically significant between groups difference at α=0.05 in favour of the control group

- indicates no statistically significant between groups differences at α=0.05

1. Body Functions and Structures

MOTOR FUNCTION			
LoE	**Conclusion Statement**	**RCTs**	**References**
1a	Action observation may produce greater improvements in motor function than sham.	4	Kim & Kim (2015a); Sale et al. (2014c); Franceschini et al. (2012); Ertelt et al. (2007)
1b	There is conflicting evidence about the effect of Action observation when compared to conventional therapy for improving motor function.	2	Fu et al. (2017); Cowles et al. (2013)
1b	Action Observation with EEG-Mediated Functional Electrical Stimulation Brain-Computer Interface may produce greater improvements in motor function than Functional Electrical Stimulation.	1	Lee et al. (2020b)
1b	Functional electrical stimulation with Action observation training and brain computer interface may produce greater improvements in motor function than Conventional therapy.	1	Kim et al. (2016b)
1b	Action observation with task-specific training may not have a difference in efficacy when compared to Sham observation with task-specific training for improving motor function.	1	Shamili et al. (2022)

1b	First-Person Action Observation Training with conventional occupational therapy may produce greater improvements in motor function than Third-person Action Observation Training with conventional occupational therapy.	1	Yu & Park (2022)
2	Action observation with Motor imagery and Conventional therapy may not have a difference in efficacy when compared to Conventional therapy with passive video exposure (without guided action observation or motor imagery) for improving motor function.	1	Valadez-Roque et al. (2024)
1b	Low frequency repetitive transcranial magnetic stimulation with Action Observation may not have a difference in efficacy when compared to Low frequency repetitive transcranial magnetic stimulation for improving motor function.	1	Noh et al. (2019)
1b	Action observation with EEG-guided robot-hand training may not have a difference in efficacy when compared to robot-hand training without action observation and EEG guidance for improving motor function.	1	Wang et al. (2018)
2	There is conflicting evidence about the effect of Motor Imagery with Action Observation and occupational therapy when compared to Action Observation with occupational therapy for improving motor function.	1	Choi et al. (2022a)
2	Action observation therapy with routine rehabilitation may produce greater improvements in motor function than routine rehabilitation alone.	1	Zhu et al. (2015)
1b	Same arm movement therapy may not have a difference in efficacy when compared to constraint-induced movement therapy for improving motor function.	1	Shaukat et al. (2022)
1b	Action observation therapy with conventional treatment may produce greater improvements in motor function than task-oriented training with conventional treatment.	1	Mancuso et al. (2021)
1b	Action observation with task-specific training may produce greater improvements in motor function than Task-specific training.	1	Kim & Bang (2016)

MUSCLE STRENGTH			
LoE	**Conclusion Statement**	**RCTs**	**References**
1b	Action observation may not have a difference in efficacy when compared to conventional therapy for improving muscle strength.	1	Cowles et al. (2013)
2	Action observation with Motor imagery and Conventional therapy may produce greater improvements in muscle strength than Conventional therapy with passive video exposure (without guided action observation or motor imagery).	1	Valadez-Roque et al. (2024)
1b	Low frequency repetitive transcranial magnetic stimulation with Action Observation may not have a difference in efficacy when compared to Low frequency repetitive transcranial magnetic stimulation for improving muscle strength.	1	Noh et al. (2019)

SPASTICITY			
LoE	**Conclusion Statement**	**RCTs**	**References**
1b	Action observation may not have a difference in efficacy when compared to sham for improving spasticity.	1	Franceschini et al. (2012)
2	Action observation therapy with routine rehabilitation may produce greater improvements in spasticity than routine rehabilitation alone.	1	Zhu et al. (2015)

1b	Action observation therapy with conventional treatment may not have a difference in efficacy when compared to task-oriented training with conventional treatment for improving spasticity.	1	Mancuso et al. (2021)
1b	Action observation with task-specific training may not have a difference in efficacy when compared to Task-specific training for improving spasticity.	1	Kim & Bang (2016)

RANGE OF MOTION			
LoE	**Conclusion Statement**	**RCTs**	**References**
2	Action observation with Motor imagery and Conventional therapy may not have a difference in efficacy when compared to Conventional therapy with passive video exposure (without guided action observation or motor imagery) for improving range of motion.	1	Valadez-Roque et al. (2024)

2. Activities

ACTIVITIES OF DAILY LIVING			
LoE	**Conclusion Statement**	**RCTs**	**References**
1b	There is conflicting evidence about the effect of Action observation when compared to sham for improving performance of activities of daily living.	2	Franceschini et al. (2012); Ertelt et al. (2007)
2	Action observation may produce greater improvements in performance of activities of daily living than conventional therapy.	1	Fu et al. (2017)
1b	Action Observation with EEG-Mediated Functional Electrical Stimulation Brain-Computer Interface may produce greater improvements in performance of activities of daily living than Functional Electrical Stimulation.	1	Lee et al. (2020b)
1b	Functional electrical stimulation with Action observation training and brain computer interface may produce greater improvements in performance of activities of daily living than Conventional therapy.	1	Kim et al. (2016b)
1b	Action observation with task-specific training may produce greater improvements in performance of activities of daily living than Sham observation with task-specific training.	1	Shamili et al. (2022)
1b	First-Person Action Observation Training with conventional occupational therapy may produce greater improvements in performance of activities of daily living than Third-person Action Observation Training with conventional occupational therapy.	1	Yu & Park (2022)
2	There is conflicting evidence about the effect of Motor Imagery with Action Observation and occupational therapy when compared to Action Observation with occupational therapy for improving performance of activities of daily living.	1	Choi et al. (2022a)
2	Action observation therapy with routine rehabilitation may produce greater improvements in performance of activities of daily living than routine rehabilitation alone.	1	Zhu et al. (2015)
1b	Action observation therapy with conventional treatment may produce greater improvements in performance of activities of daily living than task-oriented training with conventional treatment.	1	Mancuso et al. (2021)
1b	Action observation with task-specific training may produce greater improvements in performance of activities of daily living than Task-specific training.	1	Kim & Bang (2016)
2	Task specific training with action observation may produce greater improvements in performance of activities of daily living than No treatment.	1	Lee et al. (2013c)

2	Task specific training with action observation may produce greater improvements in performance of activities of daily living than Action observation.	1	Lee et al. (2013c)

DEXTERITY			
LoE	**Conclusion Statement**	**RCTs**	**References**
1a	Action observation may produce greater improvements in dexterity than sham.	3	Kuk et al. (2016); Sale et al. (2014c); Franceschini et al. (2012)
1b	Action observation with task-specific training may not have a difference in efficacy when compared to Sham observation with task-specific training for improving dexterity.	1	Shamili et al. (2022)
1b	Action observation therapy with conventional treatment may not have a difference in efficacy when compared to task-oriented training with conventional treatment for improving dexterity.	1	Mancuso et al. (2021)
1b	Action observation with task-specific training may produce greater improvements in dexterity than Task-specific training.	1	Kim & Bang (2016)

Key Points

- Action observation may be beneficial for improving motor function and dexterity, but not spasticity, after stroke when compared to sham; the literature is mixed regarding performance of activities of daily living.
- Action observation may be beneficial for improving performance of activities of daily living, but not muscle strength, after stroke when compared to conventional therapy; the literature is mixed regarding motor function.
- Action Observation with EEG-Mediated Functional Electrical Stimulation Brain-Computer Interface may be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Functional Electrical Stimulation.
- Functional electrical stimulation with Action observation training and brain computer interface may be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Conventional therapy.
- Action observation with task-specific training may be beneficial for improving performance of activities of daily living, but not motor function and dexterity, after stroke when compared to Sham observation with task-specific training.
- First-Person Action Observation Training with conventional occupational therapy may be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Third-person Action Observation Training with conventional occupational therapy.
- Action observation with Motor imagery and Conventional therapy may be beneficial for improving muscle strength, but not motor function and range of motion, after stroke when compared to Conventional therapy with passive video exposure (without guided action observation or motor imagery).
- Low frequency repetitive transcranial magnetic stimulation with Action Observation may not be beneficial for improving motor function and muscle strength after stroke when compared to Low frequency repetitive transcranial magnetic stimulation.
- Action observation with EEG-guided robot-hand training may not be beneficial for improving motor function after stroke when compared to robot-hand training without action observation and EEG guidance.
- The literature is mixed regarding the effect of Motor Imagery with Action Observation and occupational therapy on improvement of motor function and performance of activities of daily living after stroke when compared to Action Observation with occupational therapy.
- Action observation therapy with routine rehabilitation may be beneficial for improving motor function, performance of activities of daily living, and spasticity after stroke when compared to routine rehabilitation alone.

- Same arm movement therapy may not be beneficial for improving motor function after stroke when compared to constraint-induced movement therapy.
- Action observation therapy with conventional treatment may be beneficial for improving motor function and performance of activities of daily living, but not dexterity and spasticity, after stroke when compared to task-oriented training with conventional treatment.
- Action observation with task-specific training may be beneficial for improving motor function, performance of activities of daily living, and dexterity, but not spasticity, after stroke when compared to Task-specific training.
- Task specific training with action observation may be beneficial for improving performance of activities of daily living after stroke when compared to No treatment.
- Task specific training with action observation may be beneficial for improving performance of activities of daily living after stroke when compared to Action observation.

Summary of Key Points: Action Observation

Intervention	Control(s)	Function domain(s)	Effect
Action observation	sham	Motor function, dexterity	+
Action observation	sham	Spasticity	−
Action observation	sham	Performance of activities of daily living	=
Action observation	conventional therapy	Performance of activities of daily living	+
Action observation	conventional therapy	Muscle strength	−
Action observation	conventional therapy	Motor function	=
Action Observation with EEG-Mediated Functional Electrical Stimulation Brain-Computer Interface	Functional Electrical Stimulation	Motor function, performance of activities of daily living	+
Functional electrical stimulation with Action observation training and brain computer interface	Conventional therapy	Motor function, performance of activities of daily living	+
Action observation with task-specific training	Sham observation with task-specific training	Performance of activities of daily living	+
Action observation with task-specific training	Sham observation with task-specific training	Motor function, dexterity	−
First-Person Action Observation Training with conventional occupational therapy	Third-person Action Observation Training with conventional occupational therapy	Motor function, performance of activities of daily living	+
Action observation with Motor imagery and Conventional therapy	Conventional therapy with passive video exposure (without guided action observation or motor imagery)	Muscle strength	+
Action observation with Motor imagery and Conventional therapy	Conventional therapy with passive video exposure (without guided action observation or motor imagery)	Motor function, range of motion	−
Low frequency repetitive transcranial magnetic stimulation with Action Observation	Low frequency repetitive transcranial magnetic stimulation	Motor function, muscle strength	−

Action observation with EEG-guided robot-hand training	robot-hand training without action observation and EEG guidance	Motor function	–
Motor Imagery with Action Observation and occupational therapy	Action Observation with occupational therapy	Motor function, performance of activities of daily living	=
Action observation therapy with routine rehabilitation	routine rehabilitation alone	Motor function, performance of activities of daily living, spasticity	+
Same arm movement therapy	constraint-induced movement therapy	Motor function	–
Action observation therapy with conventional treatment	task-oriented training with conventional treatment	Motor function, performance of activities of daily living	+
Action observation therapy with conventional treatment	task-oriented training with conventional treatment	Dexterity, spasticity	–
Action observation with task-specific training	Task-specific training	Motor function, performance of activities of daily living, dexterity	+
Action observation with task-specific training	Task-specific training	Spasticity	–
Task specific training with action observation	No treatment	Performance of activities of daily living	+
Task specific training with action observation	Action observation	Performance of activities of daily living	+

Cognitive and Dual-Task Training



Adapted from: https://link.springer.com/chapter/10.1007/978-3-030-23762-2_40

Cognitive and dual-task training combines cognitive tasks with upper limb motor practice, either sequentially or simultaneously, with the aim of improving motor performance under attention-demanding conditions.

A total of eight RCTs were found that evaluated cognitive and Dual-Task training for upper extremity motor rehabilitation. Three RCTs compared cognitive training with conventional therapy (Moon et al. (2020); Sallés et al. (2017); Wolf et al. (2016)). One RCT compared dual-task training combined with other interventions with exercise and custom physiotherapy protocols (Hee-Su An & Deok-Ju Kim (2021)). One RCT compared cognitive training combined with other interventions with bilateral arm training (Choi & Kim (2022)). One RCT compared cognitive training combined with other interventions with exercise and custom physiotherapy protocols (Mahmoud et al.

(2024)). One RCT compared cognitive training combined with other interventions with conventional therapy (Hejazi-Shirmard M. et al. (2024)). One RCT compared cognitive training combined with other interventions with cognitive training (Maier et al. (2020)).

In addition, 6 RCTs in which cognitive and Dual-Task training formed part of a combined or comparative intervention are cross-referenced at the end of Table 13; their primary listings appear in other tables.

The methodological details and results of all eight RCTs are presented in Table 13.

Table 13. RCTs Evaluating Cognitive and Dual-Task Training for Upper Extremity Motor Rehabilitation

Authors (Year) **Study Design (PEDro Score)** **Sample Size start** **Sample Size end** **Time post stroke category** **Study design**	**Interventions** **Duration: Session length, frequency per week for total number of weeks**	**Outcome Measures** **Result (direction of effect)**
Cognitive training compared to conventional therapy		
Moon et al. (2020) RCT (6) NStart=14 NEnd=14 TPS=Chronic A vs 0	E: Cognitive Exercise Therapy C: Conventional Occupational Therapy Duration: 30min/d, 5d/wk, 4wks	E vs C: Light Touch (+exp) Two Point Discrimination Static (-) Dynamic (+exp) Modified Barthel Index (-)
Sallés et al. (2017) Pilot RCT (6) NStart=8 NEnd=7 TPS=Subacute A vs 0	E: Neurocognitive Techniques (Cognitive Therapeutic Exercise (Perfetti Method)) C: Conventional care Duration: 30min, 3x/wk, 10wk	E vs C: Motor Evaluation Scale for Upper Extremity in Stroke Patients (-) Motricity Index (-) Revised Nottingham Sensory Assessment (-) Kinesthetic and Visual Imagery Questionnaire (-)
Wolf et al. (2016) Pilot RCT (5) NStart=35 NEnd=26 TPS=Subacute A vs 0	E: Cognitive Orientation to Daily Occupational Performance C: usual occupational therapy Duration: Number of sessions varied (MAX = 10)	E vs C: Delis–Kaplan Executive Function System-condition 4 (-) Action Research Arm Test (-) Stroke Impact Scale (-) mobility (-) hand function (-) ADLs (-) recovery (+exp) physical (-) memory (-), - emotion (-) communication (-)
Dual-task training combined with other interventions compared to exercise and custom physiotherapy protocols		
Hee-Su An & Deok-Ju Kim (2021) RCT (5) NStart=30 NEnd=30 TPS=Subacute A vs B *Also in Table 3 (Exercise and Strength Training)*	E: Dual-Task Training + Conventional OT C: Single Task Training (combining sensory stimulation, UE muscle strength, cognitive and perceptual training, and fine hand movement) + Conventional OT Duration: 30min/d, 5d/wk, 5wks	E vs C: MFT (+exp) K-TMT (+exp) DST (+exp) EFPT-K (+exp) WHOQOL-BREF (+exp)

Cognitive training combined with other interventions compared to bilateral arm training		
Choi & Kim (2022) RCT (4) NStart=20 NEnd=20 TPS=Subacute A + B vs A/B *Also in Table 2 (Bilateral Arm Training)*	E: Occupation-Based Bilateral Upper Limb Training + Cognitive Behavioral Therapy C: Occupation-Based Bilateral Upper Limb Training + Conventional OT Duration: 30min/d, 5d/wk, 4wks	E vs C: ATQ-N (+exp) KDS (+exp) STAI-Korean (+exp) MFT (-) MAL (-) COPM (+exp)
Cognitive training combined with other interventions compared to exercise and custom physiotherapy protocols		
Mahmoud et al. (2024) RCT (7) NStart=30 NEnd=30 TPS=Chronic A + B vs A/B *Also in Table 3 (Exercise and Strength Training)*	E: Cognitive motor rehabilitation + specific UE exercises C: Specific UE exercises Duration: 3d/wk, 8wks	E vs C: FMA - UE Motor function (+exp) Senesation (+exp) Passive joint motion (+exp) Joint pain (+exp) ARAT (+exp) Manual Function Test (+exp) Motor evaluation scale for UE in stroke patients Hand (+exp) Arm (+exp) Total (+exp)
Cognitive training combined with other interventions compared to conventional therapy		
Hejazi-Shirmard M. et al. (2024) Pilot RCT (6) NStart=39 NEnd=39 TPS=Chronic A vs B vs 0 *Also in Table 3 (Exercise and Strength Training)*	E1: Cognitive Orientation to Daily Occupaitonal Performance E2: Progressive exercise program (strenght, functional, balance, and endurance training) C: Conventional occupational therapy Duration: 1hr/d, 2d/wk, 6wks	E1/E2 vs C: E1 v E2/ C: [COPM; - Performance (+exp1), - Satisfaction (+exp1) FMA (-) BBT (-) Motor Acitivyt Log (-) Trail Making Test A (-) Trail Making Test B (-) kinematic outcome: normalized movement time (-), - Percentage of the movement time in which peak velocity occurs (-) Maximum grasp aperture (-), - Percentage of the movement time in which MGa occurs (-)
Cognitive training combined with other interventions compared to cognitive training		
Maier et al. (2020) Pilot RCT (5) NStart=38 NEnd=30 TPS=Chronic A + B vs A/B *Also in Table 17 (Virtual Reality)*	E: Adaptive conjuctive cognitive training C: Cognitive task training at home Duration: 30min/d, 7d/wk for 6wk	E vs C: BI (no stats) FMA (no stats) Neuropsychological battery (made of several smaller tasks, not sure what to code this as) + MOCA + HAMD + MMSE
Cross-Referenced RCTs: Combined or Comparative Interventions Involving Cognitive and Dual-Task Training (results included in this table's levels of evidence)		
Fernandez-Solana et al. (2024) RCT (6) NStart=128 NEnd=120 TPS=Subacute	E1: Mirror therapy + TOT E2: Cognitive therapeutic exercise + TOT C: Conventional therapy (TOT)	E1/E2 vs C: FMA - UE Functionality (+exp1/2) Motor domain (+exp1/2) Sensory domain (+exp1/2)

A vs B vs 0 *Primary listing: Table 10 (Mirror Therapy)*	Duration: E1/E2: 50min/d, 5d/wk, 4wks; C: 30min/d, 5d/wk, 4wks	Range of motion and pain domain (-) E1 vs E2: FMA - UE Functionality (-) Motor domain (-) Sensory domain (-) Range of motion and pain domain (+exp1)
Ranzani et al. (2020) RCT (6) NStart=33 NEnd=27 TPS=Acute A + B vs X *Primary listing: Table 16 (Robotics)*	E: Robot-Assisted Neurocognitive Therapy using a haptic device +Conventional Neurocognitive Therapy C: Conventional Neurocognitive Therapy Duration: 3 sessions/d (2x45min, 1x30min) for 4wks (15 sessions total)	E vs C: Fugl-Meyer Assessment UE (-) Wrist and Hand (-) Shoulder and Elbow (-) Box and Blocks Test (-) Modified Ashworth Scale (-) Erasmus Nottingham Sensory Assessment of Tactile Sensation (-) Mini Mental State Examination (-) Albert Test (-) Frontal Assessment Battery (-)
Song et al. (2019) RCT (8) NStart=50 NEnd=49 TPS=Chronic A + B vs A/B *Primary listing: Table 4 (Task-Specific Training)*	E: Cognitive orientation to daily occupational performance (CO-OP) C: taskspecific upper extremity training (TUET) Duration: 30min, 4d/wk, 4wk	E vs C: Box and block test (+exp) Canadian occupational performance measure satisfaction (+exp) performance (+exp) Community integration questionnaire (-) Wolf motor function test-functional score (+exp) community integration scale
Fasoli et al. (2019) Pilot RCT (7) NStart=10 NEnd=10 TPS=Chronic A + B + C vs A/A + B *Primary listing: Table 16 (Robotics)*	E: Robotic Therapy (Armeo Spring & Amadeo) + Task Oriented Training with Active Learning Program for Stroke (ALPS) C: Robotic Therapy with Active Learning Program for Stroke (ALPS) Duration: 60min, 2-3x/wk, 6-8wks	E vs C: Fugl-Meyer Assessment (+exp) Modified Ashworth Scale (-) Wolf Motor Function Test (-) Motor Activity Log (-) Stroke Impact Scale (-) Confidence in Arm & Hand Movement (CAHM)
Morreale et al. (2016) RCT (7) NStart=340 NEnd=302 TPS=Acute A1 vs A2 vs B *Primary listing: Table 1 (Neurodevelopmental Techniques)*	E1: Proprioceptive neuromuscular facilitation (PNF) early E2: PNF late E3: Cognitive therapeutic exercise (CTE) early E4: CTE late Duration: 2.5hr/d, 14wk, or 1.3hr/d, 5d/wk, 38wk	E1/E3 vs E2/E4: mRankin score (-) BI (-) 6min walking test (-) Motricity index (+exp1, +exp3) MMSE (-) Beck depression Inventory (-)
Page et al. (2001a) Pilot RCT (5) NStart=13 NEnd=13 TPS=Chronic A + B vs A/B *Primary listing: Table 11 (Mental Practice)*	E: Guided Motor Imagery (tape) + OT exercises C: Stroke-information tape + OT exercises Duration: 60 min of OT 3x/wk for 6 wks, 10-minute tape (imagery or stroke information) after each session and at home 2x/wk.	E vs C: Fugl-Meyer Assessment (No stats) Action Research Arm Test (No stats)

Abbreviations and table notes: C=control group; D=days; E=experimental group; H=hours; Min=minutes; RCT=randomized controlled trial; TPS=time post stroke category (Acute: less than 30 days, Subacute: more than 1 month but less than 6 months, Chronic: over 6 months); Wk=weeks.

+exp indicates a statistically significant between groups difference at α=0.05 in favour of the experimental group

+exp1/+exp2/+exp3 indicates a statistically significant between groups difference at α=0.05 in favour of the first, second or third experimental group

+con indicates a statistically significant between groups difference at α=0.05 in favour of the control group

- indicates no statistically significant between groups differences at α=0.05

1. Body Functions and Structures

MOTOR FUNCTION			
LoE	**Conclusion Statement**	**RCTs**	**References**
2	Dual-Task Training with Conventional occupational therapy may produce greater improvements in motor function than Single Task Training (combining sensory stimulation, UE muscle strength, cognitive and perceptual training, and fine hand movement) with Conventional occupational therapy.	1	Hee-Su An & Deok-Ju Kim (2021)
2	Occupation-Based Bilateral Upper Limb Training with Cognitive Behavioral Therapy may not have a difference in efficacy when compared to Occupation-Based Bilateral Upper Limb Training with Conventional occupational therapy for improving motor function.	1	Choi & Kim (2022)
1b	Cognitive motor rehabilitation with specific UE exercises may produce greater improvements in motor function than Specific UE exercises.	1	Mahmoud et al. (2024)
1b	Robot-Assisted Neurocognitive Therapy using a haptic device with Conventional Neurocognitive Therapy may not have a difference in efficacy when compared to Conventional Neurocognitive Therapy for improving motor function.	1	Ranzani et al. (2020)
1b	Cognitive orientation to daily occupational performance (CO-OP) may produce greater improvements in motor function than taskspecific upper extremity training (TUET).	1	Song et al. (2019)
1b	Mirror therapy with TOT may produce greater improvements in motor function than Conventional therapy (TOT).	1	Fernandez-Solana et al. (2024)
1b	Mirror therapy with TOT may not have a difference in efficacy when compared to Cognitive therapeutic exercise with TOT for improving motor function.	1	Fernandez-Solana et al. (2024)
1b	Cognitive Orientation to Daily Occupaitonal Performance may not have a difference in efficacy when compared to Conventional occupational therapy for improving motor function.	1	Hejazi-Shirmard M. et al. (2024)
1b	Cognitive training may not have a difference in efficacy when compared to conventional therapy for improving motor function.	2	Sallés et al. (2017); Wolf et al. (2016)
1b	There is conflicting evidence about the effect of Robotic Therapy (Armeo Spring & Amadeo) with Task Oriented Training with Active Learning Program for Stroke (ALPS) when compared to Robotic Therapy with Active Learning Program for Stroke (ALPS) for improving motor function.	1	Fasoli et al. (2019)
1b	Cognitive Orientation to Daily Occupaitonal Performance may not have a difference in efficacy when compared to Progressive exercise program (strenght, functional, balance, and endurance training) for improving motor function.	1	Hejazi-Shirmard M. et al. (2024)

STROKE SEVERITY			
LoE	**Conclusion Statement**	**RCTs**	**References**
1b	Proprioceptive neuromuscular facilitation early may not have a difference in efficacy when compared to Cognitive therapeutic exercise (CTE) early or late for improving stroke severity.	1	Morreale et al. (2016)

MUSCLE STRENGTH			
LoE	**Conclusion Statement**	**RCTs**	**References**
1b	Proprioceptive neuromuscular facilitation early may produce greater improvements in muscle strength than Cognitive therapeutic exercise (CTE) early or proprioceptive neuromuscular facilitation late or CTE late.	1	Morreale et al. (2016)
1b	Cognitive training may not have a difference in efficacy when compared to conventional therapy for improving muscle strength.	1	Sallés et al. (2017)

SPASTICITY			
LoE	**Conclusion Statement**	**RCTs**	**References**
1b	Robot-Assisted Neurocognitive Therapy using a haptic device with Conventional Neurocognitive Therapy may not have a difference in efficacy when compared to Conventional Neurocognitive Therapy for improving spasticity.	1	Ranzani et al. (2020)
1b	Robotic Therapy (Armeo Spring & Amadeo) with Task Oriented Training with Active Learning Program for Stroke (ALPS) may not have a difference in efficacy when compared to Robotic Therapy with Active Learning Program for Stroke (ALPS) for improving spasticity.	1	Fasoli et al. (2019)

PROPRIOCEPTION			
LoE	**Conclusion Statement**	**RCTs**	**References**
1b	Cognitive Exercise Therapy may produce greater improvements in proprioception than Conventional Occupational Therapy.	1	Moon et al. (2020)
1b	Robot-Assisted Neurocognitive Therapy using a haptic device with Conventional Neurocognitive Therapy may not have a difference in efficacy when compared to Conventional Neurocognitive Therapy for improving proprioception.	1	Ranzani et al. (2020)
1b	Cognitive training may not have a difference in efficacy when compared to conventional therapy for improving proprioception.	1	Sallés et al. (2017)

2. Activities

ACTIVITIES OF DAILY LIVING			
LoE	**Conclusion Statement**	**RCTs**	**References**
1b	Cognitive Exercise Therapy may not have a difference in efficacy when compared to Conventional Occupational Therapy for improving performance of activities of daily living.	1	Moon et al. (2020)
2	There is conflicting evidence about the effect of Occupation-Based Bilateral Upper Limb Training with Cognitive Behavioral Therapy when compared to Occupation-Based Bilateral Upper Limb Training with Conventional occupational therapy for improving performance of activities of daily living.	1	Choi & Kim (2022)

1b	Proprioceptive neuromuscular facilitation early may not have a difference in efficacy when compared to Cognitive therapeutic exercise (CTE) early or proprioceptive neuromuscular facilitation late or CTE late for improving performance of activities of daily living.	1	Morreale et al. (2016)
1b	Cognitive orientation to daily occupational performance (CO-OP) may produce greater improvements in performance of activities of daily living than taskspecific upper extremity training (TUET).	1	Song et al. (2019)
1b	Cognitive Orientation to Daily Occupaitonal Performance may produce greater improvements in performance of activities of daily living than Conventional occupational therapy.	1	Hejazi-Shirmard M. et al. (2024)
1b	Robotic Therapy (Armeo Spring & Amadeo) with Task Oriented Training with Active Learning Program for Stroke (ALPS) may not have a difference in efficacy when compared to Robotic Therapy with Active Learning Program for Stroke (ALPS) for improving performance of activities of daily living.	1	Fasoli et al. (2019)
1b	Cognitive Orientation to Daily Occupaitonal Performance may produce greater improvements in performance of activities of daily living than Progressive exercise program (strenght, functional, balance, and endurance training).	1	Hejazi-Shirmard M. et al. (2024)

DEXTERITY

LoE	Conclusion Statement	RCTs	References
1b	Robot-Assisted Neurocognitive Therapy using a haptic device with Conventional Neurocognitive Therapy may not have a difference in efficacy when compared to Conventional Neurocognitive Therapy for improving dexterity.	1	Ranzani et al. (2020)
1b	Cognitive orientation to daily occupational performance (CO-OP) may produce greater improvements in dexterity than taskspecific upper extremity training (TUET).	1	Song et al. (2019)
1b	Cognitive Orientation to Daily Occupaitonal Performance may not have a difference in efficacy when compared to Conventional occupational therapy for improving dexterity.	1	Hejazi-Shirmard M. et al. (2024)
1b	Cognitive Orientation to Daily Occupaitonal Performance may not have a difference in efficacy when compared to Progressive exercise program (strenght, functional, balance, and endurance training) for improving dexterity.	1	Hejazi-Shirmard M. et al. (2024)

Key Points

- Dual-Task Training with Conventional occupational therapy may be beneficial for improving motor function after stroke when compared to Single Task Training (combining sensory stimulation, UE muscle strength, cognitive and perceptual training, and fine hand movement) with Conventional occupational therapy.
- Occupation-Based Bilateral Upper Limb Training with Cognitive Behavioral Therapy may not be beneficial for improving motor function after stroke when compared to Occupation-Based Bilateral Upper Limb Training with Conventional occupational therapy; the literature is mixed regarding performance of activities of daily living.
- Cognitive motor rehabilitation with specific UE exercises may be beneficial for improving motor function after stroke when compared to Specific UE exercises.
- Robot-Assisted Neurocognitive Therapy using a haptic device with Conventional Neurocognitive Therapy may not be beneficial for improving motor function, dexterity, spasticity, and proprioception after stroke when compared to Conventional Neurocognitive Therapy.

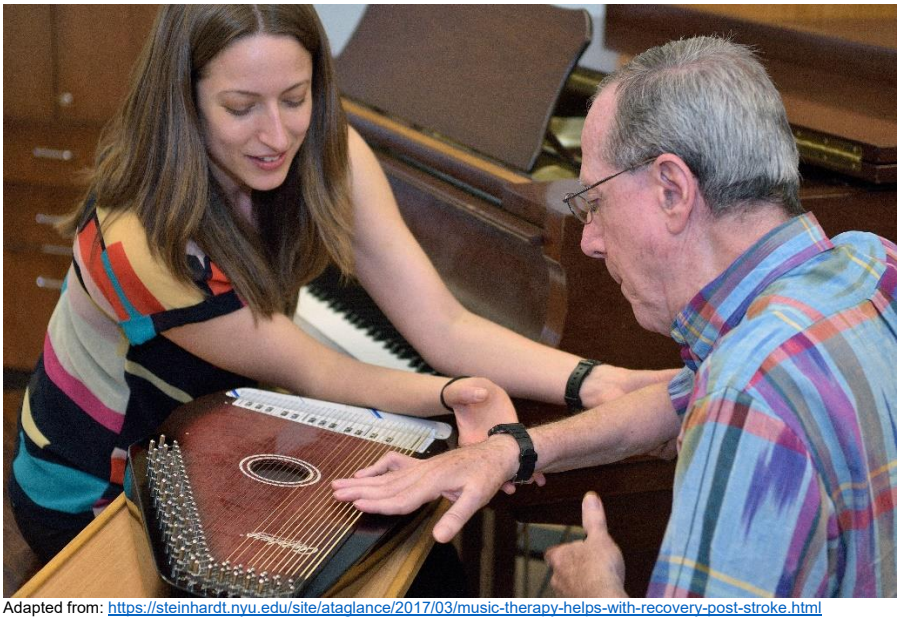
- Cognitive orientation to daily occupational performance (CO-OP) may be beneficial for improving motor function, dexterity, and performance of activities of daily living after stroke when compared to taskspecific upper extremity training (TUET).
- Mirror therapy with TOT may be beneficial for improving motor function after stroke when compared to Conventional therapy (TOT).
- Mirror therapy with TOT may not be beneficial for improving motor function after stroke when compared to Cognitive therapeutic exercise with TOT.
- Cognitive Exercise Therapy may be beneficial for improving proprioception, but not performance of activities of daily living, after stroke when compared to Conventional Occupational Therapy.
- Proprioceptive neuromuscular facilitation early may be beneficial for improving muscle strength, but not performance of activities of daily living, after stroke when compared to Cognitive therapeutic exercise (CTE) early or proprioceptive neuromuscular facilitation late or CTE late.
- Proprioceptive neuromuscular facilitation early may not be beneficial for improving stroke severity after stroke when compared to Cognitive therapeutic exercise (CTE) early or late.
- Cognitive Orientation to Daily Occupaitonal Performance may be beneficial for improving performance of activities of daily living, but not motor function and dexterity, after stroke when compared to Conventional occupational therapy.
- Cognitive training may not be beneficial for improving motor function, muscle strength, and proprioception after stroke when compared to conventional therapy.
- Robotic Therapy (Armeo Spring & Amadeo) with Task Oriented Training with Active Learning Program for Stroke (ALPS) may not be beneficial for improving spasticity and performance of activities of daily living after stroke when compared to Robotic Therapy with Active Learning Program for Stroke (ALPS); the literature is mixed regarding motor function.
- Cognitive Orientation to Daily Occupaitonal Performance may be beneficial for improving performance of activities of daily living, but not motor function and dexterity, after stroke when compared to Progressive exercise program (strenght, functional, balance, and endurance training).

Summary of Key Points: Cognitive and Dual-Task Training

Intervention	Control(s)	Function domain(s)	Effect
Dual-Task Training with Conventional occupational therapy	Single Task Training (combining sensory stimulation, UE muscle strength, cognitive and perceptual training, and fine hand movement) with Conventional occupational therapy	Motor function	+
Occupation-Based Bilateral Upper Limb Training with Cognitive Behavioral Therapy	Occupation-Based Bilateral Upper Limb Training with Conventional occupational therapy	Motor function	–
Occupation-Based Bilateral Upper Limb Training with Cognitive Behavioral Therapy	Occupation-Based Bilateral Upper Limb Training with Conventional occupational therapy	Performance of activities of daily living	=
Cognitive motor rehabilitation with specific UE exercises	Specific UE exercises	Motor function	+
Robot-Assisted Neurocognitive Therapy using a haptic device with Conventional Neurocognitive Therapy	Conventional Neurocognitive Therapy	Motor function, dexterity, spasticity, proprioception	–
Cognitive orientation to daily occupational performance (CO-OP)	taskspecific upper extremity training (TUET)	Motor function, dexterity, performance of activities of daily living	+
Mirror therapy with TOT	Conventional therapy (TOT)	Motor function	+

Mirror therapy with TOT	Cognitive therapeutic exercise with TOT	Motor function	–
Cognitive Exercise Therapy	Conventional Occupational Therapy	Proprioception	+
Cognitive Exercise Therapy	Conventional Occupational Therapy	Performance of activities of daily living	–
Proprioceptive neuromuscular facilitation early	Cognitive therapeutic exercise (CTE) early or proprioceptive neuromuscular facilitation late or CTE late	Muscle strength	+
Proprioceptive neuromuscular facilitation early	Cognitive therapeutic exercise (CTE) early or proprioceptive neuromuscular facilitation late or CTE late	Performance of activities of daily living	–
Proprioceptive neuromuscular facilitation early	Cognitive therapeutic exercise (CTE) early or late	Stroke severity	–
Cognitive Orientation to Daily Occupaitonal Performance	Conventional occupational therapy	Performance of activities of daily living	+
Cognitive Orientation to Daily Occupaitonal Performance	Conventional occupational therapy	Motor function, dexterity	–
Cognitive training	conventional therapy	Motor function, muscle strength, proprioception	–
Robotic Therapy (Armeo Spring & Amadeo) with Task Oriented Training with Active Learning Program for Stroke (ALPS)	Robotic Therapy with Active Learning Program for Stroke (ALPS)	Spasticity, performance of activities of daily living	–
Robotic Therapy (Armeo Spring & Amadeo) with Task Oriented Training with Active Learning Program for Stroke (ALPS)	Robotic Therapy with Active Learning Program for Stroke (ALPS)	Motor function	=
Cognitive Orientation to Daily Occupaitonal Performance	Progressive exercise program (strenght, functional, balance, and endurance training)	Performance of activities of daily living	+
Cognitive Orientation to Daily Occupaitonal Performance	Progressive exercise program (strenght, functional, balance, and endurance training)	Motor function, dexterity	–

Music Therapy and Rhythmic Auditory Stimulation



Adapted from: https://steinhardt.nyu.edu/site/ataglance/2017/03/music-therapy-helps-with-recovery-post-stroke.html

A total of sixteen RCTs were found that evaluated music therapy and rhythmic auditory stimulation for upper extremity motor rehabilitation. Two RCTs compared music therapy combined with other interventions with exercise and custom physiotherapy protocols (Palumbo et al. (2022); Kim & Koh (2005)). One RCT compared rhythmic auditory stimulation with conventional therapy (Tian et al. (2020)). Five RCTs compared music therapy with conventional therapy (Raglio et al. (2021); Fujioka et al. (2018); Grau-Sanchez et al. (2018); Raglio et al. (2017); Jun et al. (2013)). One RCT compared rhythmic auditory stimulation combined with other interventions with conventional therapy (Chouhan et al. (2012)). One RCT compared music therapy with no treatment (Street et al. (2018)). One RCT compared different approaches to rhythmic auditory stimulation (Johannsen et al. (2010)). One RCT compared music therapy combined with other interventions with graded repetitive arm supplementary program (Segura et al. (2024)). One RCT compared different approaches to music therapy (Tong et al. (2015)). One RCT compared music therapy combined with other interventions with music therapy (Haire et al. (2021)). Two RCTs compared music therapy combined with other interventions with conventional therapy (Liu Q. et al. (2024); Hankinson et al. (2022)).

In addition, 4 RCTs in which music therapy and rhythmic auditory stimulation formed part of a combined or comparative intervention are cross-referenced at the end of Table 14; their primary listings appear in other tables.

The methodological details and results of all sixteen RCTs are presented in Table 14.

Table 14. RCTs Evaluating Music Therapy and Rhythmic Auditory Stimulation for Upper Extremity Motor Rehabilitation

Authors (Year) **Study Design (PEDro Score)** **Sample Size start** **Sample Size end** **Time post stroke category** **Study design**	**Interventions** **Duration: Session length, frequency per week for total number of weeks**	**Outcome Measures** **Result (direction of effect)**
Music therapy combined with other interventions compared to exercise and custom physiotherapy protocols		
Palumbo et al. (2022) Pilot RCT (6) NStart=30 NEnd=25 TPS=Chronic A vs B	E: Music Upper Limb Therapy-Integrated (MULT-I) C: Home Exercise Program (HEP) Duration: 45min/d, 2d/wk, 6wks	E vs C: FMS (-), SWM (-), SIS; physical strength (-); activities (-); mobility (-); hand use (-); memory (-); emotions (-); communication(-); participation (-); recovery (-), mRS (-),

		PHQ-9 (+exp), WHO-5 (-), SSEQ (-), QLI-Stroke (-)
Kim & Koh (2005) RCT Crossover (4) NStart=10 NEnd=10 TPS=Chronic A + B1 vs A + B2 vs A *Also in Table 3 (Exercise and Strength Training)*	E1: UE Exercise + Music Therapy (Song) E2: UE Exercise + Music Therapy (Karaoke) C: UE Exercise Duration: 20min/d, for 8wks	E1/E2 vs C: Numerical Pain Rating Scale (-)
Rhythmic auditory stimulation compared to conventional therapy		
Tian et al. (2020) RCT (5) NStart=32 NEnd=30 TPS=Subacute A vs 0	E: Rhythmic Auditory Stimulation C: Conventional Rehabilitation Duration: 90min/d, 5d/wk, 4wks	E vs C: Fugl-Meyer Assessment (+exp) Wolf Motor Function Test (+exp) Barthel Index (+exp) Elbow Extension (+exp) Elbow Flexion (+exp)
Music therapy compared to conventional therapy		
Raglio et al. (2021) RCT (7) NStart=65 NEnd=63 TPS=Subacute A vs 0	E: Standard Motor Exercises supported by Sonification Techniques C: Standard Motor Exercises Duration: 15min passive +20min active with sonification/d, 5d/wk, for 4wk	E vs C: E: FMA (-) BBT (-) Numerical Pain Rating Scale (-) MAS (-) McGill Quality of Life (-)
Fujioka et al. (2018) RCT (9) NStart=29 NEnd=27 TPS=Chronic A vs 0	E: Music supported therapy C: Conventional care Duration: 30hr/10wks	E vs C: CMSA Impairment Inventory (-) ARAT (-) BBT (no stat) Trail making test (-) Musical Ear Test (-) Postive and Negative Affect Schedule (-) SIS (-) verbal fluency (-)
Grau-Sanchez et al. (2018) RCT (6) NStart=40 NEnd=34 TPS=Subacute A vs 0	E: Music Supported Therapy + conventional therapy C: Conventional Therapy Duration: 30min, 5x/wk, 4wks	E vs C: Action Research Arm Test (-) Fugl-Meyer Assessment (-) Nine Hold Pegboard Test (-) Box and Block Test (-) Chedoke Arm and Hand Activity Inventory (-) Grip Strength (-) Weschler Digit Span Test (-) Stroop Task (-) Trail-Making Test (-) Rivermead behavioural memory test Rey Auditory Verbal Learning Test (-) Story Recall (-) Profile of Mood States (-) Beck Depression Inventory Scale (-) Posititve and Negative Affect Scale (-) Apathy Evaluation Scale (-) Stroke Specific Quality of Life Scale (-)

		Short Form-36 (-)
Raglio et al. (2017) RCT (6) NStart=38 NEnd=38 TPS=Subacute A vs 0	E: Relational active music therapy (RAMT) + conventional rehabilitation C: Conventional Therapy Duration: 30min/session, 3x/week for a total of 20 sessions RAMT	E vs C: Hospital Anxiety and Depression Scale (HADS) (-) Italian v. of McGill QoLquestionnaire (-) NIHSS (-) FIM (-) Grip-pinch test (-) 9HPT (-) TUG test (-)
Jun et al. (2013) RCT (3) NStart=40 NEnd=30 TPS=Acute A vs 0	E: Music movement therapy C: Routine treatment Duration: 60min/d, 3d/wk, 8wk	E vs C: Passive Range of Motion shoulder flexio (+exp) elbow joint flexion (+exp) hip joint flexion (-) Medical Research Council scale (-) Korean Modified Barthel Index (-) Profile of Mood States Brief Instrument (+exp) Center for Epidemiological Studies Depression Scale (-)
Rhythmic auditory stimulation combined with other interventions compared to conventional therapy		
Chouhan et al. (2012) RCT (6) NStart=45 NEnd=45 TPS=Subacute A vs B vs 0 *Also in Table 20 (Feedback-Based Training)*	E1: Rhythmic auditory cueing E2: Visual cueing C: Conventional therapy Duration: 2hr, 3x/wk for 3wk	E1 vs C: FMA (+exp1) E2 vs C: FMA (+exp2) E1 vs E2: FMA (-) Dynamic gait index
Music therapy compared to no treatment		
Street et al. (2018) RCT Crossover (6) NStart=11 NEnd=10 TPS=Chronic A vs 0	E: Home based music therapy C: waitlist Duration: 2x/wk, 6wks, 20-30min	E vs C: Action Research Arm Test (-) Nine Hole Peg Test (-)
Different approaches to rhythmic auditory stimulation compared against one another		
Johannsen et al. (2010) RCT (7) NStart=24 NEnd=21 TPS=Chronic A1 vs A2	E: Bilateral Leg Training with Rhythmic Auditory Cueing C: Bilateral Arm Training with Rhythmic Auditory Cueing Duration: 45min/d, 10 sessions	E vs C: Fugl-Meyer Assessment- Upper Extremity (-) Repetitive Hand Aiming Task (+exp1) 10-m Walk Test (-) Step length (-)
Music therapy combined with other interventions compared to graded repetitive arm supplementary program		
Segura et al. (2024) RCT (6) NStart=58 NEnd=40 TPS=Chronic A vs B	E: Enriched Music-Supported Therapy (eMST) C: Graded Repetitive Arm Supplementary Program (GRASP) Duration: 60 mins, session, 4 sessions/wk, 10 weeks	E vs C: ARAT (-) FMA-UE (+exp) CAHAI (-) BBT (-) 9HPT (-)

Also in Table 3 (Exercise and Strength Training)		grip strength (-) Behaviour Rating Inventory of Executive Function (-) Sustained Attention to Response Task (-) Figural Memory (-) Rey Auditory Verbal Learning Test (-) verbal fluency (-) BDI-II (-) Apathy Evaluation Scale informant (+exp) self (-) POMS anger (+exp) vigor (-) fatigue (-) confusion (-) tension (-) depression (-) SIS strength (-) memory (-) emotion (+exp) communication (-) activity (-) mobility (-) hand function (-) participation (+exp) recovery (-) Treatment Self-regulation Questionnaire (-) Intrinsic Motivation Inventory interest (+exp) perceived competence (-) effort (-) pressure (-) perceived choice (-) value (-)
Different approaches to music therapy compared against one another		
Tong et al. (2015) Pilot RCT (5) NStart=33 NEnd=30 TPS=Subacute A vs 0	E: Audible Music Instrumental Training C: Mute Musical Instrumental Training Duration: 30min/d, 5d/wk for 4wk	E vs C: Fugl-Meyer Assessment (-) Wolf Motor Function Test (+exp) Training achievements in musical performance - single tone (-) -tones by sequence (-) -tones with no sequence (+exp) -melody 1 (-) -melody 2 (-) -melody 3 (-)
Music therapy combined with other interventions compared to music therapy		
Haire et al. (2021) Pilot RCT (8) NStart=30	E1: Therapeutic Instrumental Music Performance (TIMP) ; E2: TIMP + Metronome-cued Motor Imagery; E3: TIMP + Motor Imagery without cues	E1/E3 vs E2: FMA (+exp1), WMFT (-), MAL(-), trunk impairment scale(-)

NEnd=30 TPS=Chronic A + B + C vs A/A + B *Also in Table 11 (Mental Practice)*	Duration: 45min/d, 3d/wk, 3wks	E1 vs E3: FMA(-), WMFT(-), MAL(-), trunk impairment(-)
Music therapy combined with other interventions compared to conventional therapy		
Liu Q. et al. (2024) Pilot RCT (6) NStart=36 NEnd=30 TPS=Not Reported A + B vs A/B vs 0	E1: Robot-assisted rehabilitation + music therapy; E2: Conventional care + robot-assisted rehabilitation C: Conventional care Duration: Robot-assisted rehab: 40min/d, 5d/wk, 3wks; Music therapy: 2min/d, 5d/wk, 3wks	E1 vs E2 vs C: mBI (-) Self-esteem scale (-) Stroke Self-Efficacy Questionnaire self-management (+exp1) self-efficacy (+exp1) Positive affect scale (+exp1) FMA - UE (-)
Hankinson et al. (2022) Pilot RCT (3) NStart=22 NEnd=4 TPS=Subacute A + B vs 0 *Also in Table 3 (Exercise and Strength Training)*	E: Music motor therapy + custom program + conventional therapy C: Conventional Rehab Duration: 20min/d, 3d/wk, 6wks	E vs C: Adherence to intervention (no stat)
Cross-Referenced RCTs: Combined or Comparative Interventions Involving Music Therapy and Rhythmic Auditory Stimulation (results included in this table's levels of evidence)		
Thielbar et al. (2014) RCT (6) NStart=16 NEnd=14 TPS=Chronic A vs B *Primary listing: Table 17 (Virtual Reality)*	E: Virtual reality keypad/glove (PneuGlove) C: Task Specific Training Occupational Therapy Duration: 60min, 3d/wk for 6wk	E vs C: Action Research Arm Test (+exp) Jebsen-Taylor Hand Function Test (-) Fugl-Meyer Assessment (-) Grip strength (-) pinch strength (-)
van Delden et al. (2013) RCT (6) NStart=60 NEnd=55 TPS=Subacute A vs B vs 0 *Primary listing: Table 6 (Constraint-Induced Movement Therapy (CIMT))*	E1: Modified CIMT E2: Rythmic auditory cueing bilateral training C: Dose-matched conventional treatment Duration: 1h, 3d/wk for 6wk	E1/E2 vs C: Action Research Arm Test (-) Nine Hole Peg Test (-) Motricity Index (-) Fugl-Meyer Assessment (-) Motor Activity Log (-) Stroke Impact Scale (-) Erasmus Modification of the Nottingham Sensory Assessment (-)
Whitall et al. (2011) RCT (6) NStart=111 NEnd=92 TPS=Chronic A + B vs C *Primary listing: Table 2 (Bilateral Arm Training)*	E: Bilateral arm training with rythmic auditory cueing C: Dose matched theraupetic unilateral therapeutic exercises (customized set of 4 exercises based on neurodevelopmental principles) Duration: 20min, 3d/wk for 6wks	E vs C: Fugl Meyer (-) Wolf Motor Arm Test (-) Elbow Strength (-) Shoulder Strength (-) SIS (-) emotion (-) hand (-) strength (-) fMRI (+exp) change Isokinetic strength paretic elbow extension (-) shoulder extension (-)

		wrist extension (+con) elbow flexion (-) Isokinetic strength nonparetic elbow extension (-) elbow flexion (+exp) should extension (-) wrist extension (-) wrist flexion (+exp)
Luft et al. (2004) RCT (6) NStart=26 NEnd=21 TPS=Chronic A + B vs 0 *Primary listing: Table 2 (Bilateral Arm Training)*	E: Bilateral arm training + rhythmic auditory cueing C: Conventional therapy Duration: 1hr, 3d/wk for 6wk	E vs C: FMA (-) WMFT (-) UMAQ (-) Elbow strength (-) Shoulder strength (-) fMRI activation

Abbreviations and table notes: C=control group; D=days; E=experimental group; H=hours; Min=minutes; RCT=randomized controlled trial; TPS=time post stroke category (Acute: less than 30 days, Subacute: more than 1 month but less than 6 months, Chronic: over 6 months); Wk=weeks.

+exp indicates a statistically significant between groups difference at α=0.05 in favour of the experimental group

+exp1/+exp2/+exp3 indicates a statistically significant between groups difference at α=0.05 in favour of the first, second or third experimental group

+con indicates a statistically significant between groups difference at α=0.05 in favour of the control group

- indicates no statistically significant between groups differences at α=0.05

1. Body Functions and Structures

MOTOR FUNCTION			
LoE	**Conclusion Statement**	**RCTs**	**References**
2	Rhythmic Auditory Stimulation may produce greater improvements in motor function than Conventional Rehabilitation.	1	Tian et al. (2020)
1a	Music therapy may not have a difference in efficacy when compared to conventional therapy for improving motor function.	3	Raglio et al. (2021); Fujioka et al. (2018); Grau-Sanchez et al. (2018)
1b	Rhythmic auditory cueing may produce greater improvements in motor function than Conventional therapy.	1	Chouhan et al. (2012)
1b	Rhythmic auditory cueing may not have a difference in efficacy when compared to Visual cueing for improving motor function.	1	Chouhan et al. (2012)
1b	Home based music therapy may not have a difference in efficacy when compared to waitlist for improving motor function.	1	Street et al. (2018)
1b	Bilateral Leg Training with Rhythmic Auditory Cueing may not have a difference in efficacy when compared to Bilateral Arm Training with Rhythmic Auditory Cueing for improving motor function.	1	Johannsen et al. (2010)
1b	There is conflicting evidence about the effect of Enriched Music-Supported Therapy (eMST) when compared to Graded Repetitive Arm Supplementary Program for improving motor function.	1	Segura et al. (2024)
1b	Modified constraint-induced movement therapy may not have a difference in efficacy when compared to Dose-matched conventional treatment for improving motor function.	1	van Delden et al. (2013)
1b	Bilateral arm training with rythmic auditory cueing may not have a difference in efficacy when compared to Dose matched theraupetic unilateral therapeutic exercises for improving motor function.	1	Whitall et al. (2011)

1b	Bilateral arm training with rhythmic auditory cueing may not have a difference in efficacy when compared to Conventional therapy for improving motor function.	1	Luft et al. (2004)
1b	Music therapy combined with motor imagery may not have a difference in efficacy when compared to music therapy alone for improving motor function.	1	Haire et al. (2021)
1b	Robot-assisted rehabilitation with music therapy may not have a difference in efficacy when compared to robot-assisted rehabilitation or conventional care alone for improving motor function.	1	Liu Q. et al. (2024)
1b	Music upper limb therapy-integrated (MULT-I) may not have a difference in efficacy when compared to a home exercise program for improving motor function.	1	Palumbo et al. (2022)
2	There is conflicting evidence about the effect of Audible musical instrument training when compared to mute musical instrument training for improving motor function.	1	Tong et al. (2015)
1b	Virtual reality keypad or glove (PneuGlove) may not have a difference in efficacy when compared to Task Specific Training Occupational Therapy for improving motor function.	1	Thielbar et al. (2014)

STROKE SEVERITY			
LoE	**Conclusion Statement**	**RCTs**	**References**
1a	Music therapy may not have a difference in efficacy when compared to conventional therapy for improving stroke severity.	2	Fujioka et al. (2018); Raglio et al. (2017)
1b	Music upper limb therapy-integrated (MULT-I) may not have a difference in efficacy when compared to a home exercise program for improving stroke severity.	1	Palumbo et al. (2022)

MUSCLE STRENGTH			
LoE	**Conclusion Statement**	**RCTs**	**References**
1a	Music therapy may not have a difference in efficacy when compared to conventional therapy for improving muscle strength.	3	Grau-Sanchez et al. (2018); Raglio et al. (2017); Jun et al. (2013)
1b	Enriched Music-Supported Therapy (eMST) may not have a difference in efficacy when compared to Graded Repetitive Arm Supplementary Program for improving muscle strength.	1	Segura et al. (2024)
1b	Modified constraint-induced movement therapy may not have a difference in efficacy when compared to Dose-matched conventional treatment for improving muscle strength.	1	van Delden et al. (2013)
1b	Bilateral arm training with rhythmic auditory cueing may not have a difference in efficacy when compared to Conventional therapy for improving muscle strength.	1	Luft et al. (2004)
1b	Virtual reality keypad or glove (PneuGlove) may not have a difference in efficacy when compared to Task Specific Training Occupational Therapy for improving muscle strength.	1	Thielbar et al. (2014)
1b	Bilateral arm training with rythmic auditory cueing may not have a difference in efficacy when compared to Dose matched theraupetic unilateral therapeutic exercises for improving muscle strength.	1	Whitall et al. (2011)

SPASTICITY			
LoE	**Conclusion Statement**	**RCTs**	**References**
1b	Music therapy may not have a difference in efficacy when compared to conventional therapy for improving spasticity.	1	Raglio et al. (2021)

RANGE OF MOTION			
LoE	**Conclusion Statement**	**RCTs**	**References**
2	Music movement therapy may produce greater improvements in range of motion than routine treatment.	1	Jun et al. (2013)

PROPRIOCEPTION			
LoE	**Conclusion Statement**	**RCTs**	**References**
1b	Modified constraint-induced movement therapy may not have a difference in efficacy when compared to Dose-matched conventional treatment for improving proprioception.	1	van Delden et al. (2013)
1b	Music upper limb therapy-integrated (MULT-I) may not have a difference in efficacy when compared to a home exercise program for improving proprioception.	1	Palumbo et al. (2022)

2. Activities

ACTIVITIES OF DAILY LIVING			
LoE	**Conclusion Statement**	**RCTs**	**References**
2	Rhythmic Auditory Stimulation may produce greater improvements in performance of activities of daily living than Conventional Rehabilitation.	1	Tian et al. (2020)
1a	Music therapy may not have a difference in efficacy when compared to conventional therapy for improving performance of activities of daily living.	3	Grau-Sanchez et al. (2018); Raglio et al. (2017); Jun et al. (2013)
1b	Enriched Music-Supported Therapy (eMST) may not have a difference in efficacy when compared to Graded Repetitive Arm Supplementary Program for improving performance of activities of daily living.	1	Segura et al. (2024)
1b	Modified constraint-induced movement therapy may not have a difference in efficacy when compared to Dose-matched conventional treatment for improving performance of activities of daily living.	1	van Delden et al. (2013)
1b	Music therapy combined with motor imagery may not have a difference in efficacy when compared to music therapy alone for improving performance of activities of daily living.	1	Haire et al. (2021)
1b	There is conflicting evidence about the effect of Robot-assisted rehabilitation with music therapy when compared to robot-assisted rehabilitation or conventional care alone for improving performance of activities of daily living.	1	Liu Q. et al. (2024)
1b	Music upper limb therapy-integrated (MULT-I) may not have a difference in efficacy when compared to a home exercise program for improving performance of activities of daily living.	1	Palumbo et al. (2022)

DEXTERITY			
LoE	**Conclusion Statement**	**RCTs**	**References**
1a	Music therapy may not have a difference in efficacy when compared to conventional therapy for improving dexterity.	4	Raglio et al. (2021); Fujioka et al. (2018); Grau-Sanchez et al. (2018); Raglio et al. (2017)
1b	Home based music therapy may not have a difference in efficacy when compared to waitlist for improving dexterity.	1	Street et al. (2018)
1b	Enriched Music-Supported Therapy (eMST) may not have a difference in efficacy when compared to Graded Repetitive Arm Supplementary Program for improving dexterity.	1	Segura et al. (2024)
1b	Modified constraint-induced movement therapy may not have a difference in efficacy when compared to Dose-matched conventional treatment for improving dexterity.	1	van Delden et al. (2013)

Key Points

- Rhythmic Auditory Stimulation may be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Conventional Rehabilitation.
- Music therapy may not be beneficial for improving motor function, dexterity, performance of activities of daily living, spasticity, stroke severity, and muscle strength after stroke when compared to conventional therapy.
- Rhythmic auditory cueing may be beneficial for improving motor function after stroke when compared to Conventional therapy.
- Rhythmic auditory cueing may not be beneficial for improving motor function after stroke when compared to Visual cueing.
- Home based music therapy may not be beneficial for improving motor function and dexterity after stroke when compared to waitlist.
- Bilateral Leg Training with Rhythmic Auditory Cueing may not be beneficial for improving motor function after stroke when compared to Bilateral Arm Training with Rhythmic Auditory Cueing.
- Enriched Music-Supported Therapy (eMST) may not be beneficial for improving dexterity, performance of activities of daily living, and muscle strength after stroke when compared to Graded Repetitive Arm Supplementary Program; the literature is mixed regarding motor function.
- Modified constraint-induced movement therapy may not be beneficial for improving motor function, dexterity, performance of activities of daily living, proprioception, and muscle strength after stroke when compared to Dose-matched conventional treatment.
- Bilateral arm training with rythmic auditory cueing may not be beneficial for improving motor function and muscle strength after stroke when compared to Dose matched theraupetic unilateral therapeutic exercises.
- Bilateral arm training with rhythmic auditory cueing may not be beneficial for improving motor function and muscle strength after stroke when compared to Conventional therapy.
- Music therapy combined with motor imagery may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to music therapy alone.
- Robot-assisted rehabilitation with music therapy may not be beneficial for improving motor function after stroke when compared to robot-assisted rehabilitation or conventional care alone; the literature is mixed regarding performance of activities of daily living.
- Music upper limb therapy-integrated (MULT-I) may not be beneficial for improving motor function, performance of activities of daily living, proprioception, and stroke severity after stroke when compared to a home exercise program.
- The literature is mixed regarding the effect of Audible musical instrument training on motor function after stroke when compared to mute musical instrument training.
- Virtual reality keypad or glove (PneuGlove) may not be beneficial for improving motor function and muscle strength after stroke when compared to Task Specific Training Occupational Therapy.

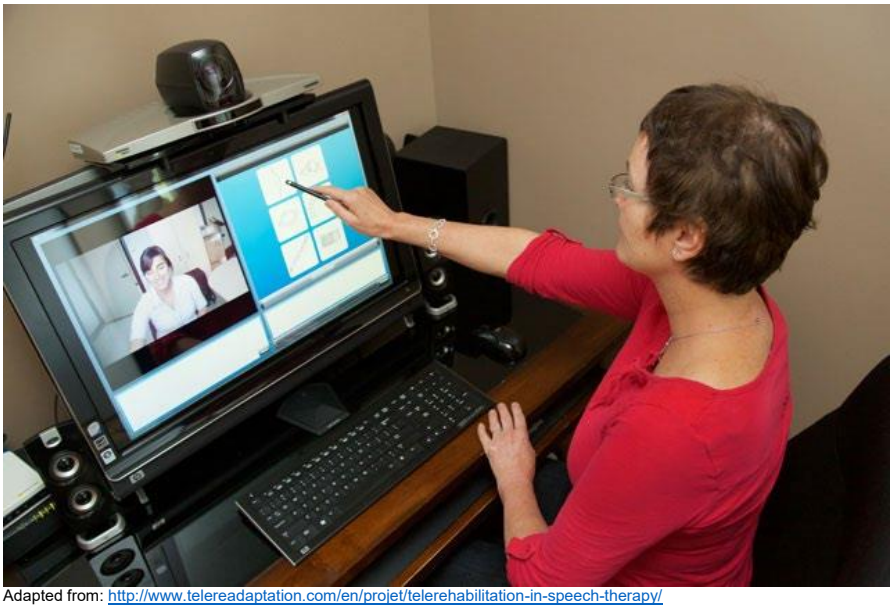
- Music movement therapy may be beneficial for improving range of motion after stroke when compared to routine treatment.

Summary of Key Points: Music Therapy and Rhythmic Auditory Stimulation

Intervention	Control(s)	Function domain(s)	Effect
Rhythmic Auditory Stimulation	Conventional Rehabilitation	Motor function, performance of activities of daily living	+
Music therapy	conventional therapy	Motor function, dexterity, performance of activities of daily living, spasticity, stroke severity, muscle strength	–
Rhythmic auditory cueing	Conventional therapy	Motor function	+
Rhythmic auditory cueing	Visual cueing	Motor function	–
Home based music therapy	waitlist	Motor function, dexterity	–
Bilateral Leg Training with Rhythmic Auditory Cueing	Bilateral Arm Training with Rhythmic Auditory Cueing	Motor function	–
Enriched Music-Supported Therapy (eMST)	Graded Repetitive Arm Supplementary Program	Dexterity, performance of activities of daily living, muscle strength	–
Enriched Music-Supported Therapy (eMST)	Graded Repetitive Arm Supplementary Program	Motor function	=
Modified constraint-induced movement therapy	Dose-matched conventional treatment	Motor function, dexterity, performance of activities of daily living, proprioception, muscle strength	–
Bilateral arm training with rythmic auditory cueing	Dose matched theraupetic unilateral therapeutic exercises	Motor function, muscle strength	–
Bilateral arm training with rhythmic auditory cueing	Conventional therapy	Motor function, muscle strength	–
Music therapy combined with motor imagery	music therapy alone	Motor function, performance of activities of daily living	–
Robot-assisted rehabilitation with music therapy	robot-assisted rehabilitation or conventional care alone	Motor function	–
Robot-assisted rehabilitation with music therapy	robot-assisted rehabilitation or conventional care alone	Performance of activities of daily living	=
Music upper limb therapy-integrated (MULT-I)	a home exercise program	Motor function, performance of activities of daily living, proprioception, stroke severity	–
Virtual reality keypad or glove (PneuGlove)	Task Specific Training Occupational Therapy	Motor function, muscle strength	–
Music movement therapy	routine treatment	Range of motion	+
Audible musical instrument training	mute musical instrument training	Motor function	=

Technology Based Interventions

Telerehabilitation and Education



Adapted from: http://www.telereadaptation.com/en/projet/telerehabilitation-in-speech-therapy/

A total of thirteen RCTs were found that evaluated telerehabilitation and education for upper extremity motor rehabilitation. Two RCTs compared exercise and custom physiotherapy protocols with conventional therapy (Toh F.M. et al. (2024); Saywell et al. (2021)). One RCT compared robotic orthosis combined with other interventions with exercise and custom physiotherapy protocols (Linder et al. (2015)). One RCT compared different approaches to exercise and custom physiotherapy protocols (Cramer et al. (2019)). One RCT compared motor relearning programmes combined with other interventions with neurodevelopmental techniques (bobath approach) (Carey et al. (2007)). One RCT compared error augmentation combined with other interventions with robotic orthosis (Majeed et al. (2015)). One RCT compared virtual reality training with conventional therapy (Piron et al. (2009)). Two RCTs compared different approaches to CIMT (Shamweel & Gupta (2024); Uswatte et al. (2021)). One RCT compared robotic glove combined with other interventions with conventional therapy (Adams et al. (2023)). One RCT compared CIMT combined with other interventions with exercise and custom physiotherapy protocols (Saygili et al. (2024)). One RCT compared education with conventional therapy (Zhang et al. (2022b)). One RCT compared different approaches to education (Serrada et al. (2022)).

The methodological details and results of all thirteen RCTs are presented in Table 15.

Table 15. RCTs Evaluating Telerehabilitation and Education for Upper Extremity Motor Rehabilitation

Authors (Year) **Study Design (PEDro Score)** **Sample Size start** **Sample Size end** **Time post stroke category** **Study design**	**Interventions** **Duration: Session length, frequency per week for total number of weeks**	**Outcome Measures** **Result (direction of effect)**
Exercise and custom physiotherapy protocols compared to conventional therapy		
Toh F.M. et al. (2024) RCT Crossover (6) NStart=12 NEnd=9 TPS=Chronic A vs 0	E: Smart reminder wristwatch telerehabilitation + Conventional therapy C: Conventional therapy Duration: E: 3hr/d, 5d/wk, 4wks; C: 15min/session, 3sessions/d, 5d/wk, 4wks; 3wk washout	E vs C: FMA - UE (-) ARAT (-) Active ROM shoulder flexion (-) shoulder abduction (+exp)

Also in Table 3 (Exercise and Strength Training)		elbow (-) pronation (-) supination (-) Motor activity log (-)
Saywell et al. (2021) RCT (7) NStart=95 NEnd=83 TPS=Chronic A vs 0 *Also in Table 3 (Exercise and Strength Training)*	E: Augmented Community Telerehabilitation C: Conventional Therapy Duration: 6mo	E vs C: Stroke Impact Scale (-) Physical (-) Strength (-) Memory (-) Emotion (-) Communication (-) Activities of Daily Living (-) Mobility (-) Use of Hand (-) Participation (+exp) Grip Strength (-) Step Number (-) Stroke Self-Efficacy Questionnaire (-) Health Related Quality of Life (EQ-5D) Visual Analogue Scale (+exp)
Robotic orthosis combined with other interventions compared to exercise and custom physiotherapy protocols		
Linder et al. (2015) RCT (6) NStart=99 NEnd=91 TPS=Subacute A + B vs A/B *Also in Table 16 (Robotics); Table 3 (Exercise and Strength Training)*	E: Robot-assisted therapy (Hand mentor pro robotic device) + home exercise program (Hand Mentor) C: Home exercise program Duration: 180min/d, 5d/wk for 8wk	E vs C: Stroke Impact Scale (-) Center for Epidemiologic Studies Depression Scale (-)
Different approaches to exercise and custom physiotherapy protocols compared against one another		
Cramer et al. (2019) RCT (6) NStart=124 NEnd=114 TPS=Subacute A1 vs A2 *Also in Table 3 (Exercise and Strength Training)*	E: Telerehabilitation (motor therapy, gaming, videoconference supervised) C: In clinic Rehabilitation (Motor therapy, gaming, therapist supervised) Duration: 70min/d, 36 sessions total over 6-8wks	E vs C: Fugl-Meyer Assessment (-) BBT (no stat) SIS-hand motor domain (no stat)
Motor relearning programmes combined with other interventions compared to neurodevelopmental techniques (bobath approach)		
Carey et al. (2007) RCT Crossover (3) NStart=25 NEnd=20 TPS=Chronic A vs B *Also in Table 1 (Neurodevelopmental Techniques)*	E: tracking training of finger and wrist (temporospatial processing) C: repetitive simple Movement training Duration: 2-8h/d, 10d, 2wks	E vs C: Box and Block test (+exp) Jebsen Taylor test (-) Finger range of motion test (+exp) Finger movement tracking test (-)
Error augmentation combined with other interventions compared to robotic orthosis		
Majeed et al. (2015) RCT (6) NStart=28	E: Bimanual robotic training + error augmentation C: Bimanual robotic training	E vs C: Fugl-Meyer Assessment -Arm Motor (-)

NEnd=26 TPS=Chronic A + B vs A/B *Also in Table 16 (Robotics)*	Duration: 45min, 3d/wk, 2wk	
Virtual reality training compared to conventional therapy		
Piron et al. (2009) RCT (7) NStart=36 NEnd=36 TPS=Chronic A vs 0 *Also in Table 17 (Virtual Reality)*	E: Remote VR treatment C: Traditional PT Duration: 60min/d, 5d/wk, for 4wks	E vs C: FMA UE (-) Ashworth scale (-) ABILHAND (+exp)
Different approaches to CIMT compared against one another		
Shamweel & Gupta (2024) RCT (7) NStart=30 NEnd=30 TPS=Chronic A1 vs A2 *Also in Table 6 (Constraint-Induced Movement Therapy (CIMT))*	E: Constraint-induced movement therapy in-person C: Constraint-induced movement therapy via telerehabilitation Duration: 40min/d, 3d/wk, 4wks	E vs C: FMA - UE (-) WMFT (-) MAL Amount of use (-) Quality of movement (-)
Uswatte et al. (2021) RCT (5) NStart=24 NEnd=20 TPS=Chronic A1 vs A2 *Also in Table 6 (Constraint-Induced Movement Therapy (CIMT))*	E: Tele-Health CIMT C: In-Lab CIMT Duration: 3.5hr/d, 5d/wk, 2wks	E vs C: MAL (-) WMFT (-)
Robotic glove combined with other interventions compared to conventional therapy		
Adams et al. (2023) RCT (5) NStart=21 NEnd=18 TPS=Chronic A + B vs 0 *Also in Table 16 (Robotics); Table 17 (Virtual Reality)*	E: Glove orthosis GRASP with Virtual reality + home based rehab with OT C: Conventional Rehab Duration: 45min/d, 4d/wk, 8wks	E vs C: FMA (+exp) WMFT time (-) functional ability (-) BBT (-) MAL amount (+exp) how well (+exp)
CIMT combined with other interventions compared to exercise and custom physiotherapy protocols		
Saygili et al. (2024) RCT (6) NStart=18 NEnd=18 TPS=Chronic A + B vs A/B *Also in Table 6 (Constraint-Induced Movement Therapy (CIMT)); Table 3 (Exercise and Strength Training)*	E: Modified Constraint-Induced Movement Therapy + Exercise/custom physiotherapy (Telerehabilitation) C: Home exercise program Duration: 90 mins/d, 5ds/wk, 3wks (Modified CIMT and Home exercise program); CIMT group also has 5hs/d of wearing a mitt on less affected hand	E vs C: STREAM Upper extremity (+exp) Lower extremity (+exp) Basic mobility (-) total score (+exp) FMA-UE (+exp) WMFT Functional ability (+exp) performance time (+exp) 9HPT (+exp) Grip strength (+exp)

		Pinch strength bipod pinch (+exp) tripod pinch (+exp) lateral pinch (+exp) MAL-28 Amount of use (+exp) Quality of use (+exp) FIM (+exp)
Education compared to conventional therapy		
Zhang et al. (2022b) Pilot RCT (6) NStart=25 NEnd=21 TPS=Chronic A vs 0	E: coaching based teleoccupational guidance (CTG) via WeChat (coaching sessions + OT) C: conventional rehab (routine teleocupiational guidance via WeChat) Duration: 40-60min/d, 5d/wk, 3mths	E vs C: RNLI (+exp) Lawton-Brody Instrumental Activities of Daily Living (+exp) FMA-UE (-) 6-MWT (-) Stroke Specific Quality of Life (-) Caregiver Benefit Finding Scale (+exp) ZBI-c Chinese Version of the Zarit Caregiver Burden Interview (-)
Different approaches to education compared against one another		
Serrada et al. (2022) Pilot RCT (6) NStart=20 NEnd=16 TPS=Chronic A1 vs A2	E: Class-based in person body awareness & movement education C: Home-based in person body awareness & movement education. Duration: 45min/d, 2d/wk, 10wks	E vs C: FMA UE (+exp) LE (+exp) MAL (-) SIS (+exp) 10MWT (-) patient specific functional scale (-) Multidimensional Assessment of Interoceptive Awareness Questionnaire (+exp) Body Perception Disturbance Scale (-) Erasmus modified Nottingham Sensory Assessment-Upper Limb (-) Stroke Self-Efficacy Questionnaire (-) Stroke-Specific Quality of Life Scale (-)

Abbreviations and table notes: C=control group; D=days; E=experimental group; H=hours; Min=minutes; RCT=randomized controlled trial; TPS=time post stroke category (Acute: less than 30 days, Subacute: more than 1 month but less than 6 months, Chronic: over 6 months); Wk=weeks.

+exp indicates a statistically significant between groups difference at α=0.05 in favour of the experimental group

+exp1/+exp2/+exp3 indicates a statistically significant between groups difference at α=0.05 in favour of the first, second or third experimental group

+con indicates a statistically significant between groups difference at α=0.05 in favour of the control group

- indicates no statistically significant between groups differences at α=0.05

1. Body Functions and Structures

MOTOR FUNCTION			
LoE	**Conclusion Statement**	**RCTs**	**References**
1b	Exercise and custom physiotherapy protocols may not have a difference in efficacy when compared to conventional therapy for improving motor function.	1	Toh F.M. et al. (2024)

1b	Telerehabilitation may not have a difference in efficacy when compared to In clinic Rehabilitation for improving motor function.	1	Cramer et al. (2019)
2	Tracking training of finger and wrist (temporospatial processing) may not have a difference in efficacy when compared to repetitive simple Movement training for improving motor function.	1	Carey et al. (2007)
1b	Bimanual robotic training with error augmentation may not have a difference in efficacy when compared to Bimanual robotic training for improving motor function.	1	Majeed et al. (2015)
1b	Remote virtual reality treatment may not have a difference in efficacy when compared to Traditional physical therapy for improving motor function.	1	Piron et al. (2009)
1b	Different approaches to constraint-induced movement therapy may not have a difference in efficacy when compared with one another for improving motor function.	2	Shamweel & Gupta (2024); Uswatte et al. (2021)
2	Glove orthosis graded repetitive arm supplementary program with Virtual reality with home based rehab with occupational therapy may not have a difference in efficacy when compared to Conventional Rehab for improving motor function.	1	Adams et al. (2023)
1b	Modified Constraint-Induced Movement Therapy with Exercise or custom physiotherapy (Telerehabilitation) may produce greater improvements in motor function than Home exercise program.	1	Saygili et al. (2024)
1b	Coaching based teleoccupational guidance (CTG) via WeChat (coaching sessions with OT) may not have a difference in efficacy when compared to conventional rehab (routine teleocupiational guidance via WeChat) for improving motor function.	1	Zhang et al. (2022b)
1b	Class-based in person body awareness & movement education may produce greater improvements in motor function than Home-based in person body awareness & movement education.	1	Serrada et al. (2022)

MUSCLE STRENGTH			
LoE	**Conclusion Statement**	**RCTs**	**References**
1b	Exercise and custom physiotherapy protocols may not have a difference in efficacy when compared to conventional therapy for improving muscle strength.	1	Saywell et al. (2021)
1b	Modified Constraint-Induced Movement Therapy with Exercise or custom physiotherapy (Telerehabilitation) may produce greater improvements in muscle strength than Home exercise program.	1	Saygili et al. (2024)

SPASTICITY			
LoE	**Conclusion Statement**	**RCTs**	**References**
1b	Remote virtual reality treatment may not have a difference in efficacy when compared to Traditional physical therapy for improving spasticity.	1	Piron et al. (2009)

RANGE OF MOTION			
LoE	**Conclusion Statement**	**RCTs**	**References**
1b	Exercise and custom physiotherapy protocols may not have a difference in efficacy when compared to conventional therapy for improving range of motion.	1	Toh F.M. et al. (2024)
2	Tracking training of finger and wrist (temporospatial processing) may produce greater improvements in range of motion than repetitive simple Movement training.	1	Carey et al. (2007)

PROPRIOCEPTION			
LoE	**Conclusion Statement**	**RCTs**	**References**
1b	Class-based in person body awareness & movement education may not have a difference in efficacy when compared to Home-based in person body awareness & movement education for improving proprioception.	1	Serrada et al. (2022)

2. Activities

ACTIVITIES OF DAILY LIVING			
LoE	**Conclusion Statement**	**RCTs**	**References**
1a	Exercise and custom physiotherapy protocols may not have a difference in efficacy when compared to conventional therapy for improving performance of activities of daily living.	2	Toh F.M. et al. (2024); Saywell et al. (2021)
1b	Remote virtual reality treatment may produce greater improvements in performance of activities of daily living than Traditional physical therapy.	1	Piron et al. (2009)
1b	Different approaches to constraint-induced movement therapy may not have a difference in efficacy when compared with one another for improving performance of activities of daily living.	2	Shamweel & Gupta (2024); Uswatte et al. (2021)
2	Glove orthosis graded repetitive arm supplementary program with Virtual reality with home based rehab with occupational therapy may produce greater improvements in performance of activities of daily living than Conventional Rehab.	1	Adams et al. (2023)
1b	Modified Constraint-Induced Movement Therapy with Exercise or custom physiotherapy (Telerehabilitation) may produce greater improvements in performance of activities of daily living than Home exercise program.	1	Saygili et al. (2024)
1b	Coaching based teleoccupational guidance (CTG) via WeChat (coaching sessions with OT) may produce greater improvements in performance of activities of daily living than conventional rehab (routine teleocupiational guidance via WeChat).	1	Zhang et al. (2022b)
1b	Class-based in person body awareness & movement education may not have a difference in efficacy when compared to Home-based in person body awareness & movement education for improving performance of activities of daily living.	1	Serrada et al. (2022)

DEXTERITY			
LoE	**Conclusion Statement**	**RCTs**	**References**
2	Tracking training of finger and wrist (temporospatial processing) may produce greater improvements in dexterity than repetitive simple Movement training.	1	Carey et al. (2007)
2	Glove orthosis graded repetitive arm supplementary program with Virtual reality with home based rehab with occupational therapy may not have a difference in efficacy when compared to Conventional Rehab for improving dexterity.	1	Adams et al. (2023)
1b	Modified Constraint-Induced Movement Therapy with Exercise or custom physiotherapy (Telerehabilitation) may produce greater improvements in dexterity than Home exercise program.	1	Saygili et al. (2024)

Key Points

- Exercise and custom physiotherapy protocols may not be beneficial for improving motor function, performance of activities of daily living, range of motion, and muscle strength after stroke when compared to conventional therapy.
- Telerehabilitation may not be beneficial for improving motor function after stroke when compared to In clinic Rehabilitation.
- Tracking training of finger and wrist (temporospatial processing) may be beneficial for improving dexterity and range of motion, but not motor function, after stroke when compared to repetitive simple Movement training.
- Bimanual robotic training with error augmentation may not be beneficial for improving motor function after stroke when compared to Bimanual robotic training.
- Remote virtual reality treatment may be beneficial for improving performance of activities of daily living, but not motor function and spasticity, after stroke when compared to Traditional physical therapy.
- Glove orthosis graded repetitive arm supplementary program with Virtual reality with home based rehab with occupational therapy may be beneficial for improving performance of activities of daily living, but not motor function and dexterity, after stroke when compared to Conventional Rehab.
- Modified Constraint-Induced Movement Therapy with Exercise or custom physiotherapy (Telerehabilitation) may be beneficial for improving motor function, dexterity, performance of activities of daily living, and muscle strength after stroke when compared to Home exercise program.
- Coaching based teleoccupational guidance (CTG) via WeChat (coaching sessions with OT) may be beneficial for improving performance of activities of daily living, but not motor function, after stroke when compared to conventional rehab (routine teleocupiational guidance via WeChat).
- Different approaches to constraint-induced movement therapy may not have a difference in efficacy when compared with one another for improving motor function and performance of activities of daily living.
- Class-based in person body awareness & movement education may be beneficial for improving motor function, but not proprioception and performance of activities of daily living, after stroke when compared to Home-based in person body awareness & movement education.

Summary of Key Points: Telerehabilitation

Intervention	Control(s)	Function domain(s)	Effect
Exercise and custom physiotherapy protocols	conventional therapy	Motor function, performance of activities of daily living, range of motion, muscle strength	−
Telerehabilitation	In clinic Rehabilitation	Motor function	−
Tracking training of finger and wrist (temporospatial processing)	repetitive simple Movement training	Dexterity, range of motion	+
Tracking training of finger and wrist (temporospatial processing)	repetitive simple Movement training	Motor function	−
Bimanual robotic training with error augmentation	Bimanual robotic training	Motor function	−
Remote virtual reality treatment	Traditional physical therapy	Performance of activities of daily living	+
Remote virtual reality treatment	Traditional physical therapy	Motor function, spasticity	−
Constraint-induced movement therapy	One another (different approaches compared)	Motor function, performance of activities of daily living	−
Glove orthosis graded repetitive arm supplementary program with Virtual reality with home based rehab with occupational therapy	Conventional Rehab	Performance of activities of daily living	+
Glove orthosis graded repetitive arm supplementary program with Virtual	Conventional Rehab	Motor function, dexterity	−

reality with home based rehab with occupational therapy			
Modified Constraint-Induced Movement Therapy with Exercise or custom physiotherapy (Telerehabilitation)	Home exercise program	Motor function, dexterity, performance of activities of daily living, muscle strength	+
Coaching based teleoccupational guidance (CTG) via WeChat (coaching sessions with OT)	conventional rehab (routine teleocupiational guidance via WeChat)	Performance of activities of daily living	+
Coaching based teleoccupational guidance (CTG) via WeChat (coaching sessions with OT)	conventional rehab (routine teleocupiational guidance via WeChat)	Motor function	–
Class-based in person body awareness & movement education	Home-based in person body awareness & movement education	Motor function	+
Class-based in person body awareness & movement education	Home-based in person body awareness & movement education	Proprioception, performance of activities of daily living	–

Robotics



Adapted from: https://www.strokengine.ca/wp-content/uploads/2015/05/robotics_ARMin-300x226:.jpg; http://www.gentle.rdg.ac.uk/103-0325_IMG.JPG; https://cpmsales.net/wp-content/uploads/CENTURA.jpg; http://img.medicalexpo.com/images_me/photo-g/74722-10591286.jpg

A total of 197 RCTs were found that evaluated robotics for upper extremity motor rehabilitation. One RCT compared robotic orthosis combined with other interventions with reaching and reach-to-grasp task training (Iwamuro et al. (2008)). 35 RCTs compared robotics with conventional therapy (Ahn S.Y. et al. (2024); Liu Y. et al. (2024); Serrano-López Terradas et al. (2022); Budhota A. et al. (2021); Jiang et al. (2021a); Amatya et al. (2020); Aprile et al. (2020); Carpinella et al. (2020); Chinembiri et al. (2020); Xu et al. (2020); Calabro et al. (2019); Dehem et al. (2019); Hung et al. (2019a); Kim et al. (2019a); DauNoraviciene et al. (2018); Hsieh et al. (2018b); Lee et al. (2018b); Lee et al. (2017b); Neuendorf et al. (2017); Tomic et al. (2017); BustamanteValles et al. (2016); Grigoras et al. (2016); Lee et al. (2016a); Masiero et al. (2014); Sale et al. (2014b); Wu et al. (2013a); Hsieh et al. (2012); Reinkensmeyer et al. (2012); Abdullah et al. (2011); Burgar et al. (2011); Conroy et al. (2011); Hsieh et al. (2011); Lum et al. (2005); Lum et al. (2002); Burgar et al. (2000)). Twenty-one RCTs compared exoskeleton robotics with

conventional therapy (Bhattacharjee et al. (2024); Cechova et al. (2024); Jayavel et al. (2024); Yildiz et al. (2024); Kim S.-H. et al. (2023); Kim et al. (2023e); Yuan R. et al. (2023); Ma D. et al. (2022); Taravati et al. (2022); Chen et al. (2021g); Singh et al. (2021); Serrezuela et al. (2020); Iwamoto et al. (2019); Villafane et al. (2018); Taveggia et al. (2016); Susanto et al. (2015); Bartolo et al. (2014); Brokaw et al. (2014); Klamroth-Marganska et al. (2014); Kim et al. (2013b); Housman et al. (2009)). Two RCTs compared non-robotic electromechanical devices combined with other interventions with conventional therapy (Barker et al. (2017); Prange et al. (2015)). One RCT compared robotic glove with no treatment (Radder et al. (2019)). Ten RCTs compared different approaches to robotics (Hoidekrova et al. (2024); Jeon et al. (2024); Doost et al. (2021); Wright et al. (2018); Bouchard et al. (2017); Hammerbeck et al. (2017); Rowe et al. (2017); Hwang et al. (2012); Zollo et al. (2011); Stein et al. (2004)). Two RCTs compared robotics combined with other interventions with exercise and custom physiotherapy protocols (Lencioni et al. (2021); Sale et al. (2014a)). One RCT compared robotics combined with other interventions with unilateral arm training (Masiero et al. (2011)). Five RCTs compared robotics combined with other interventions with task-specific training (Chen et al. (2022b); Hsieh et al. (2017); Hesse et al. (2014); Timmermans et al. (2014); Kahn et al. (2006)). One RCT compared robotics combined with other interventions with cognitive training (Ranzani et al. (2020)). Three RCTs compared robotics with sham (Masiero et al. (2007); Masiero et al. (2006); Volpe et al. (2000)). Three RCTs compared exoskeleton robotics combined with other interventions with task-specific training (Tang et al. (2023); Hsu et al. (2022a); Esquenazi et al. (2021)). Four RCTs compared non-robotic electromechanical devices with conventional therapy (Horsley et al. (2019); Hesse et al. (2008b); Wang et al. (2007); Volpe et al. (2004)). One RCT evaluated exoskeleton robotics combined with other interventions (Hesse et al. (2008a)). One RCT compared robotic orthosis combined with other interventions with exercise and custom physiotherapy protocols (Wolf et al. (2015)). Six RCTs compared robotic orthosis with conventional therapy (Bayındır et al. (2022); Lannin et al. (2016); Orihuela-Espina et al. (2016); Liao et al. (2012); deAraujo et al. (2011); Ring et al. (2005)). One RCT compared robotics combined with other interventions with sensorimotor training (Volpe et al. (2008)). Three RCTs compared robotic orthosis combined with other interventions with conventional therapy (Wang T. et al. (2023); Straudi et al. (2020); Byl et al. (2013)). One RCT compared robotics combined with other interventions with emg-triggered nmes (Hesse et al. (2005)). One RCT compared non-robotic electromechanical devices with transcutaneous electrical stimulation (tens) (Stinear et al. (2013)). Three RCTs compared exoskeleton robotics combined with other interventions with exercise and custom physiotherapy protocols (Frisoli et al. (2022); Lin et al. (2022); Takahashi et al. (2016)). Three RCTs compared exoskeleton robotics combined with other interventions with conventional therapy (Chen et al. (2023a); Ambrosini et al. (2021); Gueye et al. (2021)). Five RCTs compared robotics combined with other interventions with conventional therapy (Coskunsu et al. (2022); Rodgers et al. (2019); Hsieh et al. (2014); Lo et al. (2010); Rabadi et al. (2008)). One RCT compared robotic orthosis combined with other interventions with robotic orthosis (Rozario et al. (2009)). Nine RCTs evaluated robotics combined with other interventions (Yang et al. (2024); Qian et al. (2019); Valdes et al. (2018); Kim et al. (2017c); Valdes et al. (2017); Hu et al. (2015); Fluet et al. (2014); Cordo et al. (2013); Daly et al. (2005)). Four RCTs compared robotics combined with other interventions with sham or robotics (Bernal-Jiménez et al. (2024); Dehem et al. (2018); Capone et al. (2017); Ramos-Murguialday et al. (2013)). One RCT compared robotic orthosis with no treatment (Triandafilou et al. (2011)). One RCT compared robotics combined with other interventions with orthotics (Coote et al. (2008)). Fourteen RCTs compared robotics combined with other interventions with robotics (Dai et al. (2024); Murakami et al. (2023); Conroy et al. (2019); Hung et al. (2019b); Hung et al. (2019d); Abdollahi et al. (2018); Wang et al. (2018); Hsieh et al. (2016); Miyasaka et al. (2016); Pennati et al. (2015); Abdollahi et al. (2014); Simkins et al. (2013); Wei et al. (2011); Liu et al. (2009b)). One RCT compared robotics combined with other interventions with robotics or emg biofeedback (Huang et al. (2020)). Two RCTs compared robotics combined with other interventions with botulinum toxin (botox) (Hung et al. (2022); Gandolfi et al. (2019)). One RCT compared robotics combined with other interventions with strength training (Ellis et al. (2018)). Three RCTs compared robotic orthosis combined with other interventions with task-specific training (Kuo et al. (2023a); Page et al. (2020); Page et al. (2013)). One RCT compared robotics combined with other interventions with robotics or fes (Daly et al. (2019)). Four RCTs compared different approaches to exoskeleton robotics (Mauro et al. (2024); Lee et al. (2020e); Park et al. (2020b); Milot et al. (2013)). Six RCTs compared robotics combined with other interventions with robotics or sham (De Laet et al. (2022); Edwards et al. (2019); Straudi et al. (2016); Butler et al. (2015); Lee et al. (2015b); Triccas et al. (2015)). One RCT compared robotics combined with other interventions with motor relearning programmes (McCabe et al. (2015)). One RCT compared non-robotic electromechanical devices combined with other interventions with no treatment (Barker et al. (2008)). Two RCTs compared robotics combined with other interventions with robotics or augmented feedback training (Cho & Song (2020); Cho et al. (2019)). One RCT compared robotics combined with other interventions with conventional therapy or task-specific training (Hsu et al. (2019)). One RCT compared robotics combined with other interventions with robotics or botulinum toxin (botox) (Hung et al. (2021)). Four RCTs compared robotic glove with conventional therapy (Lee et al. (2021); Thielbar et al. (2017); VaNoglio et al. (2017); Carmeli et al. (2011)). One RCT compared non-robotic electromechanical devices combined with other interventions with task-specific training (Ozen et al.

(2021)). Two RCTs compared exoskeleton robotics combined with other interventions with stretching and positioning programs (Vanoglio et al. (2024); Remy-Neris et al. (2021)). One RCT compared robotics combined with other interventions with robotics or bilateral arm training (Li Y.-C. et al. (2021)). One RCT compared robotics combined with other interventions with cimt (Terranova T.T. et al. (2021)). One RCT compared robotics with robotics or conventional therapy (Yoon et al. (2021)). One RCT compared robotics combined with other interventions with sham (Cordo et al. (2022)). Two RCTs compared exoskeleton robotics combined with other interventions with exoskeleton robotics or sham (Joo et al. (2022); Morone et al. (2022)). One RCT compared robotics combined with other interventions with mirror therapy (Schrader et al. (2022)). One RCT compared robotic glove combined with other interventions with robotic glove (Zhao et al. (2022a)). One RCT compared robotics combined with other interventions with robotics or task-specific training (Li et al. (2023)). One RCT compared exoskeleton robotics combined with other interventions with trunk restraint (Senocak et al. (2023)). Two RCTs compared exoskeleton robotics combined with other interventions with exoskeleton robotics (Shi et al. (2024); Kim et al. (2023b)). One RCT compared robotics combined with other interventions with upper limb cycling (Chang et al. (2024a)). One RCT compared robotic glove combined with other interventions with task-specific training (Choi & Cho (2024)). Two RCTs compared robotics combined with other interventions with robotics or video game training (Carmeli et al. (2024); Chen et al. (2021h)). One RCT compared different approaches to robotic orthosis (Tay S.S. et al. (2024)). One RCT compared exoskeleton robotics combined with other interventions with exoskeleton robotics or cognitive training (Fasoli et al. (2019)). One RCT compared exoskeleton robotics combined with other interventions with sham or exoskeleton robotics (Calabro et al. (2017)). One RCT compared different approaches to robotic glove (Prange-Lasonder et al. (2017)). One RCT compared non-robotic electromechanical devices combined with other interventions with non-robotic electromechanical devices (Hayward et al. (2013)). One RCT compared robotics combined with other interventions with neurodevelopmental techniques (bobath approach) (Fazekas et al. (2007)).

In addition, 36 RCTs in which robotics formed part of a combined or comparative intervention are cross-referenced at the end of Table 16; their primary listings appear in other tables.

The methodological details and results of all 197 RCTs are presented in Table 16.

Table 16. RCTs Evaluating Robotics for Upper Extremity Motor Rehabilitation

Authors (Year) **Study Design (PEDro Score)** **Sample Size start** **Sample Size end** **Time post stroke category** **Study design**	**Interventions** **Duration: Session length, frequency per week for total number of weeks**	**Outcome Measures** **Result (direction of effect)**
Robotic orthosis combined with other interventions compared to reaching and reach-to-grasp task training		
Iwamuro et al. (2008) RCT Crossover (5) NStart=10 NEnd=10 TPS=Chronic A + B vs A/B *Also in Table 4 (Task-Specific Training)*	E: Reaching task + Wilmington Robotic Exoskeleton assistant (WREX) C: Reaching task only Duration: 2 sessions	E vs C: Arm movement kinematics (+exp) Muscle Activity EMG analysis (+exp)
Robotics compared to conventional therapy		
Ahn S.Y. et al. (2024) RCT (4) NStart=228 NEnd=180 TPS=Subacute A vs 0	E: Robot-assisted training + conventional therapy C: Conventional therapy Duration: 90min/d, 5d/wk, 4wks	E vs C: WMFT (-) BBT (-) FMA (+exp) MRCS (-) MI (+exp) Grip strength (-) mAS (-) Korean mBI (-) SIS (-)

		Korean MMSE (-) Korean GDS (-) EQ-5D (-) MEP Amplitude (-) Diffusion Tensor Imaging (-) Robotic kinematic measures smoothness (+exp) reach error (-) mean velocity (-) maxunak velocity (+exp) path error (-) circle size (-) independence (+exp)
Liu Y. et al. (2024) RCT (7) NStart=53 NEnd=48 TPS=Subacute A vs 0	E: Robot-assisted training C: Conventional occupationl therapy Duration: 30min/d, 5d/wk, 4wks	E vs C: FMA - UE (+exp) mBI (-)
Serrano-López Terradas et al. (2022) RCT Crossover (5) NStart=64 NEnd=58 TPS=Acute A vs 0	E: Robot-assisted therapy C: Conventional occupational hand therapy Duration: 45min/session, 3-5d/wk, 10wks - 2wk washout	E vs C: FMA (+exp) AROM (+exp) kinetic parameters Grip Flexor Force (+exp) Extension Force (+exp) 9HPT (+exp) BBT (+exp) AMPS (+exp)
Budhota A. et al. (2021) RCT (8) NStart=44 NEnd=44 TPS=Chronic A vs 0	E: Robotic Therapy + Conventional Therapy C: conventional physiotherapy Duration: 60min robotic +30min conventional therapy/d, 3d/wk, 6wks	E vs C: FMA (-) ARAT (-) Grip strength (-) Pain VAS (-) MAS (-)
Jiang et al. (2021a) RCT (6) NStart=45 NEnd=45 TPS=Acute A vs 0	E: Robot-Assisted Therapy (Armeo Spring) + Conventional therapy C: Conventional Therapy Duration: 2x 30min/d, 5d/wk, for 2wks conventional, 2x30min/d, 5d/wk, for 2wks Robot therapy	E vs C: Fugl-Meyer Assessment (+exp) Motricity Index (+exp) Functional Independence Measure (+exp) Barthel Index (+exp) Modified Ashworth Scale (-)
Amatya et al. (2020) RCT (6) NStart=92 NEnd=86 TPS=Acute A vs 0	E: Enriched environment using robotics (NAO robot, arm end effector) C: Conventional care Duration: 2hr/d, 5x/wk until discharge	E vs C: Action Research Arm Test (+exp) Functional Independence Measure - Motor (-) Self-care (-) Sphincter (+exp) Mobility (-) Locomotion (-) Functional Independence Measure - Cognition (-) Neurological Impairment Scale (-) Multidimensional Health Locus of Control (-) Rosenberg Self-Esteem Scale (-)

		Montreal Cognitive Assessment (-) EQ-5D mobility (-) self-care (-) daily activity (-) pain/discomfort (-) anxiety/depression (-) overall health (+exp)
Aprile et al. (2020) RCT (6) NStart=247 NEnd=190 TPS=Subacute A vs 0	E: Robotic therapy C: Conventional therapy Duration: 45min 5x/wk for 6wks	E vs C: Fugl-Meyer Assessment Upper Extremity (-) Motricity Index (+exp) Medical Research Council Shoulder (-) Elbow (-) Wrist (-) Modified Ashworth Scale (-) Neuropathic Pain DiagNostic Questionnaire (-) Numerical Rating Scale of Pain 9 (-) Modified Barthel Index (-) Frenchay Arm Test (-) Action Research Arm Test (-) 36-Item Short Form Health Survey Physical Composite Score (-)
Chinembiri et al. (2020) RCT (5) NStart=50 NEnd=45 TPS=Not Reported A vs 0	E: robotic-assisted training + OT training C: OT training Duration: OT: 70min/d, 5d/wk, 6wks, Robotic: 20min/d, 5d/wk, 6wks	E vs C: FMA-UE (+exp) Brunnstrom Recovery Stages Scale (+exp) Barthel Index (+exp)
Xu et al. (2020) RCT (6) NStart=45 NEnd=40 TPS=Subacute A vs 0	E: Smart Force Feedback Rehabilitation Robot C: Conventional Therapy Duration: 20mind/, 5d/wk, 6wks	E vs C: Fugl-Meyer Assessment (-) Wolf Motor Function Test (-) Modified Barthel Index (-)
Carpinella et al. (2020) Pilot RCT (8) NStart=40 NEnd=38 TPS=Chronic A vs 0	E: Robot assisted arm end effector C: Conventional therapy (arm-specific physiotherapy) Duration: 45min/session, 5sessions/wk, 4wk	E vs C: Fugl-Meyer Assessment Upper Extremity: (-) Modified Ashworth Scale: Proximal (+exp) Distal (-) Functional Independence Measure (-) reaching performance scale + trunk compensation index + shoulder/elbow coordination + elbow extension + elbow flexion
Calabro et al. (2019) RCT (8) NStart=50 NEnd=50 TPS=Chronic A vs 0	E: Hand robotic rehabillitation C: Conventional Hand Training Duration: 45min/d, 5d/wk, 8wk	E vs C: Fugl Meyers Assessment Upper Extremity (+exp) Nine hole Peg test (+exp)
Dehem et al. (2019)	E: Robot-assisted therapy (end-effector REAplan1robot)+ Conventional therapy	E vs C:

RCT (7) NStart=45 NEnd=32 TPS=Acute A vs 0	C: Conventional care Duration: 45min/d, 4d/wk, 9wk	Fugl-Meyer Assessment Upper extremity (+exp) Box and Block test (+exp) Functional Ability Scale of the streamlined version of the Wolf Motor Function Test (+exp) Abilhand (-) Activlim (-) Stroke Impact Scale (+exp)
Hung et al. (2019a) RCT (7) NStart=30 NEnd=30 TPS=Chronic A1 vs A2 vs 0	E1: Bi-Manu-Track(Bilateral robot training) E2: INMotion 3.0 (unilateral robot training) C: Conventional OT Duration: 70-75min, 5d/wk, 4wk	E1 vs C: FMA-UE (+exp1) proximal (+exp1) distal (-) MAS (+exp1) Proximal (+exp1) Distal (-) Medical research council (-) Motor activity log (-) E2 vs C: FMA-UE (-) proximal (-) distal (-) MAS (-) Proximal (-) Distal (-) Medical research council (-) Motor activity log (-) E1 vs E2: FMA-UE (-) proximal (-) distal (-) MAS (-) Proximal (+exp1) Distal (-) Medical research council (-) Motor activity log (-)
Kim et al. (2019a) RCT (6) NStart=38 NEnd=36 TPS=Subacute A vs 0	E: Robotic-assisted shoulder rehabilitation therapy + conventional physical therapy C: Conventional Therapy Duration: 30min/d, 5d/wk for 4wks robotic-assisted shoulder rehabilitation therapy; 2x/d conventional therapy	E vs C: Passive range of motion Flexion (-) abduction (-) external rotation (-) internal rotation (-) Pain-VAS (+exp) K-SQD (-) ultrasonographic grade (-)
DauNoraviciene et al. (2018) RCT (5) NStart=34 NEnd=34 TPS=Subacute A vs 0	E: Robot-assisted Therapy C: Conventional Rehabilitation Duration: 5d/wk, 2 wks	E vs C: Functional Independence Measure (-) Fugl-Meyer Assessment Upper Extremity (-) Hamilton Rating Scale for Depression (-) Hamilton Rating Scale for Anxiety (-) Addenbrooke's Cognitive Examination-Revised (+exp)

		Modified Ashworth Scale (No stats) Shoulder Active Range of Motion Flexion (+exp) Extension (-) Abduction (+exp) Adduction (+exp) Internal Rotation (+exp) External Rotation (-) Elbow Active Range of Motion Flexion (+exp) Extension (-) Supination (+exp) Pronation (+exp) Wrist Active Range of Motion (-)
Hsieh et al. (2018b) RCT (7) NStart=44 NEnd=40 TPS=Chronic A1 vs A2 vs 0	E1: Robot rehab Proximal-InMotion Wrist System E2: robot rehab Distal-IMT C: Conventional therapy Duration: 100min/sessionx20, 5d/wk, 4wk	E1/E2 vs C: FMA distal (D-IMT++) Medical research council Total D-IMT++ Distal D-IMT++ Motor activity log (D-IMT++ quality of movement) accelerometer (-)
Lee et al. (2018b) RCT (6) NStart=30 NEnd=30 TPS=Chronic A vs 0	E: Robot assisted therapy (REJOYCE) C: Conventional therapy Duration: 30min/session, 5x/wk for 8wks	E vs C: FMA (+exp) mBI (+exp)
Lee et al. (2017b) RCT (5) NStart=58 NEnd=50 TPS=Acute A vs 0	E: Robot Assisted Game Training C: Conventional care Duration: 30min, 2x/d, 5d/wk, 2wks	E vs C: Manual Muscle Test Shoulder (-) Elbow (-) Wrist Flexion (+con) Wrist Extension (-) Grasp (-) Manual Function Test (-) Modified Barthel Index (-)
Neuendorf et al. (2017) RCT Crossover (4) NStart=25 NEnd=20 TPS=Chronic A vs 0	E: Robotic ball- game based C: Conventional therapy Duration: 45min, 2d/wk 12wks each condition	E vs C: Grip Strength (+exp) Round Block Test (+exp) Quick Disabilities of Arm Shoulder Hand (Quick DASH) (-)
Tomic et al. (2017) RCT (7) NStart=26 NEnd=26 TPS=Subacute A vs 0	E: ArmAssist Robot C: Conventional Therapy Duration: 30min/d, 5d/wk for 3wk	E vs C: Fugl-Meyer Assessment (+exp) Wolf Motor Function Test (+exp) Barthel Index (-)
Grigoras et al. (2016) RCT (5) NStart=25 NEnd=25	E: Hybrid FES-Robot Assisted Hand Motor Training + standard therapy C: standard therapy	E vs C: FMA (-) shoulder and elbow (-) wrist and hand (-)

TPS=Subacute A vs 0		BBT (-) SIS (-)
Lee et al. (2016a) RCT (4) NStart=58 NEnd=44 TPS=Subacute A vs 0	E: Robotic assisted therapy (Neuro-x) C: Conventional therapy Duration: 30min/session, 2 sessions/d, 5d/wk, 2wks	E vs C: Modified Ashworth Scale (-) Manual muscle test (-) Manual function test (-) Mod BI (-) Brunnstrom stage (-)
BustamanteValles et al. (2016) Pilot RCT (3) NStart=27 NEnd=20 TPS=Chronic A vs 0	E: Technology-assisted rehabilitation gym (Robot Gym) C: Conventional therapy Duration: 2hr/d, 24 sessions, 6-8wk	E vs C: FMA (-) Rancho Los Amigos Functional Test for upper extremity (UE-FT) (-) BBT (-)
Masiero et al. (2014) RCT (7) NStart=34 NEnd=30 TPS=Acute A vs 0	E: Robotic therapy (NeReBot) C: Standard therapy Duration: 2hr/d, 5d/wk for 5wk	E vs C: Fugl-Meyer Assessment Shoulder, Elbow and Coordination subsections (-) Wrist and Hand subsections (-) total (-) Box and Block test (-) Frenchay Arm Test (-) Medical Research Council Scale Deltoid (-) Biceps (-) Triceps (-) Wrist Flexor (-) Wrist Extensor (-) Functional Independence Measure Motor (-)
Sale et al. (2014b) RCT (8) NStart=53 NEnd=53 TPS=Subacute A vs 0	E: Usual rehabilitation + robot-assisted therapy C: Usual rehabilitation + conventional treatment matched with robot-assisted therapy Duration: RT: 45 mins/d, 5ds/wk, 6wks; CT: 5ds/wk, 6wks	E vs C: Motricity index (+exp) Fugl-Meyer (+exp) PROM (+exp) Modified Ashworth Scale shoulder (+exp) elbow (+exp)
Wu et al. (2013a) RCT (7) NStart=53 NEnd=53 TPS=Chronic A1 vs A2 vs 0 *Also in Table 2 (Bilateral Arm Training)*	E1: unilateral robot-assisted arm training E2: Bilateral robot-assisted arm training C: dose matched exercise Duration: 90-105 min/d, 5d/wk, 4 wk	E1/E2 vs C: Wolf Motor Function Test time (+exp) Motor Activity Log AOU (-) QOM (-) ABILHAND Questionnaire (-) functional ability scores (-) E1 vs E2: Wolf Motor Function Test time (+exp1) Motor Activity Log AOU (-) QOM (-) ABILHAND Questionnaire (-)

		functional ability scores (-) NMT andNMU variables in unilateral and bilateral tasks
Hsieh et al. (2012) RCT (7) NStart=54 NEnd=53 TPS=Chronic A1 vs A2 vs 0	E1: High intensity robotic therapy (BiManu-Track) E2: Low intensity robotic therapy C: Conventional therapy Duration: 90-105 min/d, 5d/wk, 4 wk	E1 vs E2: Fugl-Meyer Assessment: (+exp) E1 vs C: Fugl-Meyer Assessment: (+exp) E1 vs E2 vs C: Medical Research Council Scale (-) Motor Activity Log (-) Stroke Impact Scale (-)
Reinkensmeyer et al. (2012) RCT (6) NStart=26 NEnd=26 TPS=Chronic A vs 0	E: Robotic training (Pneu-WREX) C: Conventional tabletop therapy Duration: 1hr/d, 3d/wk for 8wk	E vs C: Fugl-Meyer Assessment (-) Box and Block Test (-) Grip strength (-) Nottingham sensory test (-) MAL (-) Rancho level (-)
Burgar et al. (2011) RCT (6) NStart=54 NEnd=37 TPS=Acute A1 vs A2 vs 0	E1: High intensity robotic therapy (MIME) E2: Low intensity robot therapy C: Conventional Therapy Duration: 1h/d, 3d/wk for 8wk	E1/E2 vs C: Fugl-Meyer Assessment (-) Functional Independence Measure (+exp) Wolf Measure Function Test (-) Motor power (-) Ashworth Scale (-)
Conroy et al. (2011) RCT (6) NStart=62 NEnd=57 TPS=Chronic A1 vs A2 vs 0	E1: Robot-assisted planar reaching (InMotion ARM) E2: Robot-assisted planar and vertical reaching C: Conventional therapy Duration: 1hr/d, 3d/wk for 6 wk	E1/E2 vs C: FMA (-) WMFT (-) SIS (-)
Abdullah et al. (2011) Pilot RCT (6) NStart=20 NEnd=19 TPS=Subacute A vs 0	E: Robot assisted therapy C: Dose-matched conventional therapy Duration: 45min, 3x/wk, until discharge	E vs C: Chedoke Arm and Hand Activity Inventory (-) Chedoke McMaster Stroke Assessment of the Arm and Hand (+exp)
Hsieh et al. (2011) Pilot RCT (8) NStart=18 NEnd=18 TPS=Chronic A1 vs A2 vs 0	E1: High intensity Robot-assisted therapy E2: Low intensity robot-assissted therapy C: Conventional therapy Duration: 90-105min/d, 5d/wk for 4wks	E1/E2 vs C: FMA (+exp1) Medical research council (-) MAL (-) ABILHAND (-)
Lum et al. (2005) RCT (6) NStart=30 NEnd=23 TPS=Subacute A1 vs A2 vs 0	E1: Unilateral Robotic Training (MIME) E2: Bilateral Robotic Training (MIME) E3: Combined Unilateral and Bilateral Robotic Training (MIME) C: Conventional Therapy Duration: 60min, 15x over 4wks	E1/E2/E3 vs C: Modified Ashworth Scale Proximal (+con>exp1) Distal (-) Fugl-Meyer Assessment Proximal (+exp3) Distal (-) Motor Status Score Movement (-) Synergy (+exp3)

		Motor Power Scale (+con>exp2) Functional Independence Measure (+con>exp2) E1 vs E2 vs E3: Modified Ashworth Scale Proximal (-) Distal (-) Fugl-Meyer Assessment Proximal (-) Distal (-) Motor Status Score Movement (-) Synergy (+exp3>+exp1) Motor Power Scale (exp1,exp3>exp2) Functional Independence Measure (+exp1>exp2)
Lum et al. (2002) RCT (6) NStart=27 NEnd=27 TPS=Chronic A vs 0	E: Robot (MIME) assisted movement training C: Conventional therapy Duration: 1hr/d, 5d/wk for 6wk	E vs C: FMA (+exp) FIM (-) kinematic measures reach extend (+exp) shoulder strength gain (+exp)
Burgar et al. (2000) Pilot RCT (7) NStart=21 NEnd=21 TPS=Chronic A vs 0	E: Mirror Image Motion Enabler (MIME) robot C: Conventional Therapy Duration: 2hr/d, 3d/wk for 10wk	E vs C: Fugl-Meyer Assessment (-) Functional Indepedence Measure (-) Barthel Index (-)
Exoskeleton robotics compared to conventional therapy		
Bhattacharjee et al. (2024) RCT (8) NStart=44 NEnd=44 TPS=Subacute A vs 0	E: Robot-assisted therapy C: Conventional rehabilitation Duration: 30min/d, 5d/wk for 3wks	E vs C: FMA-UE motor (+exp) sensation (-) passive joint motion (+exp) joint pain (-) modified Ashworth Scale elbow flexion (-) elbow extension (-) wrist flexors (-) wrist extensors (-) SIS hand function (+exp) ADL (+exp) WHOQoL-BREF physical domain (+exp) psychological domain (+exp) social domain (+exp) environment domain (-)
Cechova et al. (2024) RCT (6) NStart=27 NEnd=27 TPS=Acute	E: Armeo Spring training + Conventional rehabilitation C: Conventional rehabiltation Duration: 30min/d, 5d/wk for 2-3wks	E vs C: EQ-5D-5L (+exp) SIS (+exp) modified Frenchay Scale (+exp) AGOAL measurements

A vs 0		hand path ratio (+exp) Barthel Index (-)
Yildiz et al. (2024) RCT (7) NStart=66 NEnd=64 TPS=Subacute A vs 0	E: Robot-assisted arm training (ArmeoSpring upper extremity robotic device) + Conventional rehabilitation C: Conventional rehabilitation Duration: Robot Assisted therapy group: 60 mins/d (30 mins of robotic therapy and 30 mins of conventional rehabilitation), 5ds/wk, 6wks; Conventional rehabilitation group: 60 mins/d, 5ds/wk, 6wks	E vs C: Maximum inspiratory pressure (+exp) Maximum expiratory pressure (+exp) ABILHAND (+exp) SIS Strength (+exp) Hand function (+exp) ADL/IADL (+exp) Mobility (-) Recovery (+exp) Memory (-) Emotions (-) Communication (-) Participation (-)
Jayavel et al. (2024) Pilot RCT (5) NStart=20 NEnd=20 TPS=Chronic A vs 0	E: 3D-printed robotic device C: Conventional therapy Duration: 60 mins/d, 5ds/wk, 8wks	E vs C: FMA-UE (no stat) AROM; - elbow flexion (no stat); -shoulder internal rotation (no stat)
Kim S.-H. et al. (2023) RCT (6) NStart=40 NEnd=36 TPS=Acute A vs 0	E: Robotic Hand therapy + Conventional therapy C: Conventional therapy Duration: 60 mins/d (Experimental group: 30 minutes of occupational therapy and 30 minutes of robotic hand rehabilitation; Control group: 60 minutes of occupational therapy), 5ds/wk, 4wks	E vs C: WMFT (+exp) FMA-UE (+exp) mBI (+exp) EQ-5D (+exp)
Yuan R. et al. (2023) RCT (8) NStart=79 NEnd=70 TPS=Subacute A vs 0	E1: Unilateral robot-assisted training + conventional therapy E2: Bilateral robot-assisted training + conventional therapy C: Conventional therapy Duration: E1/E2: 30 min/d robotic therapy + 30 min/d conventional therapy, 6d/wk, 3wks; C: 60 min/d, 6d/wk, 3wks	E1 vs C: FMA-UE (-) mBI (-) RMS biceps brachii bundle (-) anterior deltoid bundle (-) middle deltoid (-) triceps brachii bundle (-) iEMG biceps brachii bundle (-) anterior deltoid bundle (-) middle deltoid (-) triceps brachii bundle (-) MEP (-) E2 vs C: FMA-UE (+exp2) mBI (+exp2) RMS biceps brachii bundle (-) anterior deltoid bundle (+exp2) middle deltoid (-) triceps brachii bundle (-) iEMG

		biceps brachii bundle (-) anterior deltoid bundle (+exp2) middle deltoid (-) triceps brachii bundle (-) MEP (-) E1 vs E2: FMA-UE (+exp2) mBI (+exp2) RMS biceps brachii bundle (-) anterior deltoid bundle (+exp2) middle deltoid (-) triceps brachii bundle (-) iEMG biceps brachii bundle (-) anterior deltoid bundle (+exp2) middle deltoid (-) triceps brachii bundle (-) MEP (-)
Kim et al. (2023e) Pilot RCT (6) NStart=30 NEnd=30 TPS=Chronic A vs 0	E: HEXO exoskeleton assisted therapy C: Conventional Rehab Duration: 30min/d, 3d/wk, 6wks	E vs C: FMA (-) MI (-) MBI (-) AROM (-) PROM (-)
Taravati et al. (2022) RCT (5) NStart=45 NEnd=37 TPS=Chronic A vs 0	E: ReoGo™-Motorika (Robotics) + conventional care C: conventional care Duration: E: 30-45min/d, 5d/wk, 4wks + 60min/d conventional rehabilitation + 45min/d 2d/wk cognitive rehabilitation (if required), C: 60min/d conventional rehabilitation + 45min/d 2d/wk cognitive rehabilitation (if required)	E vs C: FMA (-) Coordination/Speed (+exp) MAS (-) PPT (-) MMDT (-) FIM (-) Stroke Specific Quality of Life (-) NEADL (-) MoCA (-) CES-Despression (+exp)
Ma D. et al. (2022) Pilot RCT (6) NStart=26 NEnd=19 TPS=Subacute A vs 0	E: Exoskeleton training + conventional rehab C: conventional rehab Duration: 90min/d(60 min exoskeleton, 30 min conventional), 5d/wk, 4wks	E vs C: FMA-UE (+exp) WMFT (-) ARAT (-)
Singh et al. (2021) RCT (6) NStart=27 NEnd=23 TPS=Chronic A vs 0	E: Robotic-Therapy Group C: Conventional Care Duration: 45min/d, 5d/wk, 4wks	E vs C: MAS (+exp) AROM (+exp) BRS (-) BI (-) FMA; UL (+exp) wrist/hand (+exp) shoulder/elbow (-) MEP; ipsilesional (+exp) contralesional (-) RMT; ipsilesional (+exp)

		contralesional (-)
Chen et al. (2021g) Pilot RCT (8) NStart=20 NEnd=20 TPS=Subacute A vs 0	E: exoskeleton-assisted anthropomorphic movement training (EAMT) C: Conventional UE rehabilitation Duration: 45 min/d, 5d/wk, 4wks	E vs C: FMA-UE (+exp) Action Research Arm Test (-) modified Barthel Index (+exp)
Serrezuela et al. (2020) Pilot RCT (5) NStart=16 NEnd=16 TPS=Subacute A vs 0	E: Robotic Therapy C: Conventional Therapy Duration: 1h/d, 5d/wk, 3mos	E vs C: ROM flexion extension abduction internal rotation external rotation MAS MRC Muscle Strength Scale painful shoulder severity
Iwamoto et al. (2019) RCT Crossover (4) NStart=30 NEnd=12 TPS=Acute A vs 0	E: Robotic rehabilitation using HAL-SJ + Occupational therapy C: Occupational therapy Duration: 40min/d, 5d/wk, 1wk	E vs C: Group 1 (condition A vs B): 12-grade hemiplegia recovery grade - BRS (+A) Motricity Index (-) Grip Strength (-) Functional Independence Measure (-) Barthel Index (-) Motor Activity Log (+A) Group B (condition A vs B): 12-grade hemiplegia recovery grade (+A) Motricity Index (-) Grip Strength (-) Functional Independence Measure (-) Barthel Index (-) Motor Activity Log (-)
Villafane et al. (2018) RCT (7) NStart=32 NEnd=32 TPS=Subacute A vs 0	E: robot passive mobilization (exo) 30 min + conventional rehab (OT+PT) 1 hr C: conventional rehab (OT+PT), 1.5 hour Duration: 30min 3x/wk, 3wk	E vs C: National Institutes of Health Stroke Scale (-) Modified Ashworth Scale (-) Barthel Index (-) Motricity Index (-) Quick DASH (-) Visual Analogue Scale (+exp)
Taveggia et al. (2016) RCT (7) NStart=54 NEnd=54 TPS=Not Reported A vs 0	E: Robot-assisted Training (ARMEO Exoskeleton Device) C: Conventional rehabilitation Duration: 60min (30min Robot-assisted training + 30min Conventional Therapy), 5d/wk for 6wk	E vs C: Functional Independence Measure (-) Motricity Index (-) Modified Ashworth Scale (-) Pain VAS Scale (-)
Susanto et al. (2015) Pilot RCT (7) NStart=19 NEnd=18 TPS=Chronic A vs 0	E: robot-assisted finger training (exoskeleton device) C: non-assisted conventional training Duration: 1hr/d, 5d/wk, 4wk	E vs C: Wolf Motor Function Test; - score (-) - time (-) functional movement task score (+exp) - functional movement task time (+exp) Action Research Arm Test (-) Fugl-Meyer Assessment (-)

		shoulder/elbow (-) wrist/hand (-)
Bartolo et al. (2014) RCT (7) NStart=28 NEnd=28 TPS=Acute A vs 0	E: Arm weight support training C: Conventional Physiotherapy Duration: 30min/d, 6d/wk for 2 wks	E vs C: FMA (-) FIM (-) Kinematic Active ROM (+exp)
Brokaw et al. (2014) RCT Crossover (4) NStart=12 NEnd=10 TPS=Chronic A vs 0	E: Robotic therapy (ARMin) C: Conventional therapy Duration: 90min/session, 2sessions/wk, 4wks; 12hrs of therapy in total for 1month; Washout period: 1month	E vs C: ARAT (+exp) FMA (+exp) BBT (+exp)
Klamroth-Marganska et al. (2014) RCT (8) NStart=77 NEnd=73 TPS=Chronic A vs 0	E: Robot therapy C: Conventional therapy Duration: 45min/d, 3d/wk for 8wk	E vs C: Fugl-Meyer Assessment (+exp) Wolf Motor Function Test (-) Stroke Impact Scale (-) Motor Activity Log (-) Modified Ashworth Scale (-) Mean Isometric Strength (+con) Grip Strength (-) Goal attainment scale
Kim et al. (2013b) RCT (3) NStart=15 NEnd=12 TPS=Chronic A1 vs A2 vs 0	E1: Bilateral robotic training; E2 Unilateral robotic training, video games C: Usual Care Duration: 90min; 2d/wk; 6wk	E1 vs E2 vs C: FMA (No Stats) ROM (no stats)
Housman et al. (2009) RCT Crossover (5) NStart=34 NEnd=28 TPS=Chronic A vs 0	E: Robotic exoskeleton T-WREX C: Conventional exercise w/ tabletop Duration: 24x1hr; 6mo followup	E vs C: FMA-UE (+exp) Rancho functional test for paretic UE (-) Motor activity log: <<amount of use (-) quality of control (+exp) grip strength (-) ROM deficit (-)
Non-robotic electromechanical devices combined with other interventions compared to conventional therapy		
Barker et al. (2017) RCT (7) NStart=50 NEnd=50 TPS=Subacute A + B vs A/B vs 0 *Also in Table 22 (Neuromuscular Electrical Stimulation (NMES))*	E1: SMART arm + outcome triggered electrical stim + usual therapy E2: SMART arm + usual therapy C: Usual therapy Duration: 60min/d, 5d/wk, 4wk	E1/E2 vs C: Motor assessment scale (-) Modified Ashworth Scale (-) Triceps strength measured using Medical Research Council manual muscle testing (-) Ritchie Articular Index (-) SIS (-) MAL (-)
Prange et al. (2015) RCT (7) NStart=70 NEnd=68 TPS=Subacute A + B vs 0 *Also in Table 17 (Virtual Reality)*	E: weight supported Arm training (ArmeoBoom device is a sling suspension system) C: Conventional therapy Duration: 30min/d, 3d/wk, 6wk	E vs C: Maximal Reaching distance (-) Fugl Meyer Assessment (-) Stroke Upper Limb Capacity Scale (-) Visual Analogue Scale-pain (-) Intrinsic Motivation Inventory (+exp)

Robotic glove compared to no treatment		
Radder et al. (2019) RCT (4) NStart=91 NEnd=77 TPS=Not Reported A1 vs A2 vs 0	E1: IronHand Assistive Glove E2: IronHand Therapeutic Glove C: No IronHand Glove Duration: 180min/wk (minimum), 4 wks	E1 vs E2: Hand Grip Strength (+exp2) Pinch Strength (+exp2) Box and Blocks Test (+exp1) Jebsen-Taylor Hand Function Test- Total Time (+exp1,+exp2) E1 vs C: Hand Grip Strength (-) Pinch Strength (-) Box and Blocks Test (+exp1,+con) Jebsen-Taylor Hand Function Test-Total Time (+exp1,+con) E2 vs C: Hand Grip Strength (+exp2) Pinch Strength (+exp2) Box and Blocks Test (+con) Jebsen-Taylor Hand Function Test-Total Time (+exp2,+con)
Different approaches to robotics compared against one another		
Hoidekrova et al. (2024) RCT (6) NStart=40 NEnd=36 TPS=Subacute A1 vs A2	E1: Robot-assisted bimanual therapy (sensor glove) + conventional therapy E2: robot-assisted unilateral therapy (passive glove) + conventional therapy Duration: 60 mins/d (30 mins of robot assisted therapy and 30 mins of conventional occupational therapy), 5ds/wk, 3wks	E1 vs E2: MAL (-) Modified Ashworth Scale 7th category (-) 8th category (+exp) MI (-)
Jeon et al. (2024) RCT (7) NStart=34 NEnd=32 TPS=Chronic A1 vs A2	E: Robot-assisted therapy with resistance C: Robot-assisted therapy with active assistance Duration: 30min/d, 5d/wk for 4wks	E vs C: Smoothness (+exp) FMA UE (+exp) proximal (+exp) ARAT (+exp) SIS (-) robotic kinematic measurements reach error (-) mean velocity (-) path error (-) circle size (-) joint independence (+exp) stabilization (-) displacement (+exp)
Doost et al. (2021) RCT (3) NStart=23 NEnd=23 TPS=Chronic A1 vs A2	E1: Bimanual robotic training with progressively decreasing longitudinal assistance E2: Bimanual robotic training without longitudinal assistance Duration: 20min/d, 2d	E1 vs E2: Speed Accuracy Tradeoff (No stat) Box and Block Test (No stat) Bimanual Skill Learning (No stats)
Wright et al. (2018) RCT (9) NStart=22 NEnd=22	E: robot training with forced field C: robot training without force field Duration: ~45min, 5x over 5wk	E vs C: Fugl Meyer Upper Extremity (-) Action Research Arm Test (-)

TPS=Chronic A1 vs A2		Chedoke McMaster Stroke Assessment-Arm (-) Elbow Range of Motion (-) Modified Ashworth Scale Biceps: (-) Triceps: (+exp)
Bouchard et al. (2017) RCT (6) NStart=34 NEnd=34 TPS=Chronic A1 vs A2	E1: Haptic Guided Robotic Training E2: Error Amplification Robotic Training Duration: 75 trials	E1 vs E2: Timing performance (+exp1)
Hammerbeck et al. (2017) RCT (8) NStart=36 NEnd=36 TPS=Chronic A1 vs A2	E1: Fast training E2: Slow training Duration: 4d	E1 vs E2: MAS (-) FMA (+exp1) Medical research council monofilament sensory test
Rowe et al. (2017) RCT (7) NStart=30 NEnd=30 TPS=Chronic A1 vs A2	E: High Robotic Assistance Finger Training C: Low Robotic Assistance Finger Training Duration: 90min/d, 5d/wk, 8wk	E vs C: Intrinsic Motivation Inventory motivation (+exp) effort (+ep) self-efficacy (-) Box and Block test (-) Fugl-Meyer Assessment (-) Action Research Arm Test (-) Nine-Hole Peg Test (-) Finger Tapping (-) Motor Activity Log (-) National Institutes of Health Stroke Scale (-) lateral pinch (-) 3 jaw pinch (-) Beck hopelessness scale (-) Geriatric depression scale (-)
Hwang et al. (2012) RCT (6) NStart=17 NEnd=15 TPS=Chronic A1 vs A2	E: Robot-assisted, end-effector rehab for 4 wks C: 2 wks Early passive ROM therapy + 2 wks robot-assisted rehab (half-term intervention) Duration: 45min/d, 5d/wk, for 4wks; C: 2wks passive + 2 wks robot	E vs C: Jebsen taylor hand function (-) FMA (-) Ashworth scale (-) 9HPT (-) SIS (-) Grasping force test (-) Pinching force test (-) 2nd Metacarpophalangeal joint active range of motion (-)
Zollo et al. (2011) RCT Crossover (6) NStart=24 NEnd=24 TPS=Chronic A1 vs A2	E1: Robotic Therapy (Shoulder/Elbow, InMotion2) E2: Robotic Therapy (Wrist, InMotion3) Duration: 6 wks shoulder-elbow therapy & 6wks wrist therapy	E1 vs E2: Wilcoxon Test (no stats) Kinematic Index- Unperturbed Motion Task Motion Direction (no stats) Path Length (no stats) Motion Smoothness (no stats) Force Exerted (no stats) Work Expended (no stats) Kinematic Index- Resistive Motion Task

		Motion Direction (no stats) Path Length (no stats) Force Exerted (no stats) Work Expended (no stats)
Stein et al. (2004) RCT (6) NStart=47 NEnd=46 TPS=Chronic A1 vs A2	E1: Robot-aided Progressive Resistance Training E2: Robot-aided Active-assisted Training E3: Robot-aided Progressive Resistance Training (final 3wk) E4: Robot-aided Active-assisted training (final 3wk) Duration: 1hr, 3x/wk, 6wk	E1 vs E2: Modified Ashworth Scale: (-) Fugl Meyers Upper Extremity (-) Motor Status Score Shoulder/Elbow: (-) Wrist/Hand (-) Medical research council test (-) Peak Force (N) (-) Groups E1+C1 v E2+C2: Modified Ashworth Scale: (-) Fugl Meyers Upper Extremity (-) Motor Status Score Shoulder/Elbow: (-) Wrist/Hand (-) Medical research council test (-) Peak Force (N) (-)
Robotics combined with other interventions compared to exercise and custom physiotherapy protocols		
Lencioni et al. (2021) RCT (6) NStart=40 NEnd=32 TPS=Chronic A vs B *Also in Table 3 (Exercise and Strength Training)*	E: Robotic-assisted training + conventional therapy C: Conventional therapy + arm specific physiotherapy Duration: 45min/d, 5d/wk, 4wks	E vs C: Ev C: FMA (no stat), Kinematics elbow extension (+exp) trunk angles (+exp) shoulder angles (-) movement smooth (-) forearm pronation (+exp)
Sale et al. (2014a) RCT (6) NStart=20 NEnd=20 TPS=Acute A vs B *Also in Table 3 (Exercise and Strength Training)*	E: inpatient rehabilitation + robot-assisted hand therapy C: inpatient rehabilitation + personalized OT training Duration: 3hr/day inpatient rehabilitation + 40min/d, 5d/wk, 4wk, 20x total robot assisted or OT therapy	E vs C: Fugl-Meyer Assessment Medical Research Council Scale Motricity Index Modified Ashworth scale - no stat
Robotics combined with other interventions compared to unilateral arm training		
Masiero et al. (2011) RCT (6) NStart=21 NEnd=21 TPS=Acute A vs B *Also in Table 2 (Bilateral Arm Training)*	E: Robotic arm therapy (NeReBot) + conventional therapy C: Conventional therapy + proximal paretic arm exercise Duration: 120min, 5d/wk, 5wks	E vs C: Medical Research Council Scale Deltoid (-) Biceps (-) Triceps (-) Wrist Flexor (+exp) Wrist Extensor (-) Fugl-Meyer Assessment Shoulder, Elbow and Coordination subsections (-) Wrist and Hand subsections (-) total (-) Functional Independence Measure-motor (-)

		Modified Ashworth Scale (-) Frenchay Arm Test (-) Box and Block Test (-)
Robotics combined with other interventions compared to task-specific training		
Chen et al. (2022b) RCT Crossover (5) NStart=31 NEnd=24 TPS=Chronic A + B vs C *Also in Table 19 (EMG Biofeedback); Table 4 (Task-Specific Training)*	E: EMG-driven Robot-assisted Hand Training C: Task-Oriented intervention Duration: 70min/d, 3d/wk, 4wks (1mo washout)	E vs C: FMA-UE (+exp) WMFT (-) ARAT (-) MAL AOU (-) QOM (+exp)
Hsieh et al. (2017) Pilot RCT (6) NStart=31 NEnd=31 TPS=Subacute A + B vs A/B *Also in Table 4 (Task-Specific Training)*	E: Bilateral robotic priming (Bi-Manu-Track) + task oriented exercises C: Task oriented exercises Duration: 40-45min/d, 5d/wk for 4wks bilateral robotic priming; 40-45min/d, 5d/wk for 4wks task-oriented approach	E vs C: FMA (-) Grip strength (-) BBT (-) modified rankin scale (-) FIM (-) actigraphy (-) SIS (+exp) self reported fatigue scale (-)
Hesse et al. (2014) RCT (7) NStart=50 NEnd=46 TPS=Subacute A + B vs A/B *Also in Table 4 (Task-Specific Training)*	E: Robot-assisted Group Therapy + Individual Arm Therapy C: Individual arm therapy Duration: 30min/d RAGT, 30min/d IAT, 5d/wk for 4wk, 2x30mins/d, 5d/wk, 4wks IAT	E vs C: Action Research Arm Test (+exp) Fugl-Meyer Assessment (-) Box and Block Test (-) Medical research council (-) Barthel Index (-) Modified ashworth (-)
Timmermans et al. (2014) RCT (8) NStart=22 NEnd=22 TPS=Chronic A vs B *Also in Table 4 (Task-Specific Training)*	E: Task-oriented Robotic arm training (Haptic Master) C: Task oriented arm training Duration: 30min (2x/d), 4d/wk for 8wk	E vs C: Fugl-Meyer Assessment (-) Action Research Arm Test (-) Motor Activity Log (-) EuroQol-5D (-) SF-36 Health Survey (-)
Kahn et al. (2006) Pilot RCT (4) NStart=19 NEnd=19 TPS=Chronic A + B vs A/B *Also in Table 4 (Task-Specific Training)*	E: Active-assistive reaching exercise using a robotic device (Arm Guide) C: Task-matched amount of reaching without assistance Duration: 45min/d, for 8wk	E vs C: Rancho Los Amigos Functional Test (-) Chedoke McMaster Stroke Assessment (-) Supportive range of motion
Robotics combined with other interventions compared to cognitive training		
Ranzani et al. (2020) RCT (6) NStart=33 NEnd=27 TPS=Acute A + B vs X *Also in Table 13 (Cognitive and Dual-Task Training)*	E: Robot-Assisted Neurocognitive Therapy using a haptic device +Conventional Neurocognitive Therapy C: Conventional Neurocognitive Therapy Duration: 3 sessions/d (2x45min, 1x30min) for 4wks (15 sessions total)	E vs C: Fugl-Meyer Assessment UE (-) Wrist and Hand (-) Shoulder and Elbow (-) Box and Blocks Test (-) Modified Ashworth Scale (-) Erasmus Nottingham Sensory Assessment of Tactile Sensation (-) Mini Mental State Examination (-)

		Albert Test (-) Frontal Assessment Battery (-)
Robotics compared to sham		
Masiero et al. (2007) RCT (6) NStart=35 NEnd=30 TPS=Acute A vs 0	E: Sensorimotor Robotic Training (NeReBot) + Standard rehabilitation C: exposed to Robotic training for unimpaired upper limb (sham) + Standard rehabilitation Duration: E: 20-30min, 2x/d, 4x/wk for 5wk; C: 30min/wk, 2x/wk	E vs C: Fugl-Meyer Assessment-Upper Extremity shoulder/elbow (+exp) coordination (+exp) wrist/hand (-) Medical Research Council Deltoid (+exp) Biceps (+exp) Wrist flexor (-) Functional Independence Measure Motor (+exp) Trunk Control Test (-) Modified Ashworth scale (-)
Masiero et al. (2006) Pilot RCT (5) NStart=20 NEnd=20 TPS=Acute A vs 0	E: Robot-assisted Training + standard multidisciplinary post-stroke rehabilitation C: Exposure to robot for unaffected hand (once a week) + standard multidisciplinary post-stroke rehabilitation Duration: E: 40-50min/d, 2x/d, 5d/wk (total of 25 daily sessions); C: 60min/wk	E vs C: FMA shoulder/elbow/coordination (+exp), wrist/hand (-) upper Motricity index (-) FIM, motor (+exp) Medical research council (-)
Volpe et al. (2000) RCT (6) NStart=56 NEnd=56 TPS=Acute A vs 0	E: Robotic training C: Sham treatment (robot exposure) Duration: 30min/d, 3d/wk for 4wk	E vs C: Motor power score shoulder and elbow (+exp) wrist and hand (-) Motor status score shoulder and elbow (+exp) wrist and hand (-) Functional Independence Measure (+exp) Fugl-Meyer Assessment (-)
Exoskeleton robotics combined with other interventions compared to task-specific training		
Tang et al. (2023) RCT (6) NStart=24 NEnd=24 TPS=Acute A vs B *Also in Table 4 (Task-Specific Training)*	E: Bilateral upper limb robot-assisted training + Conventional Therapy C: Task-specific Therapy + Conventional Therapy Duration: 90min/d, 6d/wk, 3wks	E vs C: FMA-UE (-) MBI (+exp) Quantitative EEG evaluations Current source density (no between group stst) functional connectivity (no between group stst)
Hsu et al. (2022a) RCT (7) NStart=34 NEnd=32 TPS=Chronic A + B vs A/B *Also in Table 4 (Task-Specific Training)*	E: Tenodesis-induced-group-exoskeleton robot (TIGER) training + Regular task-specific motor training C: Conventional OT + Regular task-specific motor training Duration: 40min/d(20min TIGER/OT, 20min task-specific), 2d/wk, 9wks	E vs C: FMA-UE (+exp) shoulder/elbow/forearm (-) wrist (+exp) hand (+exp) coordination (-) BBT (-) MAL (-) MAS (-)

Esquenazi et al. (2021) Pilot RCT (6) NStart=45 NEnd=40 TPS=Acute A vs B *Also in Table 4 (Task-Specific Training)*	E: ARMEO exoskeleton + conventional care C: Tabletop assisted exercises + conventional therapy Duration: 1hr intervention + 3hr conventional therapy, 4d/wk, wks dependant on individual patient stay	E vs C: FIM (-) FMA-UE (-) MAS (-) AROM elbow flexion (+exp) elbow extension (-) PROM elbow flexion (+exp) elbow extension (+exp) RPE (-)
Non-robotic electromechanical devices compared to conventional therapy		
Horsley et al. (2019) RCT (8) NStart=50 NEnd=48 TPS=Acute A vs 0	E: SMART Arm device+usual care C: Usual care Duration: E: 60min/d SMART arm + 5d/wk for 5wks usual care; C: 5d/wk for 5wks	E vs C: PROM Wrist extension (-) Elbow extension (+con) Shoulder flexion (-) Torque-controlled PROM shoulder external rotation (-) Motor assessment scale (-) Pain VAS (-) Pain on sleeping measured by DASH questionnaire (-)
Hesse et al. (2008b) RCT (6) NStart=8 NEnd=8 TPS=Subacute A vs 0	E: Finger Training with non-robotic device C: Conventional Therapy Duration: 20min, 5x/wk, 4wks	E vs C: Fugl-Meyer Assessments (No stats) Distal (No stats) Box and Block Test (No stats) Medical Research Council (No stats) Modified Ashworth Scale (No stats) Barthel Index (-)
Wang et al. (2007) RCT (4) NStart=44 NEnd=44 TPS=Subacute A vs 0	E: upper limbs' encircling motion (X. O. S. motion feedback machine, a mechanical upper limb training device) + conventional physical therapy C: conventional physical therapy Duration: 5d/wk, 4wk ULEM & 60min, 5x/wk, 4wk CT	E vs C: Brunnstrom stage (+exp) Barthel Index (-) Blood pressure
Volpe et al. (2004) RCT (4) NStart=32 NEnd=32 TPS=Not Reported A vs 0	E: Continuous Passive Motion Device (Shoulder 600) + standard rehab C: standard rehab Duration : 30min/d, 3d/wk for 4wk	E vs C: Motor power motor status scale of shoulder and elbow (-) Fugl-Meyer Assessment (-) Joint stability Ashworth Scale (-) pain FIM
Exoskeleton robotics combined with other interventions compared to control		
Hesse et al. (2008a) RCT (8) NStart=54 NEnd=52 TPS=Subacute A vs B	E1: Mechanical arm trainer E2: Electrical muscle stimulation of paretic wrist extensors Duration: 20-30min/d, 5d/wk for 6wk	E1 vs E2: FMA (-) BBT (+exp) Medical research council,(-) Mod Ashworth scale (-)

Also in Table 22 (Neuromuscular Electrical Stimulation (NMES))		
Robotic orthosis combined with other interventions compared to exercise and custom physiotherapy protocols		
Wolf et al. (2015) RCT (7) NStart=99 NEnd=92 TPS=Subacute A + B vs A/B *Also in Table 3 (Exercise and Strength Training)*	E: Telemonitored hand robotic-assisted therapy (Hand mentor pro) + home exercise program C: Home exercise program only Duration: 3h/d, 5d/wk for 8 wks	E vs C: Fugl Meyer Assessment (-) Action Research Arm Test (-) Wolf Motor Function Test (+exp)
Robotic orthosis compared to conventional therapy		
Bayındır et al. (2022) RCT (6) NStart=37 NEnd=33 TPS=Not Reported A vs 0	E: robot assisted therapy "HANDTUTOR" C: conventional rehab Duration: 4hr/d(3hr conventional, 1hr robot therapy), 2d/wk, 5wks	E vs C: FMA-UE (-) BBT (+exp) 9HPT (-) JTHFT (-) Pinch strength (+exp) Grip strength (-)
Orihuela-Espina et al. (2016) RCT (6) NStart=17 NEnd=17 TPS=Subacute A vs 0	E: Robot assisted therapy (Amadeo Robot) C: Conventional therapy Duration: 1hr, 5x/wk for 8-10wk	E vs C: Fugl-Meyer Assessment Upper Extremity (+exp) Motricity Index (-)
Lannin et al. (2016) Pilot RCT (7) NStart=9 NEnd=9 TPS=Subacute A vs 0	E: Saebo-Flex device C: Usual Rehabilitation Duration: 45min/d, 3d/wk group conventional therapy & 45min/d, 4d/wk individual conventional therapy & 45min/d, 5d/wk Saebo-Flex device, 8wks	E vs C: Motor assessment scale (-) BBT (-) Grip strength (-) Stroke Impact Scale (-)
Liao et al. (2012) RCT (7) NStart=20 NEnd=20 TPS=Chronic A vs 0	E: Robot assisted therapy (Bi-Manu-Track robotic arm trainer) C: Conventional Therapy Duration: 90-105min/d, 5d/wk for 4wk	E vs C: FMA (+exp) ABILHAND (+exp) Motor activity log (+exp) FIM (-) accelerometer (-)
deAraujo et al. (2011) RCT (5) NStart=12 NEnd=12 TPS=Chronic A vs 0	E: Electromechanical orthosis + conventional therapy C: Conventional care Duration: 50min 3x/wk, 8wk	E vs C: Fugl-Meyer Assessment Upper Extremity Modified Ashworth Scale (-) EMG amplitude
Ring et al. (2005) RCT Crossover (3) NStart=22 NEnd=22 TPS=Subacute A vs 0	E: Wrist-hand robotic orthosis (Handmaster) + conventional rehabilitation C: Conventional rehabilitation Duration: 3h/d, 3d/wk conventional rehabilitation & 50min, 3x/d, 6wks robotic orthosis	E vs C: Active RoM Shoulder flexion (+exp) Wrist extension (+exp) Wrist flexion (+exp) Mod Ashworth (+exp) JTHT (+exp) BBT (+exp)

Robotics combined with other interventions compared to sensorimotor training		
Volpe et al. (2008) RCT (6) NStart=21 NEnd=21 TPS=Chronic A vs B *Also in Table 5 (Sensorimotor Training)*	E: Intensive Sensorimotor Arm Training Mediated by robot (InMotion2 robot) C: Intensive Sensorimotor Arm Training Mediated by Therapist Duration: 1hr/d, 3d/wk, 6wks	E vs C: Fugl-Meyer Assessment (-) Motor Power Scale (-) Modified Ashworth Scale (-) Joint Stability Scale (-) Beck Depression Inventory (-) Action Research Arm Test (-) Stroke Impact Scale (-)
Robotic orthosis combined with other interventions compared to conventional therapy		
Wang T. et al. (2023) RCT (7) NStart=69 NEnd=69 TPS=Subacute A vs B vs 0 *Also in Table 29 (Repetitive Transcranial Magnetic Stimulation (rTMS))*	E1: Soft Robotic Glove + Conventional therapy E2: Low frequency rTMS + Conventional therapy C: Conventional therapy Duration: 50 mins/d (Experimental groups: 30 mins for conventional therapy, 20 mins for robotic glove use or rTMS; Control group: 50 minutes of conventional therapy); 5ds/wk, 2wks	E1 vs C: FMA-UE change (+exp1) mBI change (-) surface electromyographic amplitude of the wrist dorsal extensor muscle group (-) Resting Motor Threshold (-) E2 vs C: FMA-UE change (+exp2) mBI change (-) surface electromyographic amplitude of the wrist dorsal extensor muscle group (-) Resting Motor Threshold (+exp2) E1 vs E2: FMA-UE change (-) mBI change (-) surface electromyographic amplitude of the wrist dorsal extensor muscle group (-) Resting Motor Threshold (+exp2)
Straudi et al. (2020) RCT (6) NStart=40 NEnd=39 TPS=Subacute A + B vs 0 *Also in Table 22 (Neuromuscular Electrical Stimulation (NMES))*	E: Robot-assisted arm therapy + hand functional electrical stimulation (RAT+FES) C: Conventional Therapy Duration: 1hr40min, 5x/wk, 6wks	E vs C: Fugl-Meyers Upper Extremity (-) proximal (-) distal (-) Box and Block Test- affected arm (-) Wolf Motor Function Test functional ability (-) task rate (-) Barthel Index (-) Modified Ashworth Scale (-)
Byl et al. (2013) Pilot RCT (5) NStart=18 NEnd=15 TPS=Chronic A + B1 vs A + B2 vs 0 *Also in Table 4 (Task-Specific Training); Table 17 (Virtual Reality)*	E1: Robotic orthosis + Task-Specific training + Videogames (Unilateral) E2: Robotic orthosis + Task-Specific Training + Videogames (Bilateral) C: Usual Physical Therapy Duration: 2x/wk, for 6wk	E1/E2 vs C: Upper Limb Fugl Meyer (FMA) (-) Saint Louis University Mental Status Exam (SLUMS) (-) Stroke impact scale (-) California Functional Independence Scale (CAFE-40) (-) Active Range of Motion (-) Muscle Strength (-) Pain NRS (-) Box and Block (-) Finger Tapper Test (-) Wolf Motor Function Test (-) Digital Reaction Time Test (-) Modified Ashworth Scale (-)

Robotics combined with other interventions compared to emg-triggered nmes		
Hesse et al. (2005) RCT (7) NStart=44 NEnd=39 TPS=Subacute A vs B *Also in Table 22 (Neuromuscular Electrical Stimulation (NMES))*	E: Robotic Assisted Therapy (Bi-Manu-track robot) C: EMG-initiated electrical stimulation Duration: 20min/d, 5d/wk, 6wks robot therapy	E vs C: Fugl-Meyer Assessment (+exp) Medical Research Council (+exp) Modified Ashworth Scale (-)
Non-robotic electromechanical devices compared to transcutaneous electrical stimulation (tens)		
Stinear et al. (2013) RCT (8) NStart=57 NEnd=51 TPS=Acute A vs B	E: Device-assisted mirror bilateral training (the device help the paretic hand to mimic the unparetic hand movement- it's bilateral wrist training with a mechanical device help) + standard rehab C: Intermittent cutaneous electric stimulation (dosage is sonsistent with sham stimulation)+standard rehab Duration: 45min, 5d/wk, 4wk	E vs C: Action Research Arm Test (no stats) Modified Rankin Scale (no stats) SIS (-) MEP Amplitude (-) Resting motor threshold (-) Corticomotor excitability (-) Interhemispheric inhibition (-)
Exoskeleton robotics combined with other interventions compared to exercise and custom physiotherapy protocols		
Frisoli et al. (2022) RCT (4) NStart=26 NEnd=22 TPS=Chronic A vs B *Also in Table 3 (Exercise and Strength Training)*	E: Three-Dimensional Upper Limb Robotic Exoskeleton Training C: Manual Rehabilitation Duration: 45min/d, 3d/wk, 6wks	E vs C: FMA proximal (+exp) distal (-) MAS (-) BAT timing (+exp) quality (-)
Lin et al. (2022) RCT (8) NStart=172 NEnd=165 TPS=Subacute A vs B *Also in Table 3 (Exercise and Strength Training)*	E: Robot-assisted training (RAT) + conventional rehab C: Enhanced upper extremity therapy (EUET) + conventional rehab Duration: int: 30min/d, 5d/wk, 3wks; conventional rehab: 60min/d, 5d/wk, 3wks	E vs C: FMA UE (-) UE-proximal (-) LE (+exp) MBI (-)
Takahashi et al. (2016) RCT (5) NStart=60 NEnd=56 TPS=Subacute A vs B *Also in Table 3 (Exercise and Strength Training)*	E: Robot arm end effectors (ReoGO) + standard therapy C: self-guided therapy + standard therapy Duration: 40min, 7d/wk, 6wk	E vs C: Fugl Meyer Assessment total UE (-) Proximal UE (+exp) flexor synergy (+exp) Wolf Motor Function Test Total (-) proximal UE (-) Motor Activity Log Amount of use: (-) Quality of use: (-) Simple Test for Evaluating Hand Function Range of Motion VAS scale Motricity Index Modified Ashworth Scale FIM

		Brunnstrom Scale
Exoskeleton robotics combined with other interventions compared to conventional therapy		
Chen et al. (2023a) RCT (8) NStart=80 NEnd=72 TPS=Subacute A + B vs 0 *Also in Table 4 (Task-Specific Training)*	E: Exoskeleton training Armule + TST C: Conventional Rehab Duration: 45min/d, 5d/wk, 4wks	E vs C: FMA-UE (+exp) MBI (+exp) WHODAS (-)
Ambrosini et al. (2021) RCT (6) NStart=72 NEnd=64 TPS=Subacute A + B vs 0 *Also in Table 22 (Neuromuscular Electrical Stimulation (NMES))*	E: Robot Exoskeleton + EMG-Triggered FES (RETRAINER) C: Conventional Therapy Duration: 90min, 3x/wk, 9wks	E vs C: Action Research Arm Test (+exp) Gross Movements (+exp) Hand Function (+exp) Motricity Index (-) Motor Activity Log (-) Box and Block Test (+exp) Stroke Specific Quality of Life Scale (-) Muscle Research Council (-) system usability
Gueye et al. (2021) RCT (5) NStart=50 NEnd=50 TPS=Acute A + B vs 0 *Also in Table 17 (Virtual Reality)*	E: virtual reality with arm exoskeleton C: conventional physiotherapy(2 sessions) Duration: 45min/d, 4d/wk, 3 wks	E vs C: FMA-UE (+exp) FIM (-) MoCA (-)
Robotics combined with other interventions compared to conventional therapy		
Coskunsu et al. (2022) RCT (5) NStart=24 NEnd=20 TPS=Acute A + B vs 0 *Also in Table 19 (EMG Biofeedback)*	E: EMG- driven Exoskeleton Hand Robot + Rehabilitation Program C: Rehabilitation Program Duration: 60min/d, 5d/w, 3wks Robotic; 30min UE +30min LE/d, 5d/w, 3wks Rehab training	E vs C: FMA-UE (-) ARAT (-) MAL (-) EMG activities (-)
Rodgers et al. (2019) RCT (8) NStart=770 NEnd=676 TPS=Chronic A vs B vs 0 *Also in Table 3 (Exercise and Strength Training)*	E1: Robot-assisted training E2: Enhanced upper limb therapy C: Usual care Duration: 45 min, 3x/wk, 12wk	E1 vs C: ARAT (-) FMA (-) Barthel Index (-) SIS: hand function (-); mobility; ADL (-); social participation (-) E2 vs C: ARAT (+exp) FMA (+exp) Barthel Index (+exp) SIS: hand function (+exp); mobility; ADL (+exp); social participation (+exp) E1 vs E2: ARAT (-) FMA (-) Barthel Index (-) SIS: hand function (-) mobility

		ADL (-) social participation (-)
Hsieh et al. (2014) RCT (8) NStart=48 NEnd=48 TPS=Chronic A + B vs A/B vs 0 *Also in Table 6 (Constraint-Induced Movement Therapy (CIMT))*	E1: Robot therapy + distributed constraint induced therapy E2: robot therapy alone C: Conventional Therapy Duration: 90-105min/d, 5d/wk, 4wk	E1 vs C: Fugl-Meyer Assessment Total (+exp1) Distal (+exp1) Proximal (-) Wolf Motor Function Test Functional ability scale (+exp1) time (-) Motor Activity Log (-) E1 vs E2: Fugl-Meyer Assessment Total (+exp1) Distal (-) Proximal (-) Wolf Motor Function Test Functional ability scale (+exp1) time (-) Motor Activity Log (-) E2 vs C: Fugl-Meyer Assessment Total (+exp2) Distal (-) Proximal (+exp2) Wolf Motor Function Test Functional ability scale (-) time (-) Motor Activity Log (-) accelerometry
Lo et al. (2010) RCT (7) NStart=127 NEnd=120 TPS=Chronic A vs B vs 0 *Also in Table 3 (Exercise and Strength Training)*	E1: Robot-Assisted Therapy E2: Dose-matched Intensive Comparison Therapy C: Usual care Duration: 60min/session, 36 session, 12wk	E1 vs C: FMA (-) WMFT (-) SIS (+exp1) pain scale (-) mAS (-) E1 vs E2: FMA (-) WMFT (-) SIS (-) pain scale (-) mAS (-)
Rabadi et al. (2008) Pilot RCT (6) NStart=30 NEnd=30 TPS=Acute A vs B vs 0 *Also in Table 3 (Exercise and Strength Training)*	E1: Robotic therapy (MIT-Manus) + conventional therapy E2: Arm ergometer (Monark) + conventional therapy C: Occupational therapy Duration: 3hr/d conventional therapy & 40min/d, 5d/wk robot or arm ergometer therapy	E1/E2 vs C: FMA (-) FIM Motor (-), - cognition (-) Motor status scale (-) MAS + ARAT + PAIN-VAS
Robotic orthosis combined with other interventions compared to robotic orthosis		
Rozario et al. (2009) RCT Crossover (6)	E: Robotic Therapy with Haptic/Visual Feedback	E vs C: Box and Block Test (No stats)

NStart=5 NEnd=5 TPS=Chronic A + B vs A/B *Also in Table 20 (Feedback-Based Training)*	C: Robotic Therapy With No Feedback Duration: 40min, 3x/wk, 3wks/condition - 1wk washout	Fugl-Meyer Assessment (No stats) Wolf Motor Function Test (No stats) Range of Motion (No stats)
Robotics combined with other interventions compared to control		
Yang et al. (2024) RCT (5) NStart=69 NEnd=61 TPS=Subacute A + B vs A/B *Also in Table 22 (Neuromuscular Electrical Stimulation (NMES))*	E1: Robot therapy + Electroymography-triggered neuromuscular electrical stimulation (ENMES) E2: Robot therapy E3: ENMES Duration: 40min/d 5d/wk, 8wks	E1 vs E2 vs E3: FMA - UE (+exp1) WMFT (+exp1) ARAT (+exp1)
Qian et al. (2019) RCT (7) NStart=30 NEnd=30 TPS=Chronic A + B1 vs A + B2 *Also in Table 22 (Neuromuscular Electrical Stimulation (NMES))*	E1: NMES robotic to distal fingers E2: NMES robotic to proximal wrist-elbow joints Duration: 1hr/d, 3-5d/wk, 7wk (20 session in total)	E1 vs E2: FMA hand/wrist (+exp1) ARAT (-) Mod Ashworth Scale (+exp1) EMG activation (+exp1)
Valdes et al. (2018) RCT Crossover (5) NStart=23 NEnd=14 TPS=Chronic A + B vs A/B *Also in Table 20 (Feedback-Based Training)*	E1: robotic arms with scores, visual, and force feedback E2: robotic arms without scores, visual, and force feedback Duration: Not Reported	E1 vs E2: Trunk displacement (-) Trunk rotation (-) bimanual symmetry RMS
Kim et al. (2017c) RCT (7) NStart=33 NEnd=30 TPS=Chronic A + B1 vs A + B2 *Also in Table 11 (Mental Practice)*	E1: External focus with robotic arm E2: Internal focus with robot Duration: 45min/d, 3d/wk for 4wk	E1 vs E2: FMA (-) WMFT (-) Joint independence (-) Manipulation check questionnaire
Valdes et al. (2017) RCT Crossover (4) NStart=23 NEnd=15 TPS=Chronic A + B1 vs A + B2 *Also in Table 20 (Feedback-Based Training)*	E1: Robotic Training (JACO) With Force Feedback For Trunk Compensation E2: Robotic Training (JACO) With Visual Feedback For Trunk Compensation Duration: single session/condition	E1 vs E2: anterior trunk displacement, trunk rotation, index of curvature, RMS error, completion time, system usability scale
Hu et al. (2015) RCT (6) NStart=26 NEnd=26 TPS=Chronic A + B vs A + C	E1: EMG NMES robot E2: EMG robot Duration: 3-5 sessions/wk, 20 sessions total/7wks	E1 vs E2: FMA Shoulder/elbow (+exp1) Wrist/hand (-) Mod Ashworth score (-) ARAT (exp1+) EMG parameters

Also in Table 22 (Neuromuscular Electrical Stimulation (NMES)); Table 19 (EMG Biofeedback)		
Fluet et al. (2014) RCT (5) NStart=41 NEnd=40 TPS=Chronic A + B1 vs A + B2 *Also in Table 17 (Virtual Reality)*	E1: Robot hand and arm separate training with VR E2: Robot hand and arm together training with VR Duration: 2hr/d1; 3hr/d4-d8	E1 vs E2: WMFT (+HAT) Jebsen hand function (-) kinematic outcomes: Finger Fractionation, Time to Task completion, Reaching Trajectory Smoothness, End point deviation
Cordo et al. (2013) RCT (5) NStart=46 NEnd=43 TPS=Chronic A + B1 vs A + B2 *Also in Table 25 (Muscle Vibration); Table 20 (Feedback-Based Training); Table 19 (EMG Biofeedback)*	E1: AMES robot + torque biofeedback + muscle vibration E2: AMES robot + EMG biofeedback + muscle vibration Duration: 30min/d, 3d/wk, 10wk	E1 vs E2: Fugl-Meyer Assessment Upper Extremity (-) Box and Block Test (-) EMG Strength Test Flexion (+exp) Extension (-) Stroke Impact Scale (-)
Daly et al. (2005) RCT (5) NStart=13 NEnd=12 TPS=Chronic A + B vs A + C *Also in Table 22 (Neuromuscular Electrical Stimulation (NMES)); Table 1 (Neurodevelopmental Techniques)*	E1: Robotics + motor learning E2: Functional Neuromuscular Stimulation + motor learning Duration: 5hr/d, 5d/wk, 12wk	E1 vs E2: Arm Motor Ability Test Shoulder/Elbow Wrist/hand Fugl-Meyer Upper Extremity Target Accuracy Smoothness of Movement
Robotics combined with other interventions compared to sham or robotics		
Bernal-Jiménez et al. (2024) RCT (7) NStart=20 NEnd=19 TPS=Chronic A + B vs A/B *Also in Table 31 (Transcranial Direct Current Stimulation (tDCS))*	E: Bilateral tDCS + Robotic training C: Sham tDCS + Robotic training Duration: 30min/d, 5d/wk for 4wks	E vs C: FMA-UE (-) ARAT (-) FIM (-) Grip strength (-) Tardieu Spasticity Scale (-)
Dehem et al. (2018) RCT Crossover (7) NStart=21 NEnd=20 TPS=Chronic A + B vs A/B *Also in Table 31 (Transcranial Direct Current Stimulation (tDCS))*	E: Dual tDCS (1mA) + robot-assisted upper limb therapy C: Sham dual-tDCS (110microA)+ robot-assisted upper limb therapy Duration: tDCS: 20min; Robot-assisted therapy: 20min	E vs C: Upper-limb Kinematic Measures (-) Box and Block Test (-) Purdue Pegboard Test (-)
Capone et al. (2017) RCT (6) NStart=14 NEnd=12 TPS=Chronic A + B vs A/B *Also in Table 27 (Additional Afferent and Peripheral Stimulation Methods)*	E: Robot assisted therapy with Transcutaneous stim of vagus nerve tVNS C: Robot assisted therapy with sham tVNS Duration: 1h, 1d/wk for 10d	E vs C: Fugl-Meyer Assessment (+exp) heart rate blood pressure

Ramos-Murguialday et al. (2013) Pilot RCT (8) NStart=32 NEnd=30 TPS=Chronic A + B vs A/B	E: Brain-machine-interface (BMI) training + arm and hand orthosis + physiotherapy C: Sham-BMI training+ arm and hand orthosis + physiotherapy Duration: 5d/wk for 4wk	E vs C: FMA (+exp) Motor activity log(-) Ashworth scale(-) BMI control (+exp) MEP amplitude (+exp) MEP frequency (+exp) EMG waveform length extensor digitorum (-) deltoid (+exp) wrist extension and supination (-) fMRI measures (+exp)
Robotic orthosis compared to no treatment		
Triandafilou et al. (2011) RCT Crossover (5) NStart=15 NEnd=15 TPS=Chronic A1 vs A2 vs 0	E1: X-Glove Orthosis Prolonged Stretching E2: X-Glove Orthosis Repetitive Stretching C: Resting Duration: 30min - 1wk washout	E1 vs E2 vs C: Graded Wolf Motor Function Test (-) Grip Termination Time (-) Voluntary Grasp and Pinch Strength (-)
Robotics combined with other interventions compared to orthotics		
Coote et al. (2008) RCT Crossover (6) NStart=20 NEnd=20 TPS=Chronic A vs B *Also in Table 9 (Orthotics and Taping)*	E: Robot-mediated therapy (GENTLE/s) C: Sling suspension phase Duration: 30min/d, 3d/wk for 9wk	E vs C: Fugl-Meyer Assessment (+exp) Active Range of Shoulder Flexion (-) Motor Assessment Scale
Robotics combined with other interventions compared to robotics		
Dai et al. (2024) RCT (5) NStart=36 NEnd=32 TPS=Subacute A + B vs A/B *Also in Table 30 (Theta Burst Stimulation (TBS))*	E: Robot-assisted therapy + iTBS + Standard therapy C: Robot-assisted therapy + Standard therapy Duration: E: 192sec/d, 5d/wk for 4wks iTBS + 20min/d, 5d/wk for 4wks robotic training; C: 20min/d, 5d/wk for 4wks robotic training	E vs C: FMA-UE (+exp) fNIRS (+exp)
Murakami et al. (2023) RCT (7) NStart=20 NEnd=20 TPS=Chronic A + B vs A/B *Also in Table 19 (EMG Biofeedback)*	E: AI-based EMG hand robotic C: Passive robot hand robotic(no EMG) Duration: 40min/d, 2d/wk, 4wks	E vs C: FMA-UE (+exp) MAL (+exp) EMG - reflex parameters (-) MAS (-)
Conroy et al. (2019) RCT (6) NStart=45 NEnd=41 TPS=Chronic A + B vs A/B *Also in Table 4 (Task-Specific Training)*	E: Robot therapy + task training (Inmotion) C: Robot therapy Duration: 1hr, 3x/wk, 12wk	E vs C: FMA (-) WMFT (+exp) SIS (+exp)
Hung et al. (2019b) RCT (5)	E1: Unilateral robot assisted therapy + mCIMT	E1 vs C: FMA (-)

NStart=30 NEnd=30 TPS=Chronic A + B vs A + C vs A *Also in Table 6 (Constraint-Induced Movement Therapy (CIMT)); Table 2 (Bilateral Arm Training)*	E2: Bilateral robot assisted therapy + bilateral arm training C: Robot assist therapy Duration: 40-45min robot + 45min BAT/mCIMT 3x/wk, for 6 wks 3x/wk for 6wk	Chedoke arm and hand activity inventory (-) Goal attainment scale (+exp1) E2 vs C: FMA (-) Chedoke arm and hand activity inventory (-) Goal attainment scale (+exp2) E1 vs E2: FMA (-) Chedoke arm and hand activity inventory (-) Goal attainment scale (+exp2) MAS
Hung et al. (2019d) RCT (8) NStart=45 NEnd=44 TPS=Chronic A + B vs A + C vs A *Also in Table 6 (Constraint-Induced Movement Therapy (CIMT)); Table 2 (Bilateral Arm Training)*	E1: Unilateral robot assisted therapy + CIMT (unilateral arm) E2: Bilateral robot assisted therapy + BAT (Bimanual tracking) C: Robot assisted therapy alone (both modes) Duration: 45min robot, 45min BAT/CIMT, 3x/wk, 6wk	E1 vs C: FMA (-) SIS (-) WMFT (-) NEADL (-) Kitchen (-) Living affairs (-) Leisure (-) Mobility (-) E2 vs C: FMA (-) SIS (-) WMFT (time, functial ability scale) (-) NEADL (-) Kitchen (-) Living affairs (-) Leisure (-) mobility (+con) E1 vs E2: FMA (+exp2) SIS (-) WMFT (time, functional ability scale) (-) NEADL (-) kitchen (-) living affairs (-) Leisure (-) Mobility (-)
Abdollahi et al. (2018) RCT (7) NStart=28 NEnd=26 TPS=Chronic A + B vs A/B	E: Robotic Bilateral arm training with error augmentation(both heptic and visual) C: Robotic Bilateral arm training without error augmentation Duration: 45min, 3x/wk, 2wk	E vs C: Wolf Motor Function Test (-) Motor Activity Log (-) Box and Block Test (-) Fugl-Meyer Assessment Upper Extremity (-) ROM (-) intrinsic motivation inventory
Wang et al. (2018) RCT (7) NStart=24 NEnd=24 TPS=Chronic A + B vs A/B *Also in Table 12 (Action Observation)*	E: action observation (AO) with EEG-guided robot-hand training C: robot-hand training without AO and EEG guidance Duration: 90min/d, 3d/wk for 4wk	E vs C: Fugl Meyer Assessment Upper Extremity: (-) fMRI parameters

Also in Table 18 (Brain Computer Interfaces)		
Hsieh et al. (2016) RCT (7) NStart=34 NEnd=34 TPS=Chronic A + B vs A/B *Also in Table 6 (Constraint-Induced Movement Therapy (CIMT))*	E: Robot-Assisted Therapy + Modified Constraint-Induced Therapy C: Robot-Assisted Therapy Duration: 90-105 min/d, 5d/wk, 4wks	E vs C: Wolf Motor Function Test Time (-) Functional Ability Scale (+exp) Nottingham Extended Activities of Daily Living (+exp) Functional Independence Measure (-) Kinematics Reach Out Data- Index Movement Time (-) Distance (-) Peak Velocity (+exp) Percentage of Movement Time- Peak Velocity (-) Maximal Angle of Shoulder Flexion (-) Maximal Angle of Shoulder Abduction (+exp) Maximal Angle of Elbow Extension (+exp) Kinematics Reach Out Data- Trunk Movement Time (-) Distance (+exp) Peak Velocity (+exp) Maximal Angle of Trunk Flexion (+exp)
Miyasaka et al. (2016) RCT (6) NStart=30 NEnd=30 TPS=Subacute A + B vs A/B	E: NMES + robotic training C: Robotic training Duration: 1 hr/d, 5d/wk for 2 wk	E vs C: Fugl-Meyer Assessment (-) Active Range of Motion (-)
Pennati et al. (2015) Pilot RCT (6) NStart=15 NEnd=15 TPS=Chronic A + B vs A/B *Also in Table 33 (Botulinum Toxin)*	E: Botulinum toxin A + robotic training C: Robotic training Duration: 60min/session, 10sessions, 2-3d/wk	E vs C: FMA UE (-) BBT (+exp1) FIM (-) Mod Ashworth scale (+exp2) Euro-QoL (-) EMG parameters
Abdollahi et al. (2014) RCT Crossover (7) NStart=27 NEnd=26 TPS=Chronic A + B vs A/B	E: Robotic training including Combined visual and haptic error augmentation C: Equivalent amount of practice without error augmentation Duration: 45min, 3x/wk, 2wk- 1wk washout	E vs C: Fugl-Meyer Assessment (+exp) Wolf Motor Function Test (+exp) ROM (-) Box and Block Test (-)
Simkins et al. (2013) RCT (2) NStart=15 NEnd=15 TPS=Chronic A + B vs A/B vs 0	E1: Bilateral robotic arm training + mirror therapy; E2: Unilateral robotic arm training C: Conventional care Duration: Not Reported	E1 vs E2 vs C: Fugl-Meyer Assessment Grip strength Wolf Motor Function Test Box and Block Finger Tapping Reaction Time Saint Louis University Mental Exam Beck Depression Inventory Pain (no stats for all) Range of Motion

		Lateral pinch strength Manual muscle test wrist elbow shoulder
Wei et al. (2011) RCT (6) NStart=27 NEnd=27 TPS=Chronic A + B vs A/B *Also in Table 19 (EMG Biofeedback)*	E: EMG-driven interactive robotic training C: passive robotic training Duration: 3-5x/wk, 20x over 4-7wk	E vs C: Action Research Arm Test (no stat) Functional Independence Measure (no stat) Fugl-Meyer Assessment (no stat) Guyatt's Responsiveness Index (no stat) Modified Ashworth Scale (no stat) Motor Status Scale (no stat)
Liu et al. (2009b) Pilot RCT (4) NStart=9 NEnd=9 TPS=Chronic A + B vs A/B *Also in Table 27 (Additional Afferent and Peripheral Stimulation Methods)*	E: Sensory-enhanced robot-aided motor training (SERMT) C: Robot-aided motor training (RMT) Duration: 3x/wk for 6wk	E vs C: Motor status (-): Shoulder/elbow (-) wrist/hand (-)
Robotics combined with other interventions compared to robotics or emg biofeedback		
Huang et al. (2020) RCT (7) NStart=30 NEnd=30 TPS=Chronic A + B vs A + C *Also in Table 22 (Neuromuscular Electrical Stimulation (NMES)); Table 19 (EMG Biofeedback)*	E: NMES EMG robotic hand C: EMG robotic hand Duration: 3-5d/wk, 7wk (20session in total)	E vs C: FMA (-) ARAT (-) FIM (-) Modified Ashworth scale (+exp) EMG activity level (-) Co-contraction index (-)
Robotics combined with other interventions compared to botulinum toxin (botox)		
Hung et al. (2022) Pilot RCT (7) NStart=37 NEnd=37 TPS=Chronic A + B vs A + C vs A *Also in Table 10 (Mirror Therapy); Table 33 (Botulinum Toxin)*	E1: Robot-assisted training (Bi-Manu-Track BMT robotic arm) + BoNT-A injection + functional practice E2: Mirror therapy + BoNT-A injection + functional practice C: conventional task-oriented movement training + BoNT-A injection + functional practice Duration: 75min/d (45min active, 30min functional practice), 3d/wk, 8 wks	E1 vs E2 vs C: FMA-UE (-) proximal (-) distal (-)], [MAS; -elbow flexor (-); -forearm pronator (-); -wrist flexor (-); -finger PIP flexor (-) MAL (-)
Gandolfi et al. (2019) RCT (8) NStart=32 NEnd=32 TPS=Chronic A + B vs A/B *Also in Table 33 (Botulinum Toxin)*	E: Robot assisted training+ Botox C: Conventional treatment+Botox Duration: 45min/session; 2session/wk; 5wk	E vs C: Modified AS (+exp) FMA-UE (+exp) Medical research councils scale (+exp) Medical Research Council Scale Total UL strength Shoulder abduction shoulder external rotation elbow flexion elbow extension forearm supination wrist flexion

		wrist extension
Robotics combined with other interventions compared to strength training		
Ellis et al. (2018) RCT (9) NStart=32 NEnd=31 TPS=Chronic A + B vs A/B *Also in Table 3 (Exercise and Strength Training)*	E: Progressive abduction loading therapy +horizontal-plance viscous resistance device C: Progressive abduction loading therapy Duration: 1x/d; 3x/wk; 8wks	E vs C: Kinematic reaching distance (-) Reaching velocity FMA (-) SIS (-) Motor activity log Rancho los amigos functional test for hemiparetic UE isometric joint strength (-)
Robotic orthosis combined with other interventions compared to task-specific training		
Kuo et al. (2023a) RCT Crossover (7) NStart=18 NEnd=17 TPS=Chronic A vs B *Also in Table 4 (Task-Specific Training)*	E: Orthosis assistance TIGER + conventional rehab C: Task specific training at home + conventional Duration: 30min 2x/d, 5d/wk for 4wks + 2hr/wk conventional therapy	E vs C: BBT (-) MAS (-) MAL (-) SWM (-) PCGI-I patient clinical global impression improvements (-) FMA-UE (-) AROM wrist flexion (-) wrist extension (+exp)
Page et al. (2020) RCT (7) NStart=34 NEnd=31 TPS=Chronic A + B vs A vs B *Also in Table 4 (Task-Specific Training)*	E1: Myomo electromyography (EMG) powered orthosis + repetitive task-specific practice (RTP) E2: Myomo EMG powered orthosis C: Repetitive task-specific practice Duration: 1hr/d, 3d/wk for 8wk	E1 vs E2 vs C: FMA EU (-) AMAT (-)
Page et al. (2013) Pilot RCT (5) NStart=16 NEnd=16 TPS=Chronic A + B vs A/B *Also in Table 4 (Task-Specific Training)*	E: Myomo brace (EMG triggered micro robot device) + repetitive task practice C: Repetitive task practice Duration: 30min/d, 3d/wk for 8wk	E vs C: Fugl-Meyer Assessment (-) Canadian Occupational Performance Measure (-) Stroke Impact Scale (-)
Robotics combined with other interventions compared to robotics or fes		
Daly et al. (2019) RCT (5) NStart=36 NEnd=31 TPS=Chronic A + B1 vs A + B2 *Also in Table 22 (Neuromuscular Electrical Stimulation (NMES))*	E1: Distal (wrist/hand Functional Electrical Stimulation) E2: Proximal (Shoulder/elbow) (Functional Electrical Stimulation + inMotion robot) C: FES + Robot assisted Whole arm Duration: 1.5hrs, 5x/wk, 12wks	E1 vs C: Fugl Meyer Assessment Upper Extremity (-) Arm Motor Assessment Test (-) E2 vs C: Fugl Meyer Assessment Upper Extremity (-) Arm Motor Assessment Test (-) E1 vs E2: Fugl Meyer Assessment Upper Extremity (-) Arm Motor Assessment Test (-) SIS (+exp)

Different approaches to exoskeleton robotics compared against one another		
Mauro et al. (2024) Pilot RCT (6) NStart=19 NEnd=18 TPS=Subacute A1 vs A2	E1: Bilateral Arm Light Exoskeleton Rehab Station (ALEx RS) + Conventional Therapy E2: Unilateral Arm Light Exoskeleton Rehab Station (ALEx RS) + Conventional Therapy Duration: 90 mins/day (45 mins arm light exoskeleton rehab station(5d/wk), 45 mins conventional rehab(6d/wk)), 6wks	E1 vs E2: FMA-UE (-) ARAT (-) MI (-) Modified Ashworth Scale (-) WMFT (-) pairwise-derived Brain Symmetry Index after 30 sessions (-) sensorimotor EEG channel cluster after 30 sessions (-)
Lee et al. (2020e) RCT (7) NStart=39 NEnd=38 TPS=Chronic A1 vs A2	E1: End-effector robot + OT E2: Exoskeleton robot + OT Duration: 30min/d, 5d/wk, for 4wks robot therapy + same time Occupational therapy	E1 vs E2: Fugl-Meyer Assessment Upper Extremity total (-) proximal (-) WMFT FAS (+exp1) time (+exp1) weights (-) SIS hand (-) strength (-) ADLs/IADLs (-) participation (-) composite (-) overall (-) MSS total (-) proximal (-)
Park et al. (2020b) Pilot RCT (6) NStart=20 NEnd=19 TPS=Chronic A1 vs A2	E: Active-Assisted Exoskeleton Training (Armeo Power) C: Passive Exoskeleton Training (Armeo Spring) Duration: 30min/d, 5d/wk for 4wks	E vs C: Wolf Motor Function Test (-) Fugl-Meyer Assessment - Upper Extremity (-) Fugl-Meyer Assessment - Proximal (-) Stroke Impact Scale (-) Function (+con) Physical (-) Strength (-) Activities of Daily Living (-) Social Participation (+con) Spectral arc length (-) Mean speed (-)
Milot et al. (2013) Pilot RCT (6) NStart=20 NEnd=20 TPS=Chronic A1 vs A2	E1: Single joint arm exoskeleton E2: Multijoint arm exoskeleton Duration: 60min/d, 3x/wk for 4wks each training program; 1wk washout	E1 vs E2: Box and Block Test (-) Fugl-Meyers Assessment Upper Extremity: (-) Wolf Motor Function Test: (-) Time: (-) Score: (-) Motor Activity Log: Amount of Use (-) Quality of Life: (-) Grip Strength: (-) Pinch Strength: (+exp1)

Robotics combined with other interventions compared to robotics or sham		
De Laet et al. (2022) RCT Crossover (7) NStart=17 NEnd=17 TPS=Chronic A + B vs A/B *Also in Table 31 (Transcranial Direct Current Stimulation (tDCS))*	E: Bimanual motor skill learning robot + tDCS C: Sham tDCS + bimanual motor skill learning robot Duration: 30min/d(one session), 1 week washout before continuing to a 5 minute retention session, and then going back to the 30 min session	E vs C: Bimanual speed/accuracy biSAT (-) Bimanual Coordination biCO (-) bimanual force biFOP (-)
Edwards et al. (2019) RCT (8) NStart=82 NEnd=69 TPS=Chronic A + B vs A/B *Also in Table 31 (Transcranial Direct Current Stimulation (tDCS))*	E: Anodal tDCS+robot assited arm training C: robot assisted arm training+ sham Duration: 20min/d, 3d/wk, 12wks	E vs C: FMA UE (-) WMFT (-)
Straudi et al. (2016) Pilot RCT (8) NStart=23 NEnd=23 TPS=Chronic A + B vs A/B *Also in Table 31 (Transcranial Direct Current Stimulation (tDCS))*	E: Robot-assisted therapy + dual tDCS C: Robot-assisted therapy + sham tDCS Duration: 45min/d, 5d/wk, 2wk	E vs C: Fugl-Meyer Assessment (-) Box and Block Test (-) Motor Acivity Log AOU (-) QOM (-)
Lee et al. (2015b) RCT (7) NStart=39 NEnd=39 TPS=Chronic A + B vs A/B *Also in Table 22 (Neuromuscular Electrical Stimulation (NMES))*	E: NMES+robot therapy C: Robot therapy+Sham Duration: 90-100min/d, 5d/wk for 4wks	E vs C: Modified Ashworth scale (-) WMFT quality of movement (-) SIS hand function (-) UE-FMA (-) Motor activity log (-)
Butler et al. (2015) Pilot RCT (7) NStart=14 NEnd=14 TPS=Chronic A + B vs X	E: D-Cycloserine (100mg) + Robotic-Assisted Therapy (HandMentor Pro) C: Placebo + Robot-Assisted Therapy Duration: 100mg, 2x/wk, therapy for 2hrs/d, 3d/wk, 3wks	E vs C: Box and Block Test (-) Grip Strength (-) Rapid Visual Information Processing (-) Display Enhanced Testing for Concussions (-) Stroke Impact Scale (-) Center for Epidemiological Studies Depression (-)
Triccas et al. (2015) Pilot RCT (7) NStart=23 NEnd=22 TPS=Chronic A + B vs A/B *Also in Table 31 (Transcranial Direct Current Stimulation (tDCS))*	E: Anodal tDCS + robotic ArmeoSpring (RT) C: Sham tDCS + robotic ArmeoSpring Duration: 1hr (40 min RT + 20 min tDCS), 18x over 8wk RT	E vs C: Fugl-Meyer Assessment (no stat) Action Research Arm Test (no stat) Motor Activity Log (no stat) stroke impact scale (no stat)
Robotics combined with other interventions compared to motor relearning programmes		
McCabe et al. (2015) RCT (7) NStart=39	E1: Robotic training (InMotion ARM) + motor learning	E1 vs E2 vs C: Arm Motor Ability Test: Function (-) Shoulder elbow (-)

NEnd=35 TPS=Chronic A + B vs A + C vs A *Also in Table 1 (Neurodevelopmental Techniques); Table 22 (Neuromuscular Electrical Stimulation (NMES))*	E2: Motor learning + functional electrical stimulation C: Motor learning Duration: 5hr/d, 5d/wk for 12wk	Wrist Hand (-) Fugl-Meyer Assessment: Shoulders and Elbows (-) Wrists/Hands (-)
Non-robotic electromechanical devices combined with other interventions compared to no treatment		
Barker et al. (2008) RCT (5) NStart=42 NEnd=33 TPS=Chronic A + B vs A/B vs 0 *Also in Table 22 (Neuromuscular Electrical Stimulation (NMES))*	E1: SMART arm with electrical stim E2: SMART arm alone C: No Treatment Duration: 60min/d, 3/wk, 4wk	E1/E2 vs C: Motor assessment scale (+exp) Modified Ashworth Scale (+exp) Reaching Kinematics (-) EMG data (+exp1,exp2) E1 vs E2: Reaching Kinematics (-) EMG data (-)
Robotics combined with other interventions compared to robotics or augmented feedback training		
Cho & Song (2020) RCT (6) NStart=42 NEnd=40 TPS=Chronic A + B1 vs A + B2 *Also in Table 20 (Feedback-Based Training)*	E: Robot Assisted Arm Training with high inertia (RAT-WAM) C: Robot Assisted Arm Training with low-inertia Proficio (RAT-P) Duration: 40min/d, 3d/wk, 4wks	E vs C: Fugl-Meyer (-) Proximal (-) Distal (+con) Box and Block Test (-) Action Research Arm Test (-) Kinematics - Curvilinearity ratio (-)
Cho et al. (2019) RCT (8) NStart=42 NEnd=38 TPS=Chronic A + B1 vs A + B2 *Also in Table 20 (Feedback-Based Training)*	E: Robot therapy with assistance as needed C: Robot therapy with guidance forces all times Duration: 40min, 3x/wk for 6wk	E vs C: FMA (+exp) BBT (-) ARAT (+exp) Movement velocity (-)
Robotics combined with other interventions compared to conventional therapy or task-specific training		
Hsu et al. (2019) RCT (8) NStart=43 NEnd=43 TPS=Chronic A + B + C vs A/A + B *Also in Table 2 (Bilateral Arm Training); Table 4 (Task-Specific Training)*	E: Robot-Assisted Therapy with Bilateral Practice + Task-Specific Training C: Conventional Care + Task-Specific Training Duration: 50 min/d, 3d/wk, 4wks	E vs C: Motor Activity Log Amount of Use (+exp) Quantity of Movement (-) Fugl-Meyer Assessment Shoulder/ElbowForearm (+exp) Wrist (+exp) Hand (-)
Robotics combined with other interventions compared to robotics or botulinum toxin (botox)		
Hung et al. (2021) RCT (8) NStart=36 NEnd=36 TPS=Chronic A + B1 vs A + B2 *Also in Table 33 (Botulinum Toxin)*	E: Condensed Robot-assisted training + BTX + Functional training C: Distributed robot-assisted training + BTX + Functional training Duration: Condensed: 45min, 4d/wk, 6wks; distributed: 45min, 2d/wk, 12 wks; followed by 30mins functional training(every session, both groups)	E vs C: FMA-UE (-) WMFT (-) MAL (-) mAS (-) SSEQ (-)

Robotic glove compared to conventional therapy		
Lee et al. (2021) RCT Crossover (6) NStart=25 NEnd=24 TPS=Chronic A vs 0	E: Robotics therapy (consisted a glove detecting hand movements) C: Conventional therapy Duration: 60min/day, 2d/wk, 6wk, 1 month washout	E vs C: FMA-UE (+exp) BBT (-) EMG (+exp) grip dynamometer (-) Semmes–Weinsteinhand monofilament (-) Revised Nottingham Sensory Assessment (-) MBI (+exp)
Thielbar et al. (2017) RCT (6) NStart=23 NEnd=22 TPS=Chronic A + B vs 0	E: EMG-driven actuated glove (An EMG-controlled robotic glove) + conventional occupational therapy C: Conventional occupational therapy Duration: 1 hr/d, 3d/wk for 6wk	E vs C: Hand Aperture (+exp) Action Research Arm Test (-) Wolf Motor Function Test (-) Fugl-Meyer Assessment (-) Chedoke McMaster Stroke Assessment (-) Grip/Pinch Strength (-)
VaNoglio et al. (2017) Pilot RCT (7) NStart=30 NEnd=27 TPS=Acute A vs 0	E: Robotic glove (Gloreha) C: standard personalized therapy Duration: 40min/d, 3d/wk for 5wk	E vs C: Motricity Index (+exp) Nine Hole Peg Test (+exp) Grip Strength (+exp) Pinch Test (+exp) Quick Version of Disabilities of the Arm, Shoulder and Hand Questionnaire (+exp)
Carmeli et al. (2011) Pilot RCT (6) NStart=34 NEnd=31 TPS=Acute A vs 0	E: HandTutor treatment (robotic glove) + traditional therapy C: Traditional therapy Duration: 20-30min/d, 5d/wk, for 3wks	E vs C: Fugl Meyers Assessment Upper Extremity (+exp) BBT (+exp) Performance accuracy tracking speed (+exp), track width (+exp)
Non-robotic electromechanical devices combined with other interventions compared to task-specific training		
Ozen et al. (2021) RCT (5) NStart=38 NEnd=30 TPS=Subacute A vs B *Also in Table 4 (Task-Specific Training)*	E: Rejoyce system + OT C: task based exercises + OT Duration: 90min/d, 5d/wk, 4wks	E vs C: E: FMA-U (-) BrunnstromStagesofStrokeRecovery (-) MMSE (-) MoCA (-) SS-QOL (-)
Exoskeleton robotics combined with other interventions compared to stretching and positioning programs		
Vanoglio et al. (2024) Pilot RCT (5) NStart=21 NEnd=21 TPS=Acute A + B vs C *Also in Table 17 (Virtual Reality); Table 8 (Stretching Programs)*	E: Gloreha Aria (Robotic exoskeleton) + Virtual reality + Conventional therapy C: Self mobilization + Conventional therapy Duration: Total motor therapy (330 mins/week, 6 days/week, 6 weeks); Upper Limb rehab (150 mins/week, 5ds/wk, 6 wks); Speech rehabilitation (200 mins/wk, 4ds/wk, 6 wks); Gloreha aria/self mobilization (30 mins/d, 5ds/wk, 6wks)	E vs C: FMA-UE (-) wrist (-) hand (-) coordination/speed (-) motor skills (-) sensation (-) passive joint motion (-) joint pain (-) MES-UE (-) Grip strength (-) Barthel Index (-) FIM (-)

		Quick-DASH (-)
Remy-Neris et al. (2021) RCT (8) NStart=215 NEnd=208 TPS=Subacute A vs B *Also in Table 8 (Stretching Programs)*	E: games-based training using an exoskeleton + usual rehab C: basic stretching and active exercises + usual rehab Duration: 90min/d, 5d/wk, 4wks	E vs C: E: FMA (-) ARAT (-) Ashworth score (-) Pain VAS (-) FIM (-) SIS (-) EQ-5D (-)
Robotics combined with other interventions compared to robotics or bilateral arm training		
Li Y.-C. et al. (2021) RCT (8) NStart=31 NEnd=31 TPS=Chronic A + B vs A + C *Also in Table 10 (Mirror Therapy); Table 2 (Bilateral Arm Training)*	E: Robotic Priming + MT (RMT) C: Robotic Priming + Bilateral Upper Limb Training (RBULT) Duration: 80-90min/d, 3d/wk, 6wks	E vs C: FMA-UE proximal (-) distal (+exp) rNSA (-) CAHAI (-) Accelerometer data (+exp)
Robotics combined with other interventions compared to cimt		
Terranova T.T. et al. (2021) RCT (5) NStart=51 NEnd=38 TPS=Chronic A vs B *Also in Table 6 (Constraint-Induced Movement Therapy (CIMT))*	E: Robot-assisted Therapy + conventional rehab C: Constraint induced movement therapy + conventional rehab Duration: RT: 60min/d, 3d/wk, 12wks CIMT: 6hr/d, 5d/wk, 2wks(after 10wks of rehab)	E vs C: WMFT (-) FMA-UE (-) AMAT (-) MAS (-) FIM (-) SIS (-)
Robotics compared to robotics or conventional therapy		
Yoon et al. (2021) RCT (6) NStart=45 NEnd=31 TPS=Acute A vs 0	E: Patient-centered Robot-assisted occupational therapy + conventional rehab C1: Robot-centered Robot-assisted therapy + conventional rehab C2: conventional rehab Duration: 30min/wk, 5d/wk, 3wks	E1 vs E2/C: ROM shoulder flexion (-) abduction (-) elbow flexion (-) forearm pronation (-) forearm supinatio (-) wrist extension (-) Hand Strength (-) FMA-UE (+exp1) MFT (-) MBI (+exp1)
Robotics combined with other interventions compared to sham		
Cordo et al. (2022) RCT (7) NStart=83 NEnd=70 TPS=Subacute A + B vs 0 *Also in Table 27 (Additional Afferent and Peripheral Stimulation Methods)*	E: Assisted Motion, Biofeedback, and Antagonist Muscle Vibration delivered by a Robotic Device + UL rehabilitation C: Placebo intervention + UL rehabilitation Duration: 30min/d, 2-3d/wk, 6-9wks (18 sessions)	E vs C: FMA-UL (+exp) SIS (-) MAS (-) RLA (-) AROM wrist (-) grasp strength flexor (-) extensor (-)

		wrist strength flexor (+exp) extensor (-)
Exoskeleton robotics combined with other interventions compared to exoskeleton robotics or sham		
Joo et al. (2022) RCT (8) NStart=36 NEnd=36 TPS=Acute A + B vs A/B *Also in Table 7 (Trunk Restraint)*	E: Robot-assisted therapy (Armeo Spring system) + trunk restraint + general physical therapy C: Robot-assisted therapy (RT) + sham trunk restraint + general physical therapy Duration: 30min/d (RT) + 30min 2x/d general physical therapy, 5d/wk, 3wks	E vs C: FMA-UE (+exp) proximal (+exp) distal (-) WFMT (+exp) MAL (+exp) MBI (-) Muscle strength elbow flex (-) elbow ext (+exp)
Morone et al. (2022) RCT (8) NStart=66 NEnd=66 TPS=Chronic A + B vs A/B *Also in Table 31 (Transcranial Direct Current Stimulation (tDCS))*	E: Robot-Assisted Therapy (RAT) + dual tDCS C: Robot-Assisted Therapy (RAT) + sham tDCS Duration: 20min tDCS + 40min robotics/d, 5d/wk, 2wks	E vs C: FMA-UE (-) NIHSS (-) VAS (-) MAS (-) BI (-) MRC (-)
Robotics combined with other interventions compared to mirror therapy		
Schrader et al. (2022) RCT (5) NStart=29 NEnd=24 TPS=Chronic A + B vs A/B *Also in Table 10 (Mirror Therapy)*	E1: RMT E2: MT Duration: 150 min/wk, 3-5 sessions/wk, 5 weeks	E1 vs E2: FMA-UE (-) MI (-) Pain-NRS (-)
Robotic glove combined with other interventions compared to robotic glove		
Zhao et al. (2022a) RCT (5) NStart=68 NEnd=60 TPS=Acute A + B vs A/B *Also in Table 31 (Transcranial Direct Current Stimulation (tDCS))*	E: Smart hand joint training device + bilateral tDCS C: Smart hand joint training device Duration: 40min(20min hand training, 20min tDCS), 6d/wk, 2wks	E vs C: Brunnstrom stages (+exp) FMA-WH (+exp) Functional test of hemiplegic fingers and hand (+exp)
Robotics combined with other interventions compared to robotics or task-specific training		
Li et al. (2023) RCT (6) NStart=70 NEnd=63 TPS=Chronic A + B vs A + C vs A *Also in Table 10 (Mirror Therapy); Table 4 (Task-Specific Training)*	E1: Bilateral robotic priming training + mirror training (R-mirr) E2: Bilateral robotic priming training + the same training without mirror (sham: exactly the R-mirr protocol without mirror) C: Bilateral robotic priming training + movement oriented training Duration: 90min/d, 3d/wk, 6wks	E1/E2 vs C: E1 vs E2/C: FMA-UE (+exp1) ABILHAND (-) SIS (-) Lateral pinch (-) Accelerometer (-)
Exoskeleton robotics combined with other interventions compared to trunk restraint		
Senocak et al. (2023) RCT (4)	E: Robotic rehab + trunk rehab C: Conventional rehab + trunk rehab	E vs C: FMA-UE (-)

NStart=42 NEnd=41 TPS=Subacute A + B vs A/B *Also in Table 7 (Trunk Restraint)*	Duration: 60min/d, 5d/wk, 6wks	WMFT (-) Trunk Impairment scale (-)
Exoskeleton robotics combined with other interventions compared to exoskeleton robotics		
Shi et al. (2024) RCT (7) NStart=34 NEnd=34 TPS=Chronic A + B vs A/B *Also in Table 4 (Task-Specific Training)*	E: Robotic hand therapy (with objects) + Task-Oriented training + Conventional therapy C: Robotic hand therapy (without objects) + Conventional therapy Duration: Robot therapy (45 mins/d, 5ds/wk, 4 wks); Conventional therapy (30mins/d, 5ds/wk, 4wks)	E vs C: FMA-UE total (+exp) wrist and hand (+exp) shoulder and elbow (+exp) ARAT grasp (+exp) grip (+exp) pinch (+exp) gross movement (-) BBT (+exp) Maximum Grip Strength (+exp) Modified Ashworth Scale finger (+exp) wrist (-) elbow (-) AROM PIP-I (+exp) MCP-I (+exp) MCP-T (-) Muscle co-contraction index flexor digitorum and extensor digitorum (+exp) biceps brachii and triceps brachii (+exp) flexor digitorum and biceps brachii (+exp) flexor digitorum and triceps brachii (+exp) extensor digitorum and biceps brachii (+exp) extensor digitorum and triceps brachii (+exp)
Kim et al. (2023b) RCT (6) NStart=38 NEnd=38 TPS=Chronic A + B vs A/B *Also in Table 21 (Wearable Cueing and Reminder Devices)*	E: Neuro-X (Robotic exoskeleton) + Visual and Audio feedback C: Neuro-X (Robotic exoskeleton) Duration: 35 mins/d, 5d/wk, for 4 wks	E vs C: FMA-UE (+exp) BBT (+exp) FIM (+exp) MMST (-) Modified Ashworth Scale (-) BRS (-)
Robotics combined with other interventions compared to upper limb cycling		
Chang et al. (2024a) RCT (6) NStart=30 NEnd=30 TPS=Chronic A vs B *Also in Table 3 (Exercise and Strength Training)*	E: Robotic training with Rebless C: UE training with Motomed ergometer Duration: 30min/d, 10 sessions over 4wks	E vs C: FMA-UE (+exp) modified Barthel Index (-) modified Ashworth Scale elbow flexor (+exp) elbow extensor (-) wrist flexor (-) wrist extensor (-)

		ROM elbow flexor (-) elbow extensor (-) wrist flexor (-) wrist extensor (-) Motricity Index-UE (-) fNIRS (no stat)
Robotic glove combined with other interventions compared to task-specific training		
Choi & Cho (2024) RCT (5) NStart=50 NEnd=46 TPS=Chronic A + B vs A/B *Also in Table 4 (Task-Specific Training)*	E: VR-based robot therapy with smart glove + task-oriented therapy C: Task-oriented therapy Duration: 40min/d, 5d/wk for 8wks	E vs C: FMA-UE (+exp) Manual Function Test (+exp) Motor Activity Log amount of use (+exp) quality of movement (-) JTHFT (-) MEP amplitudes (+exp)
Robotics combined with other interventions compared to robotics or video game training		
Carmeli et al. (2024) RCT (4) NStart=22 NEnd=16 TPS=Acute A + B1 vs A + B2 *Also in Table 17 (Virtual Reality)*	E: Robotic training with force fields for error augmentation + Video game therapy + Conventional therapy C: Robotic training without force fields for error augmentation + Video game therapy + Conventional therapy Duration: 20 mins/d, 3ds/wk, 2wks	E vs C: FMA (no stat) Motor assessment scale (no stat) Hand trajectory deviation (+exp) Number of movement units (+exp) Normalized jerk score (-) Movement time (+exp)
Chen et al. (2021h) Pilot RCT (6) NStart=15 NEnd=14 TPS=Chronic A + B1 vs A + B2 *Also in Table 17 (Virtual Reality)*	E: Low dose exoskeleton robot HEXORR II (12 sessions) + videogames C: High dose exoskeleton robot HEXORR II (24 sessions) + video games Duration: 15h/d, 2d/wk, 6wks or 12wks	E vs C: ARAT (-) FMA (-) MAL (-) MAS (-) Grip strength (-) Finger ROM (-) Trunk ROM (-)
Different approaches to robotic orthosis compared against one another		
Tay S.S. et al. (2024) Pilot RCT (6) NStart=4 NEnd=4 TPS=Acute A1 vs A2	E1: Robot-mediated impairment training + Robot-mediated task-specific training E2: Robot-mediated impairment training Duration: E1: 2hr/d, 5d/wk, 2wks; E2: 1hr/d, 5d/wk, 4wks	E1 vs E2: no between group comparisons
Exoskeleton robotics combined with other interventions compared to exoskeleton robotics or cognitive training		
Fasoli et al. (2019) Pilot RCT (7) NStart=10 NEnd=10 TPS=Chronic A + B + C vs A/A + B *Also in Table 13 (Cognitive and Dual-Task Training); Table 4 (Task-Specific Training)*	E: Robotic Therapy (Armeo Spring & Amadeo) + Task Oriented Training with Active Learning Program for Stroke (ALPS) C: Robotic Therapy with Active Learning Program for Stroke (ALPS) Duration: 60min, 2-3x/wk, 6-8wks	E vs C: Fugl-Meyer Assessment (+exp) Modified Ashworth Scale (-) Wolf Motor Function Test (-) Motor Activity Log (-) Stroke Impact Scale (-) Confidence in Arm & Hand Movement (CAHM)

Exoskeleton robotics combined with other interventions compared to sham or exoskeleton robotics		
Calabro et al. (2017) Pilot RCT (7) NStart=20 NEnd=20 TPS=Subacute A + B vs A/B *Also in Table 25 (Muscle Vibration)*	E: Robotic training (Armeo) + Muscle vibration C: Robotic training (Armeo) + Sham muscle vibration Duration: 60min/d, 5d/wk, 8wk Armeo-Power training	E vs C: Modified Ashworth Scale (+exp) EMG findings (+exp) Functional Independence Measure (+exp) Fugl-Meyer Assessment (+exp) MEP (+exp) HADS (+exp) shoulder force range of movement
Different approaches to robotic glove compared against one another		
Prange-Lasonder et al. (2017) Pilot RCT (2) NStart=5 NEnd=5 TPS=Chronic A1 vs A2	E1: Robotic Glove (HandinMind) at home E2: Robotic Glove (HandinMind) at Clinical Setting Duration: 60min/session, 3d/wk, 6wks	E1 vs E2: JTHFT (NO STATS) handgrip strength (NO STATS) Pinch strength (no stat)
Non-robotic electromechanical devices combined with other interventions compared to non-robotic electromechanical devices		
Hayward et al. (2013) Pilot RCT (7) NStart=10 NEnd=8 TPS=Subacute A + B vs A/B *Also in Table 20 (Feedback-Based Training)*	E: SMART Arm + outcome-triggered (OT) electrical stimulation C: SMART arm alone Duration: 60min, 5d/wk, 4wks	E1/E2 vs C: Motor Assessment Scale 6 (+exp1/2) MAS7 (no stat) MAS8 (no stat) triceps strength (no stat) modified ashworth scale (no stat) tardieu scale (no stat) Ritchie articular index (no stat) SIS (no stat) E1 vs E2: Motor assessment scale 6 (-) MAS7 (no stat) MAS8 (no stat) triceps strength (no stat) modified ashworth scale (no stat) tardieu scale (no stat) Ritchie articular index (no stat) SIS (no stat)
Robotics combined with other interventions compared to neurodevelopmental techniques (bobath approach)		
Fazekas et al. (2007) Pilot RCT (2) NStart=30 NEnd=30 TPS=Chronic A + B vs A/B *Also in Table 1 (Neurodevelopmental Techniques)*	E: Robot mediated physiotherapy + bobath therapy C: Bobath therapy Duration: 30min/d+30min intervention; 20d	E vs C: Rivermead motor assessment (no stat) FIM (no stat) FMA-UE (no stat) mod Ashworth scale (no stat) range of motion of shoulder and elbow (no stat)
Cross-Referenced RCTs: Combined or Comparative Interventions Involving Robotics (results included in this table's levels of evidence)		
Kamper et al. (2024) RCT (7) NStart=94	E1: Cyproheptadine + EMG-controlled VAEDA glove E2: Cyproheptadine + Passive stretching with VAEDA glove	E1/E2 vs C1/C2: Graded Wolf Motor Function Test (-) Epworth Sleepiness Scale (no between-group stat)

NEnd=88 TPS=Chronic A + B1 vs A + B2 vs C *Primary listing: Table 34 (Antispastic Medications)*	C1: Placebo + EMG-controlled VAEDA glove C2: Placebo + passive stretching VAEDA with glove Duration: 50min/d 3d/wk for 6wks training with exoskeleton + 6wks cyproheptadine or placebo	Beck Depression Inventory-II (no between-group stat) grip strength (no between-group stat) BBT (no between-group stat) FMA-UE (no between-group stat) voluntary finger flexion torque (no between-group stat) stretch reflex torque (no between-group stat)
Li et al. (2024a) RCT (6) NStart=44 NEnd=40 TPS=Subacute A + B vs A/B *Primary listing: Table 4 (Task-Specific Training)*	E: Task-oriented training with force feedback hand rehab robot + Conventional upper limb rehabilitation C: Task-oriented training assisted by a therapist + Conventional upper limb rehabilitation Duration: 20min/d, 5d/wk for 4wks task-oriented training + 40min/d 5d/wk for 4wks conventional rehabilitation	E vs C: FMA-hand (+exp) finger mass flexion (-) finger mass extension (-) hook grasp (-) lateral pinch (-) interdigital pinch (-) cylindrical grasp (+exp) spherical grasp (+exp) ARAT (+exp) grip strength (+exp) modified Ashworth Scale (-) AROM (+exp) Brunnstrom Recovery Stages of the Hand (-) BI (-)
Egger et al. (2024) Pilot RCT (9) NStart=41 NEnd=37 TPS=Subacute A + B vs A/B *Primary listing: Table 27 (Additional Afferent and Peripheral Stimulation Methods)*	E: Repetitive sensory stimulation + Robot-assisted arm training C: Sham stimulation + Robot-assisted arm training Duration: 45-60min/d stimulation + 45min/d robotic training, 4d/wk for 3wks	E vs C: FMA-UE (-) motor (-) sensoric (-) RoM, pain (-) BBT (-) Stroke Upper Limb Capacity Scale (SULCS) (-) grip strength (-) level of touch threshold-von Frey filaments distal thumb (-) index finger (-) thenar (-) two point discrimination test distal thumb (-) index finger (-) thenar (-)
Hu et al. (2024) Pilot RCT (9) NStart=19 NEnd=18 TPS=Chronic A + B + C vs A/A + B *Primary listing: Table 31 (Transcranial Direct Current Stimulation (tDCS))*	E: High-definition tDCS + EMG-driven robotic hand (EMG-RH) C: Sham tDCS + EMG-RH Duration: 20min/d stimulation + 60min/d EMG-RH 1-3d/wk for 20 sessions total	E vs C: FMA-UE (+exp) modified Ashworth Scale finger (+exp) wrist (-) ARAT (-) task-based fMRI (+exp) EEG-EMG assessment (-) EMG assessments (+exp)
Adams et al. (2023) RCT (5) NStart=21 NEnd=18	E: Glove orthosis GRASP with Virtual reality + home based rehab with OT C: Conventional Rehab Duration: 45min/d, 4d/wk, 8wks	E vs C: FMA (+exp) WMFT time (-)

TPS=Chronic A + B vs 0 *Primary listing: Table 15 (Telerehabilitation and Education)*		functional ability (-) BBT (-) MAL amount (+exp) how well (+exp)
Chen et al. (2023c) RCT (6) NStart=43 NEnd=37 TPS=Chronic A + B vs A/B *Primary listing: Table 10 (Mirror Therapy)*	E: Mirror therapy + robot assisted training HOH(Hand of Hope) C: Sham mirror therapy + robot assisted training HOH Duration: 60min/d(20min mirror therapy, 40min robot therapy), 3d/wk, 6wks	E vs C: FMA-UE (-) WMFT (-) NEADL (-) SSEQ (-) DLSES (-)
Fu J. et al. (2023) RCT (7) NStart=66 NEnd=61 TPS=Subacute A + B + C vs A + D *Primary listing: Table 18 (Brain Computer Interfaces)*	E: Portable BCI-based hand robot system + Conventional therapy + neuromuscular electrical stimulation C: Task-specific training + Conventional therapy + neuromuscular electrical stimulation Duration: 90mins/d (30 mins of BCI/task-specific training, 20 mins of physical therapy, 20 mins of occupational therapy + 20 mins of neuromuscular electrical stimulation), 5ds/wk, 4 wks	E vs C: FMA-UE (+exp) EEG-derived Laterality Index (no stat) BCI accuracy (no stat)
Zanona A.D.F. et al. (2023) RCT (7) NStart=44 NEnd=44 TPS=Subacute A + B + C vs 0 *Primary listing: Table 18 (Brain Computer Interfaces)*	E: BCI controlled hand exoskeleton + Mental practice + Occupational therapy C: Occupational therapy Duration: 80 mins/d (Experimental group - 30 mins BCI + 15 mins mental practice + 35 mins of OT; Control group 80 minutes of OT) 5d/wk for 2wks	E vs C: FMA-UE sensory function (-) motor function (-) FIM (-) MAL amount of movement (-) quality of movement (-) BBT (-) Jebson Hand function test (-)
Lülsdorff et al. (2023) RCT (5) NStart=60 NEnd=45 TPS=Subacute A vs B *Primary listing: Table 17 (Virtual Reality)*	E: Immersive virtual reality (CUREO) + Conventional therapy C: Electromechanically assisted training (ARMEOSpring) + Conventional therapy Duration: 20min/d for 10 sessions over 3wks VR or exoskeleton + 20min/d conventional UE therapy + 1-2hrs/d 5d/wk standard rehabilitation	E vs C: ARAT (+exp) User Experience Questionnaire (UEQ) attractiveness (-) perspicuity (-) efficiency (-) dependability (-) stimulation (-) novelty (-)
Maguire et al. (2023) Pilot RCT (5) NStart=17 NEnd=13 TPS=Chronic A + B vs A + C *Primary listing: Table 3 (Exercise and Strength Training)*	E: Moderate intensity ergometer training + ARMEO robotic training C: Low intensity task oriented balance training + ARMEO robotic training Duration: 80min/d(40min exercise, 40min robotics), 3d/wk, 12wks	E vs C: Serum BDNF (no stat) ARAT (no stat) FMA-UE (no stat) BESTest (no stat) FSS (no stat) EQ-5D (no stat)
Guo et al. (2022) RCT (6)	E1: BCI - Robotic + Conventional Rehab E2: Robotic + Conventional Rehab	E1/E2 vs C: E1 vs E2/C:

NStart=30 NEnd=30 TPS=Chronic A + B vs A/B vs 0 *Primary listing: Table 18 (Brain Computer Interfaces)*	C: Conventional Rehab Duration: 60min/d, 5d/w, 2wks	FMA (+exp1) MAS (-) WMFT (+exp1)
Takebayashi et al. (2022) RCT (7) NStart=129 NEnd=121 TPS=Chronic A + B vs A/B vs 0 *Primary listing: Table 6 (Constraint-Induced Movement Therapy (CIMT))*	E1: Robotic self training + CIMT E2: Robotic self training + conventional care C: Conventional self training + conventional care Duration: 1h/d, 3d/wk, 10wks	E1/E2 vs C: FMA-UE (-) Shoulder/elbow/forearm (-) MAL (+exp1) ARAT (no stat) Motricity Index (no stat) Modified Ashworth Scale (no stat) AROM (no stat) Stroke Impact Scale (no stat) E1 vs E2: FMA (-) Shoulder/elbow/forearm (-) MAL (-) ARAT (no stat) Motricity Index (no stat) Modified Ashworth Scale (no stat) AROM (no stat) Stroke Impact Scale (no stat)
Zhang et al. (2022a) RCT (7) NStart=42 NEnd=42 TPS=Chronic A + B vs A/B *Primary listing: Table 30 (Theta Burst Stimulation (TBS))*	E1: cTBS (priming) + iTBS + robot assisted therapy E2: sham cTBS (nonpriming) + iTBS + robot assisted training C: sham cTBS + sham iTBS + robot-assisted therapy Duration: 40 min/d, 3d/wk, 3wks	E1/E2 vs C: FMA-UE (+exp1) ARAT (-) velocity (-) ERD MVF Induced Beta 3 (+exp1) E1 vs E2: FMA-UE (-) ARAT (-) velocity (-) ERD MVF Induced Beta 3 (-)
Chang J.L. et al. (2021) RCT (7) NStart=36 NEnd=34 TPS=Chronic A + B vs A/B *Primary listing: Table 27 (Additional Afferent and Peripheral Stimulation Methods)*	E: Transcutaneous Auricular Vagus Nerve Stimulation (taVNS) + Robotic Training C: Sham taVNS + Robotic Training Duration: 60min/d, 3d/wk, 3wks	E vs C: FMA-UE (-) MRCS (-) WMFT (-) MTS (+exp) EMG amplitude (+exp)
Cantillo-Negrete J. et al. (2021) RCT Crossover (6) NStart=11 NEnd=10 TPS=Subacute A + B vs 0 *Primary listing: Table 18 (Brain Computer Interfaces)*	E: BCI Therapy + Robotic Hand Orthosis C: Conventional Care Duration: 30-40min/d, 3d/wk 4wks	E vs C: FMA (-) ARAT (-) grip strength (-) pinch strength (-) MEP (-) EEG (-)

Rong J. et al. (2021) RCT (8) NStart=40 NEnd=40 TPS=Subacute A + B vs A/B *Primary listing: Table 10 (Mirror Therapy)*	E: Mirror Visual Feedback + Robot-Assisted Training C: Sham-Mirror Visual Feedback+ Robot-Assisted Training Duration: 90min/d, 5d/wk, 4wks	E vs C: FMA UL (+exp) HW (-) FIM Total (-) Self-care (+exp) Sphincter control (-) Transfers (-) Locomotion (-) Communication (-) Social cognition ability (-) mBI (-) Grip strength (+exp)
Yang et al. (2021) RCT (5) NStart=30 NEnd=28 TPS=Chronic A + B1 vs A + B2 *Primary listing: Table 7 (Trunk Restraint)*	E: Trunk support + visual feedback SMART upper limb training system C: Trunk restraint + visual feedback SMART upper limb training system Duration: 30m/day, 3d/wk, 4wks	E vs C: PASS (+exp) FRT (+exp) ROM (-) MMT (-) FMA-UE (+exp)
Perini et al. (2020) Pilot RCT (7) NStart=18 NEnd=18 TPS=Chronic A + B vs 0 *Primary listing: Table 22 (Neuromuscular Electrical Stimulation (NMES))*	E: EMG-Controlled FES during task oriented training + Robotic training C: Conventional rehab (TST) Duration: 45min, 5x/wk, 4wks conventional, 45min FEs + 45min robot, 3x/wk experimental	E vs C: Fugl-Meyer Assessment (+exp) Proximal (+exp) Distal (-) Reaching Performance Scale (+exp) Box and Block Test (-)
Mazzoleni et al. (2019) RCT (5) NStart=40 NEnd=39 TPS=Acute A + B vs A/B *Primary listing: Table 31 (Transcranial Direct Current Stimulation (tDCS))*	E: Robot assisted therapy (InMotion WRIST Robot) + Anodal tDCS C: Robot assisted therapy + sham tDCS Duration: 30min, 5x/wk for 6wks	E vs C: Fugl-Meyers Assessment Wrist: (-) Shoulder/Elbow: (-) Upper Extremity: (-) Modified Ashworth Scale - Wrist (-) Motricity Index: (-) Box and Block Test: (-) Kinematic parameters (-)
Lyukmanov et al. (2019) RCT (4) NStart=73 NEnd=55 TPS=Subacute A + B vs 0 *Primary listing: Table 18 (Brain Computer Interfaces)*	E: BCI-exoskeleton system C: Sham Duration: 40min/session, 12 sessions	E vs C: FMA (no stats) ARAT (no stats)
Willigenburg et al. (2017) RCT (4) NStart=12 NEnd=12 TPS=Chronic	E: Myoelectric brace + Repetitive task-specific practice (RTP) C: Repetitive task-specific practice (RTP) Duration: 45min, 3d/wk for 8wks	E vs C: Stroke Impact Scale Arm: (-) Hand: (-) Activities of Daily Living: (-)

A + B vs A/B *Primary listing: Table 4 (Task-Specific Training)*		Recovery: (+exp) Kinematics reach out task Range shoulder flex: (-) Range elbow extension: (-) Hand velocity: (-) Kinematics reach up task Range shoulder flex: (-) Range elbow extension: (-) Hand velocity: (+con)
Frolov et al. (2017) RCT (5) NStart=89 NEnd=74 TPS=Chronic A + B vs 0 *Primary listing: Table 18 (Brain Computer Interfaces)*	E: brain-computer interfaces-Exoskeleton-Based Training C: Sham exoskeleton Training Duration: 30min/d, 10d	E vs C: ARAT (+exp) FMA (-)
Qian et al. (2017) Pilot RCT (6) NStart=24 NEnd=24 TPS=Subacute A + B vs 0 *Primary listing: Table 22 (Neuromuscular Electrical Stimulation (NMES))*	E: EMG driven NMES Robot arm C: Conventional Therapy Duration: 40min, 5d/wk for 4wk	E vs C: FIM (-) ARAT (-) Modified Ashworth Scale (+exp) FMA (+exp)
Hung et al. (2016) RCT (7) NStart=21 NEnd=21 TPS=Chronic A + B vs A + C *Primary listing: Table 4 (Task-Specific Training)*	E1: Robot therapy + task specific training E2: Robot therapy + impairment oriented training Duration: 90 to 100 min/d, 5 d/wk for 4wk	E1 vs E2: FMA-UE (+exp) Stroke Impact Scale (+exp) ARAT (-) Medical Research Council Scale (-)
DiLazzaro et al. (2016) Pilot RCT (7) NStart=20 NEnd=17 TPS=Chronic A + B vs A/B *Primary listing: Table 30 (Theta Burst Stimulation (TBS))*	E: cTBS + robotic therapy C: Sham stimulation + robotic therapy Duration: 1hr/d, 5d/wk for 2wk	E vs C: FMA-UE (+exp) Motion accuracy (-) Motion direction (-) Motion smoothness (-) speed (-) Movement duration (-)
Linder et al. (2015) RCT (6) NStart=99 NEnd=91 TPS=Subacute A + B vs A/B *Primary listing: Table 15 (Telerehabilitation and Education)*	E: Robot-assisted therapy (Hand mentor pro robotic device) + home exercise program (Hand Mentor) C: Home exercise program Duration: 180min/d, 5d/wk for 8wk	E vs C: Stroke Impact Scale (-) Center for Epidemiologic Studies Depression Scale (-)
Ang et al. (2015b) RCT (6) NStart=26 NEnd=25	E: Brain computer interface motor imagery+ MITManus robotic training C: MIT-Manus robotic training Duration: 90min/d, 3d/wk for 4wk	E vs C: Fugl-Meyer Assessment Upper Extremity (-)

TPS=Chronic A + B + C vs A/A + B *Primary listing: Table 18 (Brain Computer Interfaces)*		
Majeed et al. (2015) RCT (6) NStart=28 NEnd=26 TPS=Chronic A + B vs A/B *Primary listing: Table 15 (Telerehabilitation and Education)*	E: Bimanual robotic training + error augmentation C: Bimanual robotic training Duration: 45min, 3d/wk, 2wk	E vs C: Fugl-Meyer Assessment -Arm Motor (-)
Ang et al. (2014) RCT (6) NStart=22 NEnd=21 TPS=Chronic A + B + C vs A/A + B vs 0 *Primary listing: Table 18 (Brain Computer Interfaces)*	E1: EEG-based motor imargery brain-computer interface with Haptic Knob robotic arm rehabilitation E2: Haptic Knob robot-based arm rehabilitation C: Standard arm therapy Duration: 90min/d, 3d/wk for 6wks	E1/E2 vs C: E1 vs E2/C: Fugl-Meyer Assessment (-)
Ochi et al. (2013) RCT Crossover (6) NStart=18 NEnd=18 TPS=Chronic A + B1 vs A + B2 *Primary listing: Table 31 (Transcranial Direct Current Stimulation (tDCS))*	E: Anodal tDCS on affected hemisphere + robot assisted arm training C: Cathodal tDCS on unaffected hemisphere + robot assisted arm training Duration: 45min/d, for 5d	E vs C: Modified Ashworth Scale (+exp) Fugl-Meyer Assessment (-) Motor Activity Log (-)
Wu et al. (2012a) RCT (8) NStart=42 NEnd=42 TPS=Chronic A + B vs A/B vs 0 *Primary listing: Table 2 (Bilateral Arm Training)*	E1: Therapist-based Bilateral Arm Training E2: Robot-assisted Bilateral Arm Training C: Control treatment Duration: 90-105 min/d, 5d/wk, for 4 wks	E1 vs C: FMA (-) Proximal (-) Distal (+exp1) MAL (-) SIS (-) Unilateral task normalized movement time (+exp) normalized movement unit (+exp) Trunk NTD (+exp) Trunk contribution start (-) Trunk contribution middle (+exp) Angular change shoulder flexion (-) Angular change elbow extension (-) Bimanual task NMT (-) NMU (-) Trunk NTD (-) Trunk contribution start (-) Trunk contribution middle (+exp) Angular change shoulder flexion (-) elbow flexion (-) E2 vs C: Fugal-Meyer Assessment (-) MAL (-)

		SIS (+exp2) strength (+exp2) memory (-) emotion (-) communication (-) ADL/IADL (-) mobility (-) hand function (-) participation (-) physical function (+exp2) Unilateral task NMT (-) NMU (-) Trunk NTD (-) Trunk contribution start (-) Trunk contribution middle (-) Angular change shoulder flexion (+exp) Angular change elbow extension (-) Bimanual task NMT (-) NMU (-) Trunk NTD (-) Trunk contribution start (-) Trunk contribution middle (-) Angular change shoulder flexion (+exp) elbow flexion (-)
Cameirao et al. (2012) RCT (6) NStart=48 NEnd=44 TPS=Chronic A + B vs A + C vs A *Primary listing: Table 17 (Virtual Reality)*	E1: Virtual Relaity Game (Vision Based Tracking) E2: Virtual Reality (Haptic Feedback) E3: Virtual Reality (Exoskelton) Duration: 35min/d, 5d/wk, 4wks	E1 vs E2: Fugl-Meyer Arm (No stats) -Wrist/hand (No stats) , Chedoke Arm and Hand Activity Inventory (-) Box and Block Test (+exp2) E2 vs E3: Fugl-Meyer Arm (No stats) -Wrist/hand (No stats) Chedoke Arm and Hand Activity Inventory (-) Box and Block Test (+exp2) E1 vs E3: Fugl-Meyer Arm (No stats) -Wrist/hand Chedoke Arm and Hand Activity Inventory (-) Box and Block Test (-)
Hesse et al. (2011b) RCT (8) NStart=96 NEnd=85 TPS=Acute A + B1 vs A + B2 vs A *Primary listing: Table 31 (Transcranial Direct Current Stimulation (tDCS))*	E1: Anodal tDCS + Robot-Assisted Arm Training E2: Cathodal tDCS + Robot-Assisted Arm Training C: Sham stimulation + Robot-Asssited Arm Training Duration: 20min/d, 5d/wk for 6wk	E1/E2 vs C: FMA (-) BBT (-) Barthel Index (-) Medical research council (-) modified Ashworth scale (-)
Kutner et al. (2010) RCT (6)	E: Repetitive Task Practice + Robot-assisted therapy	E vs C: SIS (-)

NStart=21 NEnd=18 TPS=Chronic A + B vs A/B *Primary listing: Table 4 (Task-Specific Training)*	C: Repetitive task training Duration: E: 30h over 3wk C: 60h over 3wk	
Ang et al. (2010) RCT (5) NStart=26 NEnd=25 TPS=Chronic A + B + C vs A/A + B *Primary listing: Table 18 (Brain Computer Interfaces)*	E: EEG-based Motor Imagery Brain-Computer Interface with Robotic Feedback (MIT-MANUS) C: Traditional Robotic Therapy Duration: 60min, 12x, 4wks	E vs C: Fugl-Meyer Assessment (-) Wolf Motor Function Test (-) Active Range of Motion (-) Modified Barthel Index (-) Stroke Impact Scale (+exp)
Hu et al. (2009) RCT (5) NStart=27 NEnd=27 TPS=Chronic A + B vs A/B *Primary listing: Table 19 (EMG Biofeedback)*	E: EMG-driven Robot C: Passive motion robot device on wrist Duration: 3-5 session/wk; 20/ 7wk	E vs C: FMA (+exp) Mod Ashworth score (+exp) ARAT (-) FIM (-) EMG contraction records

Abbreviations and table notes: C=control group; D=days; E=experimental group; H=hours; Min=minutes; RCT=randomized controlled trial; TPS=time post stroke category (Acute: less than 30 days, Subacute: more than 1 month but less than 6 months, Chronic: over 6 months); Wk=weeks.

+exp indicates a statistically significant between groups difference at α=0.05 in favour of the experimental group

+exp1/+exp2/+exp3 indicates a statistically significant between groups difference at α=0.05 in favour of the first, second or third experimental group

+con indicates a statistically significant between groups difference at α=0.05 in favour of the control group

- indicates no statistically significant between groups differences at α=0.05

1. Body Functions and Structures

MOTOR FUNCTION			
LoE	**Conclusion Statement**	**RCTs**	**References**
1a	Robotics may not have a difference in efficacy when compared to conventional therapy for improving motor function.	32	Ahn S.Y. et al. (2024); Liu Y. et al. (2024); Serrano-López Terradas et al. (2022); Budhota A. et al. (2021); Jiang et al. (2021a); Amatya et al. (2020); Aprile et al. (2020); Carpinella et al. (2020); Chinembiri et al. (2020); Xu et al. (2020); Calabro et al. (2019); Dehem et al. (2019); Hung et al. (2019a); DauNoraviciene et al. (2018); Lee et al. (2018b); Lee et al. (2017b); Neuendorf et al. (2017); Tomic et al. (2017); BustamanteValles et al. (2016); Grigoras et al. (2016); Lee et al. (2016a); Masiero et al. (2014); Sale et al. (2014b); Wu et al. (2013a); Hsieh et al. (2012); Reinkensmeyer et al. (2012); Burgar et al. (2011); Conroy et al. (2011); Hsieh et al. (2011); Lum et al. (2005); Lum et al. (2002); Burgar et al. (2000)

1b	Bi-Manu-Track(Bilateral robot training) may not have a difference in efficacy when compared to INMotion 3.0 (unilateral robot training) for improving motor function.	1	Hung et al. (2019a)
1b	Unilateral robot-assisted arm training may produce greater improvements in motor function than Bilateral robot-assisted arm training.	1	Wu et al. (2013a)
1b	High intensity robotic therapy (BiManu-Track) may produce greater improvements in motor function than Low intensity robotic therapy.	1	Hsieh et al. (2012)
1b	Unilateral Robotic Training (MIME) may not have a difference in efficacy when compared to Bilateral Robotic Training (MIME) or Combined Unilateral and Bilateral Robotic Training (MIME) for improving motor function.	1	Lum et al. (2005)
1a	Exoskeleton robotics may not have a difference in efficacy when compared to conventional therapy for improving motor function.	14	Bhattacharjee et al. (2024); Kim S.-H. et al. (2023); Kim et al. (2023e); Yuan R. et al. (2023); Ma D. et al. (2022); Taravati et al. (2022); Chen et al. (2021g); Singh et al. (2021); Villafane et al. (2018); Susanto et al. (2015); Bartolo et al. (2014); Brokaw et al. (2014); Klamroth-Marganska et al. (2014); Housman et al. (2009)
1b	Unilateral robot-assisted training with conventional therapy may result in lesser improvements in motor function when compared to Bilateral robot-assisted training with conventional therapy.	1	Yuan R. et al. (2023)
1b	Non-robotic electromechanical devices combined with other interventions may not have a difference in efficacy when compared to conventional therapy for improving motor function.	1	Prange et al. (2015)
2	There is conflicting evidence about the effect of IronHand Assistive Glove when compared to No IronHand Glove for improving motor function.	1	Radder et al. (2019)
2	IronHand Assistive Glove may produce greater improvements in motor function than IronHand Therapeutic Glove.	1	Radder et al. (2019)
1a	Different approaches to robotics may not have a difference in efficacy when compared with one another for improving motor function.	4	Jeon et al. (2024); Wright et al. (2018); Rowe et al. (2017); Hwang et al. (2012)
1b	Fast training may produce greater improvements in motor function than Slow training.	1	Hammerbeck et al. (2017)
1b	Robot-aided Progressive Resistance Training may not have a difference in efficacy when compared to Robot-aided Active-assisted Training for improving motor function.	1	Stein et al. (2004)
1b	Robotics combined with other interventions may produce greater improvements in motor function than exercise and custom physiotherapy protocols.	1	Lencioni et al. (2021)
1b	Robotic arm therapy (NeReBot) with conventional therapy may not have a difference in efficacy when compared to Conventional therapy with proximal paretic arm exercise for improving motor function.	1	Masiero et al. (2011)
1a	Robotics combined with other interventions may not have a difference in efficacy when compared to task-specific training for improving motor function.	4	Chen et al. (2022b); Hsieh et al. (2017); Hesse et al. (2014); Timmermans et al. (2014)
1b	Robot-Assisted Neurocognitive Therapy using a haptic device with Conventional Neurocognitive Therapy may not have a difference in	1	Ranzani et al. (2020)

	efficacy when compared to Conventional Neurocognitive Therapy for improving motor function.		
1a	Robotics may not have a difference in efficacy when compared to sham for improving motor function.	3	Masiero et al. (2007); Masiero et al. (2006); Volpe et al. (2000)
1a	Exoskeleton robotics combined with other interventions may not have a difference in efficacy when compared to task-specific training for improving motor function.	3	Tang et al. (2023); Hsu et al. (2022a); Esquenazi et al. (2021)
1b	Mechanical arm trainer may not have a difference in efficacy when compared to Electrical muscle stimulation of paretic wrist extensors for improving motor function.	1	Hesse et al. (2008a)
1b	Telemonitored hand robotic-assisted therapy (Hand mentor pro) with home exercise program may not have a difference in efficacy when compared to Home exercise program only for improving motor function.	1	Wolf et al. (2015)
1a	There is conflicting evidence about the effect of Robotic orthosis when compared to conventional therapy for improving motor function.	5	Bayındır et al. (2022); Orihuela-Espina et al. (2016); Liao et al. (2012); deAraujo et al. (2011); Ring et al. (2005)
1b	Intensive Sensorimotor Arm Training Mediated by robot may not have a difference in efficacy when compared to Intensive Sensorimotor Arm Training Mediated by Therapist for improving motor function.	1	Volpe et al. (2008)
1a	Robotic orthosis combined with other interventions may not have a difference in efficacy when compared to conventional therapy for improving motor function.	3	Wang T. et al. (2023); Straudi et al. (2020); Byl et al. (2013)
1b	Soft Robotic Glove with Conventional therapy may not have a difference in efficacy when compared to Low frequency repetitive transcranial magnetic stimulation with Conventional therapy for improving motor function.	1	Wang T. et al. (2023)
1b	Robotic Assisted Therapy (Bi-Manu-track robot) may produce greater improvements in motor function than electromyography-initiated electrical stimulation.	1	Hesse et al. (2005)
1b	Exoskeleton robotics combined with other interventions may not have a difference in efficacy when compared to exercise and custom physiotherapy protocols for improving motor function.	3	Frisoli et al. (2022); Lin et al. (2022); Takahashi et al. (2016)
1a	Exoskeleton robotics combined with other interventions may produce greater improvements in motor function than conventional therapy.	3	Chen et al. (2023a); Ambrosini et al. (2021); Gueye et al. (2021)
1a	Robotics combined with other interventions may not have a difference in efficacy when compared to conventional therapy for improving motor function.	4	Coskunsu et al. (2022); Hsieh et al. (2014); Lo et al. (2010); Rabadi et al. (2008)
1b	Robot therapy with distributed constraint induced therapy may not have a difference in efficacy when compared to robot therapy alone for improving motor function.	1	Hsieh et al. (2014)
1b	Robot-Assisted Therapy may not have a difference in efficacy when compared to Dose-matched Intensive Comparison Therapy for improving motor function.	1	Lo et al. (2010)
1b	There is conflicting evidence about the comparative effects of different approaches to robotics combined with other interventions for improving motor function.	1	Hu et al. (2015)
2	Robot therapy with Electroymography-triggered neuromuscular electrical stimulation (ENMES) may produce greater improvements in motor function than Robot therapy or ENMES.	1	Yang et al. (2024)
1b	There is conflicting evidence about the effect of Neuromuscular electrical stimulation robotic to distal fingers when compared to	1	Qian et al. (2019)

	neuromuscular electrical stimulation robotic to proximal wrist-elbow joints for improving motor function.		
1b	External focus with robotic arm may not have a difference in efficacy when compared to Internal focus with robot for improving motor function.	1	Kim et al. (2017c)
2	Robot hand and arm separate training with virtual reality may not have a difference in efficacy when compared to Robot hand and arm together training with virtual reality for improving motor function.	1	Fluet et al. (2014)
2	AMES robot with torque biofeedback and muscle vibration may not have a difference in efficacy when compared to AMES robot with electromyography biofeedback and muscle vibration for improving motor function.	1	Cordo et al. (2013)
1a	Robotics combined with other interventions may produce greater improvements in motor function than sham or robotics.	3	Bernal-Jiménez et al. (2024); Capone et al. (2017); Ramos-Murguialday et al. (2013)
2	X-Glove Orthosis Prolonged Stretching may not have a difference in efficacy when compared to Resting for improving motor function.	1	Triandafilou et al. (2011)
1b	Robot-mediated therapy (GENTLE/s) may produce greater improvements in motor function than Sling suspension phase.	1	Coote et al. (2008)
1a	Robotics combined with other interventions may not have a difference in efficacy when compared to robotics for improving motor function.	12	Dai et al. (2024); Murakami et al. (2023); Conroy et al. (2019); Hung et al. (2019b); Hung et al. (2019d); Abdollahi et al. (2018); Wang et al. (2018); Hsieh et al. (2016); Miyasaka et al. (2016); Pennati et al. (2015); Abdollahi et al. (2014); Liu et al. (2009b)
2	Unilateral robot assisted therapy with modified constraint-induced movement therapy may not have a difference in efficacy when compared to Bilateral robot assisted therapy with bilateral arm training for improving motor function.	1	Hung et al. (2019b)
1b	Unilateral robot assisted therapy with constraint-induced movement therapy (unilateral arm) may result in lesser improvements in motor function when compared to Bilateral robot assisted therapy with BAT (Bimanual tracking).	1	Hung et al. (2019d)
1b	Neuromuscular electrical stimulation electromyography robotic hand may not have a difference in efficacy when compared to electromyography robotic hand for improving motor function.	1	Huang et al. (2020)
1b	Robot assisted training with Botox may produce greater improvements in motor function than Conventional treatment with Botox.	1	Gandolfi et al. (2019)
1b	Progressive abduction loading therapy with horizontal-plance viscous resistance device may not have a difference in efficacy when compared to Progressive abduction loading therapy for improving motor function.	1	Ellis et al. (2018)
1a	Robotic orthosis combined with other interventions may not have a difference in efficacy when compared to task-specific training for improving motor function.	3	Kuo et al. (2023a); Page et al. (2020); Page et al. (2013)
2	Distal (wrist or hand Functional Electrical Stimulation) may not have a difference in efficacy when compared to functional electrical stimulation with Robot assisted Whole arm for improving motor function.	1	Daly et al. (2019)
2	Distal (wrist or hand Functional Electrical Stimulation) may not have a difference in efficacy when compared to Proximal (Shoulder or	1	Daly et al. (2019)

	elbow) (Functional Electrical Stimulation with inMotion robot) for improving motor function.		
1b	End-effector robot with occupational therapy may not have a difference in efficacy when compared to Exoskeleton robot with occupational therapy for improving motor function.	1	Lee et al. (2020e)
1a	Robotics combined with other interventions may not have a difference in efficacy when compared to robotics or sham for improving motor function.	3	Edwards et al. (2019); Straudi et al. (2016); Lee et al. (2015b)
1b	Robotic training (InMotion ARM) with motor learning may not have a difference in efficacy when compared to Motor learning for improving motor function.	1	McCabe et al. (2015)
1a	There is conflicting evidence about the effect of Robotics combined with other interventions when compared to robotics or augmented feedback training for improving motor function.	2	Cho & Song (2020); Cho et al. (2019)
1b	Robot-Assisted Therapy with Bilateral Practice with Task-Specific Training may produce greater improvements in motor function than Conventional Care with Task-Specific Training.	1	Hsu et al. (2019)
1b	Condensed Robot-assisted training with botulinum toxin A and Functional training may not have a difference in efficacy when compared to Distributed robot-assisted training with botulinum toxin A and Functional training for improving motor function.	1	Hung et al. (2021)
1a	Robotic glove therapy may produce greater improvements in motor function than conventional therapy.	4	Lee et al. (2021); Thielbar et al. (2017); VaNoglio et al. (2017); Carmeli et al. (2011)
2	Rejoyce system with occupational therapy may not have a difference in efficacy when compared to task based exercises with occupational therapy for improving motor function.	1	Ozen et al. (2021)
1b	Games-based training using an exoskeleton with usual rehab may not have a difference in efficacy when compared to basic stretching and active exercises with usual rehab for improving motor function.	1	Remy-Neris et al. (2021)
1b	Robotic Priming with mirror therapy (RMT) may not have a difference in efficacy when compared to Robotic Priming with Bilateral Upper Limb Training (RBULT) for improving motor function.	1	Li Y.-C. et al. (2021)
2	Robot-assisted Therapy with conventional rehab may not have a difference in efficacy when compared to Constraint induced movement therapy with conventional rehab for improving motor function.	1	Terranova T.T. et al. (2021)
1b	There is conflicting evidence about the effect of Patient-centered Robot-assisted occupational therapy with conventional rehab when compared to Robot-centered Robot-assisted therapy with conventional rehab or conventional rehab for improving motor function.	1	Yoon et al. (2021)
1b	Assisted Motion, Biofeedback, and Antagonist Muscle Vibration delivered by a Robotic Device with UL rehabilitation may produce greater improvements in motor function than Placebo intervention with UL rehabilitation.	1	Cordo et al. (2022)
1a	There is conflicting evidence about the effect of Exoskeleton robotics combined with other interventions when compared to exoskeleton robotics or sham for improving motor function.	2	Joo et al. (2022); Morone et al. (2022)
2	RMT may not have a difference in efficacy when compared to mirror therapy for improving motor function.	1	Schrader et al. (2022)
2	Smart hand joint training device with bilateral transcranial direct current stimulation may produce greater improvements in motor function than Smart hand joint training device.	1	Zhao et al. (2022a)

1b	Bilateral robotic priming training with mirror training (R-mirr) may produce greater improvements in motor function than Bilateral robotic priming training with movement oriented training.	1	Li et al. (2023)
2	Robotic rehab with trunk rehab may not have a difference in efficacy when compared to Conventional rehab with trunk rehab for improving motor function.	1	Senocak et al. (2023)
1a	Exoskeleton robotics combined with other interventions may produce greater improvements in motor function than exoskeleton robotics.	2	Shi et al. (2024); Kim et al. (2023b)
1b	Robotic training with Rebless may produce greater improvements in motor function than UE training with Motomed ergometer.	1	Chang et al. (2024a)
2	Virtual reality-based robot therapy with smart glove with task-oriented therapy may produce greater improvements in motor function than Task-oriented therapy.	1	Choi & Cho (2024)
2	Robotic training with force fields for error augmentation with Video game therapy and Conventional therapy may produce greater improvements in motor function than Robotic training without force fields for error augmentation with Video game therapy and Conventional therapy.	1	Carmeli et al. (2024)
2	Robot assisted therapy (InMotion WRIST Robot) with Anodal transcranial direct current stimulation may not have a difference in efficacy when compared to Robot assisted therapy with sham transcranial direct current stimulation for improving motor function.	1	Mazzoleni et al. (2019)
1b	Anodal transcranial direct current stimulation with Robot-Assisted Arm Training may not have a difference in efficacy when compared to Sham stimulation with Robot-Asssited Arm Training for improving motor function.	1	Hesse et al. (2011b)
1b	There is conflicting evidence about the effect of Robot therapy with task specific training when compared to Robot therapy with impairment oriented training for improving motor function.	1	Hung et al. (2016)
2	There is conflicting evidence about the effect of Electromyography-driven Robot when compared to Passive motion robot device on wrist for improving motor function.	1	Hu et al. (2009)
1b	Anodal transcranial direct current stimulation on affected hemisphere with robot assisted arm training may not have a difference in efficacy when compared to Cathodal transcranial direct current stimulation on unaffected hemisphere with robot assisted arm training for improving motor function.	1	Ochi et al. (2013)
1b	EEG-based motor imargery brain-computer interface with Haptic Knob robotic arm rehabilitation may not have a difference in efficacy when compared to arm therapy for improving motor function.	1	Ang et al. (2014)
2	EEG-based Motor Imagery Brain-Computer Interface with Robotic Feedback (MIT-MANUS) may not have a difference in efficacy when compared to Traditional Robotic Therapy for improving motor function.	1	Ang et al. (2010)
1b	Brain computer interface motor imagery with MITManus robotic training may not have a difference in efficacy when compared to MIT-Manus robotic training for improving motor function.	1	Ang et al. (2015b)
1b	Bimanual robotic training with error augmentation may not have a difference in efficacy when compared to Bimanual robotic training for improving motor function.	1	Majeed et al. (2015)
1b	Therapist-based Bilateral Arm Training may not have a difference in efficacy when compared to Control treatment for improving motor function.	1	Wu et al. (2012a)

2	There is conflicting evidence about the effect of Brain-computer interfaces-Exoskeleton-Based Training when compared to Sham exoskeleton Training for improving motor function.	1	Frolov et al. (2017)
1b	Transcutaneous Auricular Vagus Nerve Stimulation with Robotic Training may not have a difference in efficacy when compared to Sham transcutaneous auricular vagus nerve stimulation with Robotic Training for improving motor function.	1	Chang J.L. et al. (2021)
1b	Brain-computer interface Therapy with Robotic Hand Orthosis may not have a difference in efficacy when compared to Conventional Care for improving motor function.	1	Cantillo-Negrete J. et al. (2021)
1b	There is conflicting evidence about the effect of Mirror Visual Feedback with Robot-Assisted Training when compared to Sham-Mirror Visual Feedback with Robot-Assisted Training for improving motor function.	1	Rong J. et al. (2021)
2	Trunk support with visual feedback SMART upper limb training system may produce greater improvements in motor function than Trunk restraint with visual feedback SMART upper limb training system.	1	Yang et al. (2021)
1b	Brain-computer interface - Robotic with Conventional Rehab may produce greater improvements in motor function than Conventional Rehab.	1	Guo et al. (2022)
1b	Robotic self training with constraint-induced movement therapy may not have a difference in efficacy when compared to Conventional self training with conventional care for improving motor function.	1	Takebayashi et al. (2022)
1b	Robotic self training with constraint-induced movement therapy may not have a difference in efficacy when compared to Robotic self training with conventional care for improving motor function.	1	Takebayashi et al. (2022)
1b	There is conflicting evidence about the effect of Continuous theta burst stimulation with intermittent theta burst stimulation and robot assisted therapy when compared to sham continuous theta burst stimulation with sham intermittent theta burst stimulation and robot-assisted therapy for improving motor function.	1	Zhang et al. (2022a)
1b	Continuous theta burst stimulation with intermittent theta burst stimulation and robot assisted therapy may not have a difference in efficacy when compared to sham continuous theta burst stimulation with intermittent theta burst stimulation and robot assisted training for improving motor function.	1	Zhang et al. (2022a)
2	Glove orthosis graded repetitive arm supplementary program with Virtual reality with home based rehab with occupational therapy may not have a difference in efficacy when compared to Conventional Rehab for improving motor function.	1	Adams et al. (2023)
1b	Mirror therapy with robot assisted training HOH(Hand of Hope) may not have a difference in efficacy when compared to Sham mirror therapy with robot assisted training HOH for improving motor function.	1	Chen et al. (2023c)
1b	Portable brain-computer interface-based hand robot system with Conventional therapy and neuromuscular electrical stimulation may produce greater improvements in motor function than Task-specific training with Conventional therapy and neuromuscular electrical stimulation.	1	Fu J. et al. (2023)
1b	Brain-computer interface controlled hand exoskeleton with Mental practice and Occupational therapy may not have a difference in efficacy when compared to Occupational therapy for improving motor function.	1	Zanona A.D.F. et al. (2023)
2	Immersive virtual reality (CUREO) with Conventional therapy may produce greater improvements in motor function than	1	Lülsdorff et al. (2023)

	Electromechanically assisted training (ARMEOSpring) with Conventional therapy.		
1b	Cyproheptadine with EMG-controlled VAEDA glove may not have a difference in efficacy when compared to Placebo with EMG-controlled VAEDA glove or Placebo with passive stretching VAEDA with glove for improving motor function.	1	Kamper et al. (2024)
1b	Task-oriented training with force feedback hand rehab robot with Conventional upper limb rehabilitation may produce greater improvements in motor function than Task-oriented training assisted by a therapist with Conventional upper limb rehabilitation.	1	Li et al. (2024a)
2	Non-robotic electromechanical devices may not have a difference in efficacy when compared to conventional therapy for improving motor function.	1	Volpe et al. (2004)
1b	Bilateral Arm Light Exoskeleton Rehab Station (ALEx RS) with Conventional Therapy may not have a difference in efficacy when compared to Unilateral Arm Light Exoskeleton Rehab Station (ALEx RS) with Conventional Therapy for improving motor function.	1	Mauro et al. (2024)
2	Exoskeleton robotics combined with other interventions may not have a difference in efficacy when compared to stretching and positioning programs for improving motor function.	1	Vanoglio et al. (2024)
1b	Robotics combined with other interventions may not have a difference in efficacy when compared to botulinum toxin (botox) for improving motor function.	1	Hung et al. (2022)
1b	Robotics combined with other interventions may not have a difference in efficacy when compared to robotics or video game training for improving motor function.	1	Chen et al. (2021h)
1b	Different approaches to exoskeleton robotics may not have a difference in efficacy when compared with one another for improving motor function.	1	Park et al. (2020b)
1b	There is conflicting evidence about the effect of Robotic Therapy (Armeo Spring & Amadeo) with Task Oriented Training with Active Learning Program for Stroke (ALPS) when compared to Robotic Therapy with Active Learning Program for Stroke (ALPS) for improving motor function.	1	Fasoli et al. (2019)
1b	Robotic training (Armeo) with Muscle vibration may produce greater improvements in motor function than Robotic training (Armeo) with Sham muscle vibration.	1	Calabro et al. (2017)
1b	Single joint arm exoskeleton may not have a difference in efficacy when compared to Multijoint arm exoskeleton for improving motor function.	1	Milot et al. (2013)
1b	Repetitive sensory stimulation with Robot-assisted arm training may not have a difference in efficacy when compared to Sham stimulation with Robot-assisted arm training for improving motor function.	1	Egger et al. (2024)
1b	There is conflicting evidence about the effect of High-definition tDCS with EMG-driven robotic hand (EMG-RH) when compared to Sham tDCS with EMG-RH for improving motor function.	1	Hu et al. (2024)
1b	EMG-Controlled FES during task oriented training with Robotic training may produce greater improvements in motor function than Conventional rehab (TST).	1	Perini et al. (2020)
1b	There is conflicting evidence about the effect of EMG driven NMES Robot arm when compared to Conventional Therapy for improving motor function.	1	Qian et al. (2017)

1b	CTBS with robotic therapy may produce greater improvements in motor function than Sham stimulation with robotic therapy.	1	DiLazzaro et al. (2016)
1b	Robot-assisted training may not have a difference in efficacy when compared to Usual care for improving motor function.	1	Rodgers et al. (2019)
1b	Enhanced upper limb therapy may produce greater improvements in motor function than Usual care.	1	Rodgers et al. (2019)
1b	Robot-assisted training may not have a difference in efficacy when compared to Enhanced upper limb therapy for improving motor function.	1	Rodgers et al. (2019)

STROKE SEVERITY			
LoE	**Conclusion Statement**	**RCTs**	**References**
1a	There is conflicting evidence about the effect of Robotics when compared to conventional therapy for improving stroke severity.	4	Amatya et al. (2020); Chinembiri et al. (2020); Lee et al. (2016a); Abdullah et al. (2011)
1a	Exoskeleton robotics may not have a difference in efficacy when compared to conventional therapy for improving stroke severity.	3	Singh et al. (2021); Iwamoto et al. (2019); Villafane et al. (2018)
1a	Different approaches to robotics may not have a difference in efficacy when compared with one another for improving stroke severity.	2	Wright et al. (2018); Rowe et al. (2017)
2	Non-robotic electromechanical devices may produce greater improvements in stroke severity than conventional therapy.	1	Wang et al. (2007)
2	Rejoyce system with occupational therapy may not have a difference in efficacy when compared to task based exercises with occupational therapy for improving stroke severity.	1	Ozen et al. (2021)
1b	Exoskeleton robotics combined with other interventions may not have a difference in efficacy when compared to exoskeleton robotics or sham for improving stroke severity.	1	Morone et al. (2022)
2	Smart hand joint training device with bilateral transcranial direct current stimulation may produce greater improvements in stroke severity than Smart hand joint training device.	1	Zhao et al. (2022a)
1b	Exoskeleton robotics combined with other interventions may not have a difference in efficacy when compared to exoskeleton robotics for improving stroke severity.	1	Kim et al. (2023b)
1b	Task-oriented training with force feedback hand rehab robot with Conventional upper limb rehabilitation may not have a difference in efficacy when compared to Task-oriented training assisted by a therapist with Conventional upper limb rehabilitation for improving stroke severity.	1	Li et al. (2024a)
1b	Robotic glove therapy may not have a difference in efficacy when compared to conventional therapy for improving stroke severity.	1	Thielbar et al. (2017)
1b	Robotics combined with other interventions may not have a difference in efficacy when compared to task-specific training for improving stroke severity.	2	Hsieh et al. (2017); Kahn et al. (2006)

MUSCLE STRENGTH			
LoE	**Conclusion Statement**	**RCTs**	**References**
1a	Robotics may not have a difference in efficacy when compared to conventional therapy for improving muscle strength.	15	Ahn S.Y. et al. (2024); Serrano-López Terradas et al. (2022); Budhota A. et al. (2021); Jiang et al. (2021a); Aprile et al. (2020); Hung et al. (2019a); Lee et al.

			(2017b); Neuendorf et al. (2017); Lee et al. (2016a); Masiero et al. (2014); Sale et al. (2014b); Hsieh et al. (2012); Reinkensmeyer et al. (2012); Hsieh et al. (2011); Lum et al. (2002)
1b	Bi-Manu-Track(Bilateral robot training) may not have a difference in efficacy when compared to INMotion 3.0 (unilateral robot training) for improving muscle strength.	1	Hung et al. (2019a)
1a	Exoskeleton robotics may not have a difference in efficacy when compared to conventional therapy for improving muscle strength.	6	Kim et al. (2023e); Iwamoto et al. (2019); Villafane et al. (2018); Taveggia et al. (2016); Klamroth-Marganska et al. (2014); Housman et al. (2009)
1b	Non-robotic electromechanical devices combined with other interventions may not have a difference in efficacy when compared to conventional therapy for improving muscle strength.	1	Barker et al. (2017)
2	There is conflicting evidence about the effect of IronHand Assistive Glove when compared to No IronHand Glove for improving muscle strength.	1	Radder et al. (2019)
2	IronHand Assistive Glove may result in lesser improvements in muscle strength when compared to IronHand Therapeutic Glove.	1	Radder et al. (2019)
1a	Different approaches to robotics may not have a difference in efficacy when compared with one another for improving muscle strength.	3	Hoidekrova et al. (2024); Rowe et al. (2017); Hwang et al. (2012)
1b	Robot-aided Progressive Resistance Training may not have a difference in efficacy when compared to Robot-aided Active-assisted Training for improving muscle strength.	1	Stein et al. (2004)
1b	Robotic arm therapy (NeReBot) with conventional therapy may not have a difference in efficacy when compared to Conventional therapy with proximal paretic arm exercise for improving muscle strength.	1	Masiero et al. (2011)
1a	Robotics combined with other interventions may not have a difference in efficacy when compared to task-specific training for improving muscle strength.	2	Hsieh et al. (2017); Hesse et al. (2014)
1a	Robotics may produce greater improvements in muscle strength than sham.	3	Masiero et al. (2007); Masiero et al. (2006); Volpe et al. (2000)
1b	Mechanical arm trainer may not have a difference in efficacy when compared to Electrical muscle stimulation of paretic wrist extensors for improving muscle strength.	1	Hesse et al. (2008a)
1a	Robotic orthosis may not have a difference in efficacy when compared to conventional therapy for improving muscle strength.	3	Bayındır et al. (2022); Lannin et al. (2016); Orihuela-Espina et al. (2016)
1b	Robotic Assisted Therapy (Bi-Manu-track robot) may produce greater improvements in muscle strength than electromyography-initiated electrical stimulation.	1	Hesse et al. (2005)
1b	Exoskeleton robotics combined with other interventions may not have a difference in efficacy when compared to conventional therapy for improving muscle strength.	1	Ambrosini et al. (2021)
1b	Robotics combined with other interventions may not have a difference in efficacy when compared to sham or robotics for improving muscle strength.	1	Bernal-Jiménez et al. (2024)
2	X-Glove Orthosis Prolonged Stretching may not have a difference in efficacy when compared to Resting for improving muscle strength.	1	Triandafilou et al. (2011)

1b	Robot assisted training with Botox may produce greater improvements in muscle strength than Conventional treatment with Botox.	1	Gandolfi et al. (2019)
1a	There is conflicting evidence about the effect of Robotic glove therapy when compared to conventional therapy for improving muscle strength.	3	Lee et al. (2021); Thielbar et al. (2017); VaNoglio et al. (2017)
1a	Exoskeleton robotics combined with other interventions may not have a difference in efficacy when compared to exoskeleton robotics or sham for improving muscle strength.	2	Joo et al. (2022); Morone et al. (2022)
2	RMT may not have a difference in efficacy when compared to mirror therapy for improving muscle strength.	1	Schrader et al. (2022)
1b	Bilateral robotic priming training with mirror training (R-mirr) may not have a difference in efficacy when compared to Bilateral robotic priming training with movement oriented training for improving muscle strength.	1	Li et al. (2023)
1a	There is conflicting evidence about the effect of Exoskeleton robotics combined with other interventions when compared to exoskeleton robotics for improving muscle strength.	2	Shi et al. (2024); Kim et al. (2023b)
1b	Robotic training with Rebless may not have a difference in efficacy when compared to UE training with Motomed ergometer for improving muscle strength.	1	Chang et al. (2024a)
2	Robot assisted therapy (InMotion WRIST Robot) with Anodal transcranial direct current stimulation may not have a difference in efficacy when compared to Robot assisted therapy with sham transcranial direct current stimulation for improving muscle strength.	1	Mazzoleni et al. (2019)
1b	Anodal transcranial direct current stimulation with Robot-Assisted Arm Training may not have a difference in efficacy when compared to Sham stimulation with Robot-Asssited Arm Training for improving muscle strength.	1	Hesse et al. (2011b)
1b	Robot therapy with task specific training may not have a difference in efficacy when compared to Robot therapy with impairment oriented training for improving muscle strength.	1	Hung et al. (2016)
1b	Transcutaneous Auricular Vagus Nerve Stimulation with Robotic Training may not have a difference in efficacy when compared to Sham transcutaneous auricular vagus nerve stimulation with Robotic Training for improving muscle strength.	1	Chang J.L. et al. (2021)
1b	Brain-computer interface Therapy with Robotic Hand Orthosis may not have a difference in efficacy when compared to Conventional Care for improving muscle strength.	1	Cantillo-Negrete J. et al. (2021)
1b	Mirror Visual Feedback with Robot-Assisted Training may produce greater improvements in muscle strength than Sham-Mirror Visual Feedback with Robot-Assisted Training.	1	Rong J. et al. (2021)
2	There is conflicting evidence about the effect of Trunk support with visual feedback SMART upper limb training system when compared to Trunk restraint with visual feedback SMART upper limb training system for improving muscle strength.	1	Yang et al. (2021)
1b	Task-oriented training with force feedback hand rehab robot with Conventional upper limb rehabilitation may not have a difference in efficacy when compared to Task-oriented training assisted by a therapist with Conventional upper limb rehabilitation for improving muscle strength.	1	Li et al. (2024a)
1b	Progressive abduction loading therapy with horizontal-plance viscous resistance device may not have a difference in efficacy when compared to Progressive abduction loading therapy for improving muscle strength.	1	Ellis et al. (2018)

1b	Patient-centered Robot-assisted occupational therapy with conventional rehab may not have a difference in efficacy when compared to Robot-centered Robot-assisted therapy with conventional rehab or conventional rehab for improving muscle strength.	1	Yoon et al. (2021)
1b	Bimanual motor skill learning with robot-assisted training and transcranial direct current stimulation may not have a difference in efficacy when compared to bimanual motor skill learning with sham stimulation for improving muscle strength.	1	De Laet et al. (2022)
1b	Bilateral Arm Light Exoskeleton Rehab Station (ALEx RS) with Conventional Therapy may not have a difference in efficacy when compared to Unilateral Arm Light Exoskeleton Rehab Station (ALEx RS) with Conventional Therapy for improving muscle strength.	1	Mauro et al. (2024)
2	Exoskeleton robotics combined with other interventions may not have a difference in efficacy when compared to stretching and positioning programs for improving muscle strength.	1	Vanoglio et al. (2024)
1b	Robotics combined with other interventions may not have a difference in efficacy when compared to robotics or video game training for improving muscle strength.	1	Chen et al. (2021h)
1b	Robotics combined with other interventions may not have a difference in efficacy when compared to robotics or sham for improving muscle strength.	1	Butler et al. (2015)
2	Robotic orthosis combined with other interventions may not have a difference in efficacy when compared to conventional therapy for improving muscle strength.	1	Byl et al. (2013)
1b	There is conflicting evidence about the effect of Single joint arm exoskeleton when compared to Multijoint arm exoskeleton for improving muscle strength.	1	Milot et al. (2013)
1b	Repetitive sensory stimulation with Robot-assisted arm training may not have a difference in efficacy when compared to Sham stimulation with Robot-assisted arm training for improving muscle strength.	1	Egger et al. (2024)
1b	Assisted Motion, Biofeedback, and Antagonist Muscle Vibration delivered by a Robotic Device with UL rehabilitation may not have a difference in efficacy when compared to Placebo intervention with UL rehabilitation for improving muscle strength.	1	Cordo et al. (2022)

SPASTICITY			
LoE	**Conclusion Statement**	**RCTs**	**References**
1a	Robotics may not have a difference in efficacy when compared to conventional therapy for improving spasticity.	11	Ahn S.Y. et al. (2024); Budhota A. et al. (2021); Jiang et al. (2021a); Aprile et al. (2020); Carpinella et al. (2020); Hung et al. (2019a); DauNoraviciene et al. (2018); Lee et al. (2016a); Sale et al. (2014b); Burgar et al. (2011); Lum et al. (2005)
1b	Bi-Manu-Track(Bilateral robot training) may not have a difference in efficacy when compared to INMotion 3.0 (unilateral robot training) for improving spasticity.	1	Hung et al. (2019a)
1b	Unilateral Robotic Training (MIME) may not have a difference in efficacy when compared to Bilateral Robotic Training (MIME) or Combined Unilateral and Bilateral Robotic Training (MIME) for improving spasticity.	1	Lum et al. (2005)

1a	Exoskeleton robotics may not have a difference in efficacy when compared to conventional therapy for improving spasticity.	6	Bhattacharjee et al. (2024); Taravati et al. (2022); Singh et al. (2021); Villafane et al. (2018); Taveggia et al. (2016); Klamroth-Marganska et al. (2014)
1b	Non-robotic electromechanical devices combined with other interventions may not have a difference in efficacy when compared to conventional therapy for improving spasticity.	1	Barker et al. (2017)
1a	Different approaches to robotics may not have a difference in efficacy when compared with one another for improving spasticity.	3	Hoidekrova et al. (2024); Wright et al. (2018); Hwang et al. (2012)
1b	Robot-aided Progressive Resistance Training may not have a difference in efficacy when compared to Robot-aided Active-assisted Training for improving spasticity.	1	Stein et al. (2004)
1b	Robotic arm therapy (NeReBot) with conventional therapy may not have a difference in efficacy when compared to Conventional therapy with proximal paretic arm exercise for improving spasticity.	1	Masiero et al. (2011)
1b	Robotics combined with other interventions may not have a difference in efficacy when compared to task-specific training for improving spasticity.	1	Hesse et al. (2014)
1b	Robot-Assisted Neurocognitive Therapy using a haptic device with Conventional Neurocognitive Therapy may not have a difference in efficacy when compared to Conventional Neurocognitive Therapy for improving spasticity.	1	Ranzani et al. (2020)
1b	Robotics may not have a difference in efficacy when compared to sham for improving spasticity.	1	Masiero et al. (2007)
1a	Exoskeleton robotics combined with other interventions may not have a difference in efficacy when compared to task-specific training for improving spasticity.	2	Hsu et al. (2022a); Esquenazi et al. (2021)
1b	Mechanical arm trainer may not have a difference in efficacy when compared to Electrical muscle stimulation of paretic wrist extensors for improving spasticity.	1	Hesse et al. (2008a)
2	There is conflicting evidence about the effect of Robotic orthosis when compared to conventional therapy for improving spasticity.	2	deAraujo et al. (2011); Ring et al. (2005)
1b	Intensive Sensorimotor Arm Training Mediated by robot may not have a difference in efficacy when compared to Intensive Sensorimotor Arm Training Mediated by Therapist for improving spasticity.	1	Volpe et al. (2008)
1b	Robotic orthosis combined with other interventions may not have a difference in efficacy when compared to conventional therapy for improving spasticity.	2	Straudi et al. (2020); Byl et al. (2013)
1b	Robotic Assisted Therapy (Bi-Manu-track robot) may not have a difference in efficacy when compared to electromyography-initiated electrical stimulation for improving spasticity.	1	Hesse et al. (2005)
2	Exoskeleton robotics combined with other interventions may not have a difference in efficacy when compared to exercise and custom physiotherapy protocols for improving spasticity.	2	Frisoli et al. (2022); Takahashi et al. (2016)
1b	Robotics combined with other interventions may not have a difference in efficacy when compared to conventional therapy for improving spasticity.	1	Lo et al. (2010)
1b	Robot-Assisted Therapy may not have a difference in efficacy when compared to Dose-matched Intensive Comparison Therapy for improving spasticity.	1	Lo et al. (2010)

1b	Different approaches to robotics combined with other interventions may not have a difference in efficacy when compared with one another for improving spasticity.	1	Hu et al. (2015)
1b	Neuromuscular electrical stimulation robotic to distal fingers may produce greater improvements in spasticity than neuromuscular electrical stimulation robotic to proximal wrist-elbow joints.	1	Qian et al. (2019)
1a	Robotics combined with other interventions may not have a difference in efficacy when compared to sham or robotics for improving spasticity.	2	Bernal-Jiménez et al. (2024); Ramos-Murguialday et al. (2013)
1a	Robotics combined with other interventions may not have a difference in efficacy when compared to robotics for improving spasticity.	3	Murakami et al. (2023); Hung et al. (2019b); Pennati et al. (2015)
1b	Neuromuscular electrical stimulation electromyography robotic hand may produce greater improvements in spasticity than electromyography robotic hand.	1	Huang et al. (2020)
1b	Robotic orthosis combined with other interventions may not have a difference in efficacy when compared to task-specific training for improving spasticity.	1	Kuo et al. (2023a)
1b	Robotics combined with other interventions may not have a difference in efficacy when compared to robotics or sham for improving spasticity.	1	Lee et al. (2015b)
2	SMART arm with electrical stim may produce greater improvements in spasticity than No Treatment.	1	Barker et al. (2008)
1b	Condensed Robot-assisted training with botulinum toxin A and Functional training may not have a difference in efficacy when compared to Distributed robot-assisted training with botulinum toxin A and Functional training for improving spasticity.	1	Hung et al. (2021)
1b	Games-based training using an exoskeleton with usual rehab may not have a difference in efficacy when compared to basic stretching and active exercises with usual rehab for improving spasticity.	1	Remy-Neris et al. (2021)
2	Robot-assisted Therapy with conventional rehab may not have a difference in efficacy when compared to Constraint induced movement therapy with conventional rehab for improving spasticity.	1	Terranova T.T. et al. (2021)
1b	Assisted Motion, Biofeedback, and Antagonist Muscle Vibration delivered by a Robotic Device with UL rehabilitation may not have a difference in efficacy when compared to Placebo intervention with UL rehabilitation for improving spasticity.	1	Cordo et al. (2022)
1b	Exoskeleton robotics combined with other interventions may not have a difference in efficacy when compared to exoskeleton robotics or sham for improving spasticity.	1	Morone et al. (2022)
1a	Exoskeleton robotics combined with other interventions may not have a difference in efficacy when compared to exoskeleton robotics for improving spasticity.	2	Shi et al. (2024); Kim et al. (2023b)
1b	Robotic training with Rebless may not have a difference in efficacy when compared to UE training with Motomed ergometer for improving spasticity.	1	Chang et al. (2024a)
2	Robot assisted therapy (InMotion WRIST Robot) with Anodal transcranial direct current stimulation may not have a difference in efficacy when compared to Robot assisted therapy with sham transcranial direct current stimulation for improving spasticity.	1	Mazzoleni et al. (2019)
1b	Anodal transcranial direct current stimulation with Robot-Assisted Arm Training may not have a difference in efficacy when compared to Sham stimulation with Robot-Asssited Arm Training for improving spasticity.	1	Hesse et al. (2011b)

2	Electromyography-driven Robot may produce greater improvements in spasticity than Passive motion robot device on wrist.	1	Hu et al. (2009)
1b	Anodal transcranial direct current stimulation on affected hemisphere with robot assisted arm training may produce greater improvements in spasticity than Cathodal transcranial direct current stimulation on unaffected hemisphere with robot assisted arm training.	1	Ochi et al. (2013)
1b	Transcutaneous Auricular Vagus Nerve Stimulation with Robotic Training may produce greater improvements in spasticity than Sham transcutaneous auricular vagus nerve stimulation with Robotic Training.	1	Chang J.L. et al. (2021)
1b	Brain-computer interface - Robotic with Conventional Rehab may not have a difference in efficacy when compared to Conventional Rehab for improving spasticity.	1	Guo et al. (2022)
1b	Task-oriented training with force feedback hand rehab robot with Conventional upper limb rehabilitation may not have a difference in efficacy when compared to Task-oriented training assisted by a therapist with Conventional upper limb rehabilitation for improving spasticity.	1	Li et al. (2024a)
1b	Fast training may not have a difference in efficacy when compared to Slow training for improving spasticity.	1	Hammerbeck et al. (2017)
2	Non-robotic electromechanical devices may not have a difference in efficacy when compared to conventional therapy for improving spasticity.	1	Volpe et al. (2004)
1b	Bilateral Arm Light Exoskeleton Rehab Station (ALEx RS) with Conventional Therapy may not have a difference in efficacy when compared to Unilateral Arm Light Exoskeleton Rehab Station (ALEx RS) with Conventional Therapy for improving spasticity.	1	Mauro et al. (2024)
1b	Robotics combined with other interventions may not have a difference in efficacy when compared to robotics or video game training for improving spasticity.	1	Chen et al. (2021h)
1b	Robotic Therapy (Armeo Spring & Amadeo) with Task Oriented Training with Active Learning Program for Stroke (ALPS) may not have a difference in efficacy when compared to Robotic Therapy with Active Learning Program for Stroke (ALPS) for improving spasticity.	1	Fasoli et al. (2019)
1b	Robotic training (Armeo) with Muscle vibration may produce greater improvements in spasticity than Robotic training (Armeo) with Sham muscle vibration.	1	Calabro et al. (2017)
1b	There is conflicting evidence about the effect of High-definition tDCS with EMG-driven robotic hand (EMG-RH) when compared to Sham tDCS with EMG-RH for improving spasticity.	1	Hu et al. (2024)
1b	EMG driven NMES Robot arm may produce greater improvements in spasticity than Conventional Therapy.	1	Qian et al. (2017)
1b	Robot assisted training with Botox may produce greater improvements in spasticity than Conventional treatment with Botox.	1	Gandolfi et al. (2019)
1b	There is conflicting evidence about the effect of robot training with forced field when compared to robot training without force field for improving spasticity.	1	Wright et al. (2018)

RANGE OF MOTION			
LoE	**Conclusion Statement**	**RCTs**	**References**
1a	Robotics may produce greater improvements in range of motion than conventional therapy.	5	Serrano-López Terradas et al. (2022); Carpinella et al. (2020); Kim et al. (2019a);

			DauNoraviciene et al. (2018); Sale et al. (2014b)
1a	Exoskeleton robotics may produce greater improvements in range of motion than conventional therapy.	4	Kim et al. (2023e); Singh et al. (2021); Bartolo et al. (2014); Housman et al. (2009)
1a	Different approaches to robotics may not have a difference in efficacy when compared with one another for improving range of motion.	2	Wright et al. (2018); Hwang et al. (2012)
1b	Exoskeleton robotics combined with other interventions may produce greater improvements in range of motion than task-specific training.	1	Esquenazi et al. (2021)
1b	Non-robotic electromechanical devices may not have a difference in efficacy when compared to conventional therapy for improving range of motion.	1	Horsley et al. (2019)
2	Robotic orthosis may produce greater improvements in range of motion than conventional therapy.	1	Ring et al. (2005)
1a	Robotics combined with other interventions may not have a difference in efficacy when compared to robotics for improving range of motion.	3	Abdollahi et al. (2018); Miyasaka et al. (2016); Abdollahi et al. (2014)
1b	There is conflicting evidence about the effect of Robotic orthosis combined with other interventions when compared to task-specific training for improving range of motion.	1	Kuo et al. (2023a)
1b	Patient-centered Robot-assisted occupational therapy with conventional rehab may not have a difference in efficacy when compared to Robot-centered Robot-assisted therapy with conventional rehab or conventional rehab for improving range of motion.	1	Yoon et al. (2021)
1b	Assisted Motion, Biofeedback, and Antagonist Muscle Vibration delivered by a Robotic Device with UL rehabilitation may not have a difference in efficacy when compared to Placebo intervention with UL rehabilitation for improving range of motion.	1	Cordo et al. (2022)
1b	Exoskeleton robotics combined with other interventions may produce greater improvements in range of motion than exoskeleton robotics.	1	Shi et al. (2024)
1b	Robotic training with Rebless may not have a difference in efficacy when compared to UE training with Motomed ergometer for improving range of motion.	1	Chang et al. (2024a)
2	Trunk support with visual feedback SMART upper limb training system may not have a difference in efficacy when compared to Trunk restraint with visual feedback SMART upper limb training system for improving range of motion.	1	Yang et al. (2021)
1b	Task-oriented training with force feedback hand rehab robot with Conventional upper limb rehabilitation may produce greater improvements in range of motion than Task-oriented training assisted by a therapist with Conventional upper limb rehabilitation.	1	Li et al. (2024a)
1b	Robot-mediated therapy (GENTLE/s) may not have a difference in efficacy when compared to Sling suspension phase for improving range of motion.	1	Coote et al. (2008)
1b	Robotics combined with other interventions may not have a difference in efficacy when compared to robotics or video game training for improving range of motion.	1	Chen et al. (2021h)

PROPRIOCEPTION			
LoE	**Conclusion Statement**	**RCTs**	**References**
1b	Robotics may not have a difference in efficacy when compared to conventional therapy for improving proprioception.	1	Reinkensmeyer et al. (2012)
1b	Robot-Assisted Neurocognitive Therapy using a haptic device with Conventional Neurocognitive Therapy may not have a difference in efficacy when compared to Conventional Neurocognitive Therapy for improving proprioception.	1	Ranzani et al. (2020)
1b	Robotics therapy (consisted a glove detecting hand movements) may not have a difference in efficacy when compared to Conventional therapy for improving proprioception.	1	Lee et al. (2021)
1b	Robotic Priming with mirror therapy (RMT) may not have a difference in efficacy when compared to Robotic Priming with Bilateral Upper Limb Training (RBULT) for improving proprioception.	1	Li Y.-C. et al. (2021)
1b	Repetitive sensory stimulation with Robot-assisted arm training may not have a difference in efficacy when compared to Sham stimulation with Robot-assisted arm training for improving proprioception.	1	Egger et al. (2024)
1b	Robotic orthosis combined with other interventions may not have a difference in efficacy when compared to task-specific training for improving proprioception.	1	Kuo et al. (2023a)

2. Activities

ACTIVITIES OF DAILY LIVING			
LoE	**Conclusion Statement**	**RCTs**	**References**
1a	Robotics may not have a difference in efficacy when compared to conventional therapy for improving performance of activities of daily living.	27	Ahn S.Y. et al. (2024); Liu Y. et al. (2024); Serrano-López Terradas et al. (2022); Jiang et al. (2021a); Amatya et al. (2020); Aprile et al. (2020); Carpinella et al. (2020); Chinembiri et al. (2020); Xu et al. (2020); Dehem et al. (2019); Hung et al. (2019a); Kim et al. (2019a); DauNoraviciene et al. (2018); Lee et al. (2018b); Lee et al. (2017b); Tomic et al. (2017); Lee et al. (2016a); Masiero et al. (2014); Wu et al. (2013a); Hsieh et al. (2012); Reinkensmeyer et al. (2012); Abdullah et al. (2011); Burgar et al. (2011); Hsieh et al. (2011); Lum et al. (2005); Lum et al. (2002); Burgar et al. (2000)
1b	Bi-Manu-Track(Bilateral robot training) may not have a difference in efficacy when compared to INMotion 3.0 (unilateral robot training) for improving performance of activities of daily living.	1	Hung et al. (2019a)
1b	Unilateral robot-assisted arm training may not have a difference in efficacy when compared to Bilateral robot-assisted arm training for improving performance of activities of daily living.	1	Wu et al. (2013a)
1b	Unilateral Robotic Training (MIME) may not have a difference in efficacy when compared to Bilateral Robotic Training (MIME) or Combined Unilateral and Bilateral Robotic Training (MIME) for improving performance of activities of daily living.	1	Lum et al. (2005)

1a	Exoskeleton robotics may not have a difference in efficacy when compared to conventional therapy for improving performance of activities of daily living.	15	Bhattacharjee et al. (2024); Cechova et al. (2024); Yildiz et al. (2024); Kim S.-H. et al. (2023); Kim et al. (2023e); Yuan R. et al. (2023); Taravati et al. (2022); Chen et al. (2021g); Singh et al. (2021); Iwamoto et al. (2019); Villafane et al. (2018); Taveggia et al. (2016); Bartolo et al. (2014); Klamroth-Marganska et al. (2014); Housman et al. (2009)
1b	Unilateral robot-assisted training with conventional therapy may not have a difference in efficacy when compared to Bilateral robot-assisted training with conventional therapy for improving performance of activities of daily living.	1	Yuan R. et al. (2023)
1b	Non-robotic electromechanical devices combined with other interventions may not have a difference in efficacy when compared to conventional therapy for improving performance of activities of daily living.	1	Barker et al. (2017)
1a	Different approaches to robotics may not have a difference in efficacy when compared with one another for improving performance of activities of daily living.	3	Hoidekrova et al. (2024); Wright et al. (2018); Rowe et al. (2017)
1b	Fast training may not have a difference in efficacy when compared to Slow training for improving performance of activities of daily living.	1	Hammerbeck et al. (2017)
1b	Robotic arm therapy (NeReBot) with conventional therapy may not have a difference in efficacy when compared to Conventional therapy with proximal paretic arm exercise for improving performance of activities of daily living.	1	Masiero et al. (2011)
1a	Robotics combined with other interventions may not have a difference in efficacy when compared to task-specific training for improving performance of activities of daily living.	4	Chen et al. (2022b); Hsieh et al. (2017); Hesse et al. (2014); Timmermans et al. (2014)
1a	Robotics may produce greater improvements in performance of activities of daily living than sham.	3	Masiero et al. (2007); Masiero et al. (2006); Volpe et al. (2000)
1a	Exoskeleton robotics combined with other interventions may not have a difference in efficacy when compared to task-specific training for improving performance of activities of daily living.	3	Tang et al. (2023); Hsu et al. (2022a); Esquenazi et al. (2021)
1a	Non-robotic electromechanical devices may not have a difference in efficacy when compared to conventional therapy for improving performance of activities of daily living.	3	Horsley et al. (2019); Hesse et al. (2008b); Wang et al. (2007)
1a	There is conflicting evidence about the effect of Robotic orthosis when compared to conventional therapy for improving performance of activities of daily living.	2	Lannin et al. (2016); Liao et al. (2012)
1a	Robotic orthosis combined with other interventions may not have a difference in efficacy when compared to conventional therapy for improving performance of activities of daily living.	3	Wang T. et al. (2023); Straudi et al. (2020); Byl et al. (2013)
1b	Soft Robotic Glove with Conventional therapy may not have a difference in efficacy when compared to Low frequency repetitive transcranial magnetic stimulation with Conventional therapy for improving performance of activities of daily living.	1	Wang T. et al. (2023)
1b	Exoskeleton robotics combined with other interventions may not have a difference in efficacy when compared to exercise and custom physiotherapy protocols for improving performance of activities of daily living.	2	Lin et al. (2022); Takahashi et al. (2016)
1a	Exoskeleton robotics combined with other interventions may not have a difference in efficacy when compared to conventional therapy for improving performance of activities of daily living.	3	Chen et al. (2023a); Ambrosini et al. (2021); Gueye et al. (2021)

1a	Robotics combined with other interventions may not have a difference in efficacy when compared to conventional therapy for improving performance of activities of daily living.	3	Coskunsu et al. (2022); Hsieh et al. (2014); Rabadi et al. (2008)
1b	Robot therapy with distributed constraint induced therapy may not have a difference in efficacy when compared to robot therapy alone for improving performance of activities of daily living.	1	Hsieh et al. (2014)
1a	Robotics combined with other interventions may not have a difference in efficacy when compared to sham or robotics for improving performance of activities of daily living.	2	Bernal-Jiménez et al. (2024); Ramos-Murguialday et al. (2013)
1b	Robot-mediated therapy (GENTLE/s) may not have a difference in efficacy when compared to Sling suspension phase for improving performance of activities of daily living.	1	Coote et al. (2008)
1a	Robotics combined with other interventions may not have a difference in efficacy when compared to robotics for improving performance of activities of daily living.	6	Murakami et al. (2023); Hung et al. (2019b); Hung et al. (2019d); Abdollahi et al. (2018); Hsieh et al. (2016); Pennati et al. (2015)
2	Unilateral robot assisted therapy with modified constraint-induced movement therapy may result in lesser improvements in performance of activities of daily living when compared to Bilateral robot assisted therapy with bilateral arm training.	1	Hung et al. (2019b)
1b	Unilateral robot assisted therapy with constraint-induced movement therapy (unilateral arm) may not have a difference in efficacy when compared to Bilateral robot assisted therapy with BAT (Bimanual tracking) for improving performance of activities of daily living.	1	Hung et al. (2019d)
1b	Neuromuscular electrical stimulation electromyography robotic hand may not have a difference in efficacy when compared to electromyography robotic hand for improving performance of activities of daily living.	1	Huang et al. (2020)
1a	Robotic orthosis combined with other interventions may not have a difference in efficacy when compared to task-specific training for improving performance of activities of daily living.	3	Kuo et al. (2023a); Page et al. (2020); Page et al. (2013)
2	Distal (wrist or hand Functional Electrical Stimulation) may not have a difference in efficacy when compared to functional electrical stimulation with Robot assisted Whole arm for improving performance of activities of daily living.	1	Daly et al. (2019)
2	Distal (wrist or hand Functional Electrical Stimulation) may not have a difference in efficacy when compared to Proximal (Shoulder or elbow) (Functional Electrical Stimulation with inMotion robot) for improving performance of activities of daily living.	1	Daly et al. (2019)
1a	Robotics combined with other interventions may not have a difference in efficacy when compared to robotics or sham for improving performance of activities of daily living.	2	Straudi et al. (2016); Lee et al. (2015b)
1b	Robotic training (InMotion ARM) with motor learning may not have a difference in efficacy when compared to Motor learning for improving performance of activities of daily living.	1	McCabe et al. (2015)
2	SMART arm with electrical stim may produce greater improvements in performance of activities of daily living than No Treatment.	1	Barker et al. (2008)
1b	There is conflicting evidence about the effect of Robot-Assisted Therapy with Bilateral Practice with Task-Specific Training when compared to Conventional Care with Task-Specific Training for improving performance of activities of daily living.	1	Hsu et al. (2019)
1b	Condensed Robot-assisted training with botulinum toxin A and Functional training may not have a difference in efficacy when compared to Distributed robot-assisted training with botulinum toxin	1	Hung et al. (2021)

	A and Functional training for improving performance of activities of daily living.		
1a	There is conflicting evidence about the effect of Robotic glove therapy when compared to conventional therapy for improving performance of activities of daily living.	2	Lee et al. (2021); Thielbar et al. (2017)
1b	Games-based training using an exoskeleton with usual rehab may not have a difference in efficacy when compared to basic stretching and active exercises with usual rehab for improving performance of activities of daily living.	1	Remy-Neris et al. (2021)
1b	Robotic Priming with mirror therapy (RMT) may not have a difference in efficacy when compared to Robotic Priming with Bilateral Upper Limb Training (RBULT) for improving performance of activities of daily living.	1	Li Y.-C. et al. (2021)
2	Robot-assisted Therapy with conventional rehab may not have a difference in efficacy when compared to Constraint induced movement therapy with conventional rehab for improving performance of activities of daily living.	1	Terranova T.T. et al. (2021)
1b	Patient-centered Robot-assisted occupational therapy with conventional rehab may produce greater improvements in performance of activities of daily living than Robot-centered Robot-assisted therapy with conventional rehab or conventional rehab.	1	Yoon et al. (2021)
1a	Exoskeleton robotics combined with other interventions may not have a difference in efficacy when compared to exoskeleton robotics or sham for improving performance of activities of daily living.	2	Joo et al. (2022); Morone et al. (2022)
1b	Bilateral robotic priming training with mirror training (R-mirr) may not have a difference in efficacy when compared to Bilateral robotic priming training with movement oriented training for improving performance of activities of daily living.	1	Li et al. (2023)
1b	Exoskeleton robotics combined with other interventions may produce greater improvements in performance of activities of daily living than exoskeleton robotics.	1	Kim et al. (2023b)
1b	Robotic training with Rebless may not have a difference in efficacy when compared to UE training with Motomed ergometer for improving performance of activities of daily living.	1	Chang et al. (2024a)
2	There is conflicting evidence about the effect of Virtual reality-based robot therapy with smart glove with task-oriented therapy when compared to Task-oriented therapy for improving performance of activities of daily living.	1	Choi & Cho (2024)
1b	Anodal transcranial direct current stimulation with Robot-Assisted Arm Training may not have a difference in efficacy when compared to Sham stimulation with Robot-Asssited Arm Training for improving performance of activities of daily living.	1	Hesse et al. (2011b)
2	Electromyography-driven Robot may not have a difference in efficacy when compared to Passive motion robot device on wrist for improving performance of activities of daily living.	1	Hu et al. (2009)
1b	Anodal transcranial direct current stimulation on affected hemisphere with robot assisted arm training may not have a difference in efficacy when compared to Cathodal transcranial direct current stimulation on unaffected hemisphere with robot assisted arm training for improving performance of activities of daily living.	1	Ochi et al. (2013)
1b	Therapist-based Bilateral Arm Training may not have a difference in efficacy when compared to Control treatment for improving performance of activities of daily living.	1	Wu et al. (2012a)
1b	Mirror Visual Feedback with Robot-Assisted Training may not have a difference in efficacy when compared to Sham-Mirror Visual	1	Rong J. et al. (2021)

	Feedback with Robot-Assisted Training for improving performance of activities of daily living.		
2	Trunk support with visual feedback SMART upper limb training system may produce greater improvements in performance of activities of daily living than Trunk restraint with visual feedback SMART upper limb training system.	1	Yang et al. (2021)
1b	Robotic self training with constraint-induced movement therapy may produce greater improvements in performance of activities of daily living than Conventional self training with conventional care.	1	Takebayashi et al. (2022)
1b	Robotic self training with constraint-induced movement therapy may not have a difference in efficacy when compared to Robotic self training with conventional care for improving performance of activities of daily living.	1	Takebayashi et al. (2022)
2	Glove orthosis graded repetitive arm supplementary program with Virtual reality with home based rehab with occupational therapy may produce greater improvements in performance of activities of daily living than Conventional Rehab.	1	Adams et al. (2023)
1b	Mirror therapy with robot assisted training HOH(Hand of Hope) may not have a difference in efficacy when compared to Sham mirror therapy with robot assisted training HOH for improving performance of activities of daily living.	1	Chen et al. (2023c)
1b	Brain-computer interface controlled hand exoskeleton with Mental practice and Occupational therapy may not have a difference in efficacy when compared to Occupational therapy for improving performance of activities of daily living.	1	Zanona A.D.F. et al. (2023)
1b	Task-oriented training with force feedback hand rehab robot with Conventional upper limb rehabilitation may not have a difference in efficacy when compared to Task-oriented training assisted by a therapist with Conventional upper limb rehabilitation for improving performance of activities of daily living.	1	Li et al. (2024a)
2	Exoskeleton robotics combined with other interventions may not have a difference in efficacy when compared to stretching and positioning programs for improving performance of activities of daily living.	1	Vanoglio et al. (2024)
1b	Robotics combined with other interventions may not have a difference in efficacy when compared to botulinum toxin (botox) for improving performance of activities of daily living.	1	Hung et al. (2022)
1b	Robotics combined with other interventions may not have a difference in efficacy when compared to robotics or video game training for improving performance of activities of daily living.	1	Chen et al. (2021h)
1b	Robotic Therapy (Armeo Spring & Amadeo) with Task Oriented Training with Active Learning Program for Stroke (ALPS) may not have a difference in efficacy when compared to Robotic Therapy with Active Learning Program for Stroke (ALPS) for improving performance of activities of daily living.	1	Fasoli et al. (2019)
1b	Robotic training (Armeo) with Muscle vibration may produce greater improvements in performance of activities of daily living than Robotic training (Armeo) with Sham muscle vibration.	1	Calabro et al. (2017)
1b	Single joint arm exoskeleton may not have a difference in efficacy when compared to Multijoint arm exoskeleton for improving performance of activities of daily living.	1	Milot et al. (2013)
1b	EMG driven NMES Robot arm may not have a difference in efficacy when compared to Conventional Therapy for improving performance of activities of daily living.	1	Qian et al. (2017)

1b	SMART Arm with outcome-triggered (OT) electrical stimulation may produce greater improvements in performance of activities of daily living than SMART arm alone.	1	Hayward et al. (2013)
2	EEG-based Motor Imagery Brain-Computer Interface with Robotic Feedback (MIT-MANUS) may not have a difference in efficacy when compared to Traditional Robotic Therapy for improving performance of activities of daily living.	1	Ang et al. (2010)
1b	Robot-assisted training may not have a difference in efficacy when compared to Usual care for improving performance of activities of daily living.	1	Rodgers et al. (2019)
1b	Enhanced upper limb therapy may produce greater improvements in performance of activities of daily living than Usual care.	1	Rodgers et al. (2019)
1b	Robot-assisted training may not have a difference in efficacy when compared to Enhanced upper limb therapy for improving performance of activities of daily living.	1	Rodgers et al. (2019)

DEXTERITY			
LoE	**Conclusion Statement**	**RCTs**	**References**
1a	Robotics may produce greater improvements in dexterity than conventional therapy.	9	Ahn S.Y. et al. (2024); Serrano-López Terradas et al. (2022); Calabro et al. (2019); Dehem et al. (2019); Neuendorf et al. (2017); BustamanteValles et al. (2016); Grigoras et al. (2016); Masiero et al. (2014); Reinkensmeyer et al. (2012)
2	There is conflicting evidence about the effect of Exoskeleton robotics when compared to conventional therapy for improving dexterity.	2	Taravati et al. (2022); Brokaw et al. (2014)
2	IronHand Assistive Glove may result in lesser improvements in dexterity when compared to No IronHand Glove.	1	Radder et al. (2019)
2	IronHand Assistive Glove may produce greater improvements in dexterity than IronHand Therapeutic Glove.	1	Radder et al. (2019)
1a	Different approaches to robotics may not have a difference in efficacy when compared with one another for improving dexterity.	2	Rowe et al. (2017); Hwang et al. (2012)
1b	Robotic arm therapy (NeReBot) with conventional therapy may not have a difference in efficacy when compared to Conventional therapy with proximal paretic arm exercise for improving dexterity.	1	Masiero et al. (2011)
1a	Robotics combined with other interventions may not have a difference in efficacy when compared to task-specific training for improving dexterity.	2	Hsieh et al. (2017); Hesse et al. (2014)
1b	Robot-Assisted Neurocognitive Therapy using a haptic device with Conventional Neurocognitive Therapy may not have a difference in efficacy when compared to Conventional Neurocognitive Therapy for improving dexterity.	1	Ranzani et al. (2020)
1b	Exoskeleton robotics combined with other interventions may not have a difference in efficacy when compared to task-specific training for improving dexterity.	1	Hsu et al. (2022a)
1b	Mechanical arm trainer may produce greater improvements in dexterity than Electrical muscle stimulation of paretic wrist extensors.	1	Hesse et al. (2008a)
1a	There is conflicting evidence about the effect of Robotic orthosis when compared to conventional therapy for improving dexterity.	3	Bayındır et al. (2022); Lannin et al. (2016); Ring et al. (2005)

1b	Robotic orthosis combined with other interventions may not have a difference in efficacy when compared to conventional therapy for improving dexterity.	2	Straudi et al. (2020); Byl et al. (2013)
1b	Exoskeleton robotics combined with other interventions may produce greater improvements in dexterity than conventional therapy.	1	Ambrosini et al. (2021)
2	AMES robot with torque biofeedback and muscle vibration may not have a difference in efficacy when compared to AMES robot with electromyography biofeedback and muscle vibration for improving dexterity.	1	Cordo et al. (2013)
1b	Robotics combined with other interventions may not have a difference in efficacy when compared to sham or robotics for improving dexterity.	1	Dehem et al. (2018)
1a	Robotics combined with other interventions may not have a difference in efficacy when compared to robotics for improving dexterity.	3	Abdollahi et al. (2018); Pennati et al. (2015); Abdollahi et al. (2014)
1b	Robotic orthosis combined with other interventions may not have a difference in efficacy when compared to task-specific training for improving dexterity.	1	Kuo et al. (2023a)
1a	Robotics combined with other interventions may not have a difference in efficacy when compared to robotics or augmented feedback training for improving dexterity.	2	Cho & Song (2020); Cho et al. (2019)
1b	Robotics therapy (consisted a glove detecting hand movements) may not have a difference in efficacy when compared to Conventional therapy for improving dexterity.	1	Lee et al. (2021)
1a	Exoskeleton robotics combined with other interventions may produce greater improvements in dexterity than exoskeleton robotics.	2	Shi et al. (2024); Kim et al. (2023b)
2	Robot assisted therapy (InMotion WRIST Robot) with Anodal transcranial direct current stimulation may not have a difference in efficacy when compared to Robot assisted therapy with sham transcranial direct current stimulation for improving dexterity.	1	Mazzoleni et al. (2019)
1b	Anodal transcranial direct current stimulation with Robot-Assisted Arm Training may not have a difference in efficacy when compared to Sham stimulation with Robot-Asssited Arm Training for improving dexterity.	1	Hesse et al. (2011b)
1b	Virtual Relaity Game (Vision Based Tracking) may result in lesser improvements in dexterity when compared to Virtual Reality (Haptic Feedback).	1	Cameirao et al. (2012)
1b	Virtual Reality (Haptic Feedback) may produce greater improvements in dexterity than Virtual Reality (Exoskelton).	1	Cameirao et al. (2012)
1b	Virtual Relaity Game (Vision Based Tracking) may not have a difference in efficacy when compared to Virtual Reality (Exoskelton) for improving dexterity.	1	Cameirao et al. (2012)
2	Glove orthosis graded repetitive arm supplementary program with Virtual reality with home based rehab with occupational therapy may not have a difference in efficacy when compared to Conventional Rehab for improving dexterity.	1	Adams et al. (2023)
1b	Brain-computer interface controlled hand exoskeleton with Mental practice and Occupational therapy may not have a difference in efficacy when compared to Occupational therapy for improving dexterity.	1	Zanona A.D.F. et al. (2023)
1a	Robotic glove therapy may produce greater improvements in dexterity than conventional therapy.	2	VaNoglio et al. (2017); Carmeli et al. (2011)

1a	Robotics combined with other interventions may not have a difference in efficacy when compared to robotics or sham for improving dexterity.	2	Straudi et al. (2016); Butler et al. (2015)
1b	Single joint arm exoskeleton may not have a difference in efficacy when compared to Multijoint arm exoskeleton for improving dexterity.	1	Milot et al. (2013)
1b	Repetitive sensory stimulation with Robot-assisted arm training may not have a difference in efficacy when compared to Sham stimulation with Robot-assisted arm training for improving dexterity.	1	Egger et al. (2024)
1b	EMG-Controlled FES during task oriented training with Robotic training may not have a difference in efficacy when compared to Conventional rehab (TST) for improving dexterity.	1	Perini et al. (2020)

Key Points

- Robotics may be beneficial for improving range of motion and dexterity, but not motor function, muscle strength, spasticity, proprioception, and performance of activities of daily living, after stroke when compared to conventional therapy; the literature is mixed regarding stroke severity.
- Bi-Manu-Track(Bilateral robot training) may not be beneficial for improving motor function, performance of activities of daily living, spasticity, and muscle strength after stroke when compared to INMotion 3.0 (unilateral robot training).
- Unilateral robot-assisted arm training may be beneficial for improving motor function, but not performance of activities of daily living, after stroke when compared to Bilateral robot-assisted arm training.
- High intensity robotic therapy (BiManu-Track) may be beneficial for improving motor function after stroke when compared to Low intensity robotic therapy.
- Unilateral Robotic Training (MIME) may not be beneficial for improving motor function, spasticity, and performance of activities of daily living after stroke when compared to Bilateral Robotic Training (MIME) or Combined Unilateral and Bilateral Robotic Training (MIME).
- Different approaches to exoskeleton robotics may not have a difference in efficacy when compared with one another for improving motor function.
- Unilateral robot-assisted training with conventional therapy may not be beneficial for improving performance of activities of daily living after stroke when compared to Bilateral robot-assisted training with conventional therapy.
- Unilateral robot-assisted training with conventional therapy may be less beneficial than Bilateral robot-assisted training with conventional therapy for improving motor function after stroke.
- Non-robotic electromechanical devices combined with other interventions may not be beneficial for improving motor function, performance of activities of daily living, spasticity, and muscle strength after stroke when compared to conventional therapy.
- IronHand Assistive Glove may be less beneficial than No IronHand Glove for improving dexterity after stroke; the literature is mixed regarding motor function and muscle strength.
- IronHand Assistive Glove may be beneficial for improving motor function and dexterity after stroke when compared to IronHand Therapeutic Glove.
- IronHand Assistive Glove may be less beneficial than IronHand Therapeutic Glove for improving muscle strength after stroke.
- Fast training may be beneficial for improving motor function, but not performance of activities of daily living and spasticity, after stroke when compared to Slow training.
- Robot-aided Progressive Resistance Training may not be beneficial for improving motor function, spasticity, and muscle strength after stroke when compared to Robot-aided Active-assisted Training.
- Robotics combined with other interventions may be beneficial for improving motor function after stroke when compared to exercise and custom physiotherapy protocols.
- Robotic arm therapy (NeReBot) with conventional therapy may not be beneficial for improving motor function, dexterity, performance of activities of daily living, spasticity, and muscle strength after stroke when compared to Conventional therapy with proximal paretic arm exercise.

- Robotics combined with other interventions may not be beneficial for improving motor function, stroke severity, muscle strength, spasticity, performance of activities of daily living, and dexterity after stroke when compared to task-specific training.
- Robot-Assisted Neurocognitive Therapy using a haptic device with Conventional Neurocognitive Therapy may not be beneficial for improving motor function, dexterity, spasticity, and proprioception after stroke when compared to Conventional Neurocognitive Therapy.
- Robotics may be beneficial for improving muscle strength and performance of activities of daily living, but not motor function and spasticity, after stroke when compared to sham.
- Exoskeleton robotics combined with other interventions may be beneficial for improving range of motion, but not motor function, spasticity, performance of activities of daily living, and dexterity, after stroke when compared to task-specific training.
- Mechanical arm trainer may be beneficial for improving dexterity, but not motor function, spasticity, and muscle strength, after stroke when compared to Electrical muscle stimulation of paretic wrist extensors.
- Telemonitored hand robotic-assisted therapy (Hand mentor pro) with home exercise program may not be beneficial for improving motor function after stroke when compared to Home exercise program only.
- Robotic orthosis may be beneficial for improving range of motion, but not muscle strength, after stroke when compared to conventional therapy; the literature is mixed regarding motor function, spasticity, performance of activities of daily living, and dexterity.
- Intensive Sensorimotor Arm Training Mediated by robot may not be beneficial for improving motor function and spasticity after stroke when compared to Intensive Sensorimotor Arm Training Mediated by Therapist.
- Robotic orthosis combined with other interventions may not be beneficial for improving motor function, muscle strength, spasticity, performance of activities of daily living, and dexterity after stroke when compared to conventional therapy.
- Soft Robotic Glove with Conventional therapy may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Low frequency repetitive transcranial magnetic stimulation with Conventional therapy.
- Robotic Assisted Therapy (Bi-Manu-track robot) may be beneficial for improving motor function and muscle strength, but not spasticity, after stroke when compared to electromyography-initiated electrical stimulation.
- Exoskeleton robotics combined with other interventions may not be beneficial for improving motor function, performance of activities of daily living, and spasticity after stroke when compared to exercise and custom physiotherapy protocols.
- Exoskeleton robotics combined with other interventions may be beneficial for improving motor function and dexterity, but not performance of activities of daily living and muscle strength, after stroke when compared to conventional therapy.
- Robotics combined with other interventions may not be beneficial for improving motor function, spasticity, and performance of activities of daily living after stroke when compared to conventional therapy.
- Robot therapy with distributed constraint induced therapy may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to robot therapy alone.
- Robot-Assisted Therapy may not be beneficial for improving motor function and spasticity after stroke when compared to Dose-matched Intensive Comparison Therapy.
- Robot therapy with Electroymography-triggered neuromuscular electrical stimulation (ENMES) may be beneficial for improving motor function after stroke when compared to Robot therapy or ENMES.
- Neuromuscular electrical stimulation robotic to distal fingers may be beneficial for improving spasticity after stroke when compared to neuromuscular electrical stimulation robotic to proximal wrist-elbow joints; the literature is mixed regarding motor function.
- External focus with robotic arm may not be beneficial for improving motor function after stroke when compared to Internal focus with robot.
- Robot hand and arm separate training with virtual reality may not be beneficial for improving motor function after stroke when compared to Robot hand and arm together training with virtual reality.

- AMES robot with torque biofeedback and muscle vibration may not be beneficial for improving motor function and dexterity after stroke when compared to AMES robot with electromyography biofeedback and muscle vibration.
- Robotics combined with other interventions may be beneficial for improving motor function, but not muscle strength, spasticity, performance of activities of daily living, and dexterity, after stroke when compared to sham or robotics.
- X-Glove Orthosis Prolonged Stretching may not be beneficial for improving motor function and muscle strength after stroke when compared to Resting.
- Robot-mediated therapy (GENTLE/s) may be beneficial for improving motor function, but not performance of activities of daily living and range of motion, after stroke when compared to Sling suspension phase.
- Robotics combined with other interventions may not be beneficial for improving motor function, spasticity, range of motion, performance of activities of daily living, and dexterity after stroke when compared to robotics.
- Unilateral robot assisted therapy with modified constraint-induced movement therapy may not be beneficial for improving motor function after stroke when compared to Bilateral robot assisted therapy with bilateral arm training.
- Unilateral robot assisted therapy with modified constraint-induced movement therapy may be less beneficial than Bilateral robot assisted therapy with bilateral arm training for improving performance of activities of daily living after stroke.
- Unilateral robot assisted therapy with constraint-induced movement therapy (unilateral arm) may not be beneficial for improving performance of activities of daily living after stroke when compared to Bilateral robot assisted therapy with BAT (Bimanual tracking).
- Unilateral robot assisted therapy with constraint-induced movement therapy (unilateral arm) may be less beneficial than Bilateral robot assisted therapy with BAT (Bimanual tracking) for improving motor function after stroke.
- Neuromuscular electrical stimulation electromyography robotic hand may be beneficial for improving spasticity, but not motor function and performance of activities of daily living, after stroke when compared to electromyography robotic hand.
- Robot assisted training with Botox may be beneficial for improving motor function, muscle strength, and spasticity after stroke when compared to Conventional treatment with Botox.
- Progressive abduction loading therapy with horizontal-plance viscous resistance device may not be beneficial for improving motor function and muscle strength after stroke when compared to Progressive abduction loading therapy.
- Robotic orthosis combined with other interventions may not be beneficial for improving motor function, spasticity, proprioception, performance of activities of daily living, and dexterity after stroke when compared to task-specific training; the literature is mixed regarding range of motion.
- Distal (wrist or hand Functional Electrical Stimulation) may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to functional electrical stimulation with Robot assisted Whole arm.
- Distal (wrist or hand Functional Electrical Stimulation) may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Proximal (Shoulder or elbow) (Functional Electrical Stimulation with inMotion robot).
- End-effector robot with occupational therapy may not be beneficial for improving motor function after stroke when compared to Exoskeleton robot with occupational therapy.
- Robotics combined with other interventions may not be beneficial for improving motor function, muscle strength, spasticity, performance of activities of daily living, and dexterity after stroke when compared to robotics or sham.
- Robotic training (InMotion ARM) with motor learning may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Motor learning.
- Robotics combined with other interventions may not be beneficial for improving dexterity after stroke when compared to robotics or augmented feedback training; the literature is mixed regarding motor function.

- Robot-Assisted Therapy with Bilateral Practice with Task-Specific Training may be beneficial for improving motor function after stroke when compared to Conventional Care with Task-Specific Training; the literature is mixed regarding performance of activities of daily living.
- Condensed Robot-assisted training with botulinum toxin A and Functional training may not be beneficial for improving motor function, performance of activities of daily living, and spasticity after stroke when compared to Distributed robot-assisted training with botulinum toxin A and Functional training.
- Robotic glove therapy may be beneficial for improving motor function and dexterity, but not stroke severity, after stroke when compared to conventional therapy; the literature is mixed regarding muscle strength and performance of activities of daily living.
- Rejoyce system with occupational therapy may not be beneficial for improving motor function and stroke severity after stroke when compared to task based exercises with occupational therapy.
- Games-based training using an exoskeleton with usual rehab may not be beneficial for improving motor function, performance of activities of daily living, and spasticity after stroke when compared to basic stretching and active exercises with usual rehab.
- Robotic Priming with mirror therapy (RMT) may not be beneficial for improving motor function, proprioception, and performance of activities of daily living after stroke when compared to Robotic Priming with Bilateral Upper Limb Training (RBULT).
- Robot-assisted Therapy with conventional rehab may not be beneficial for improving motor function, performance of activities of daily living, and spasticity after stroke when compared to Constraint induced movement therapy with conventional rehab.
- Patient-centered Robot-assisted occupational therapy with conventional rehab may be beneficial for improving performance of activities of daily living, but not range of motion and muscle strength, after stroke when compared to Robot-centered Robot-assisted therapy with conventional rehab or conventional rehab; the literature is mixed regarding motor function.
- Assisted Motion, Biofeedback, and Antagonist Muscle Vibration delivered by a Robotic Device with UL rehabilitation may be beneficial for improving motor function, but not muscle strength, spasticity, and range of motion, after stroke when compared to Placebo intervention with UL rehabilitation.
- Exoskeleton robotics combined with other interventions may not be beneficial for improving stroke severity, muscle strength, spasticity, and performance of activities of daily living after stroke when compared to exoskeleton robotics or sham; the literature is mixed regarding motor function.
- RMT may not be beneficial for improving motor function and muscle strength after stroke when compared to mirror therapy.
- Smart hand joint training device with bilateral transcranial direct current stimulation may be beneficial for improving motor function and stroke severity after stroke when compared to Smart hand joint training device.
- Bilateral robotic priming training with mirror training (R-mirr) may be beneficial for improving motor function, but not performance of activities of daily living and muscle strength, after stroke when compared to Bilateral robotic priming training with movement oriented training.
- Robotic rehab with trunk rehab may not be beneficial for improving motor function after stroke when compared to Conventional rehab with trunk rehab.
- Exoskeleton robotics combined with other interventions may be beneficial for improving motor function, range of motion, performance of activities of daily living, and dexterity, but not stroke severity and spasticity, after stroke when compared to exoskeleton robotics; the literature is mixed regarding muscle strength.
- Robotic training with Rebless may be beneficial for improving motor function, but not performance of activities of daily living, spasticity, range of motion, and muscle strength, after stroke when compared to UE training with Motomed ergometer.
- Virtual reality-based robot therapy with smart glove with task-oriented therapy may be beneficial for improving motor function after stroke when compared to Task-oriented therapy; the literature is mixed regarding performance of activities of daily living.
- Robotic training with force fields for error augmentation with Video game therapy and Conventional therapy may be beneficial for improving motor function after stroke when compared to Robotic training without force fields for error augmentation with Video game therapy and Conventional therapy.

- Robot assisted therapy (InMotion WRIST Robot) with Anodal transcranial direct current stimulation may not be beneficial for improving motor function, dexterity, spasticity, and muscle strength after stroke when compared to Robot assisted therapy with sham transcranial direct current stimulation.
- Anodal transcranial direct current stimulation with Robot-Assisted Arm Training may not be beneficial for improving motor function, dexterity, performance of activities of daily living, spasticity, and muscle strength after stroke when compared to Sham stimulation with Robot-Asssited Arm Training.
- Robot therapy with task specific training may not be beneficial for improving muscle strength after stroke when compared to Robot therapy with impairment oriented training; the literature is mixed regarding motor function.
- Electromyography-driven Robot may be beneficial for improving spasticity, but not performance of activities of daily living, after stroke when compared to Passive motion robot device on wrist; the literature is mixed regarding motor function.
- Anodal transcranial direct current stimulation on affected hemisphere with robot assisted arm training may be beneficial for improving spasticity, but not motor function and performance of activities of daily living, after stroke when compared to Cathodal transcranial direct current stimulation on unaffected hemisphere with robot assisted arm training.
- EEG-based motor imargery brain-computer interface with Haptic Knob robotic arm rehabilitation may not be beneficial for improving motor function after stroke when compared to arm therapy.
- EEG-based Motor Imagery Brain-Computer Interface with Robotic Feedback (MIT-MANUS) may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Traditional Robotic Therapy.
- Brain computer interface motor imagery with MITManus robotic training may not be beneficial for improving motor function after stroke when compared to MIT-Manus robotic training.
- Bimanual robotic training with error augmentation may not be beneficial for improving motor function after stroke when compared to Bimanual robotic training.
- Therapist-based Bilateral Arm Training may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Control treatment.
- The literature is mixed regarding the effect of Brain-computer interfaces-Exoskeleton-Based Training on improvement of motor function after stroke when compared to Sham exoskeleton Training.
- Transcutaneous Auricular Vagus Nerve Stimulation with Robotic Training may be beneficial for improving spasticity, but not motor function and muscle strength, after stroke when compared to Sham transcutaneous auricular vagus nerve stimulation with Robotic Training.
- Brain-computer interface Therapy with Robotic Hand Orthosis may not be beneficial for improving motor function and muscle strength after stroke when compared to Conventional Care.
- Mirror Visual Feedback with Robot-Assisted Training may be beneficial for improving muscle strength, but not performance of activities of daily living, after stroke when compared to Sham-Mirror Visual Feedback with Robot-Assisted Training; the literature is mixed regarding motor function.
- Trunk support with visual feedback SMART upper limb training system may be beneficial for improving motor function and performance of activities of daily living, but not range of motion, after stroke when compared to Trunk restraint with visual feedback SMART upper limb training system; the literature is mixed regarding muscle strength.
- Brain-computer interface - Robotic with Conventional Rehab may be beneficial for improving motor function, but not spasticity, after stroke when compared to Conventional Rehab.
- Robotic self training with constraint-induced movement therapy may be beneficial for improving performance of activities of daily living, but not motor function, after stroke when compared to Conventional self training with conventional care.
- Robotic self training with constraint-induced movement therapy may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Robotic self training with conventional care.
- The literature is mixed regarding the effect of Continuous theta burst stimulation with intermittent theta burst stimulation and robot assisted therapy on improvement of motor function after stroke when compared to sham continuous theta burst stimulation with sham intermittent theta burst stimulation and robot-assisted therapy.

- Continuous theta burst stimulation with intermittent theta burst stimulation and robot assisted therapy may not be beneficial for improving motor function after stroke when compared to sham continuous theta burst stimulation with intermittent theta burst stimulation and robot assisted training.
- Glove orthosis graded repetitive arm supplementary program with Virtual reality with home based rehab with occupational therapy may be beneficial for improving performance of activities of daily living, but not motor function and dexterity, after stroke when compared to Conventional Rehab.
- Mirror therapy with robot assisted training HOH(Hand of Hope) may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Sham mirror therapy with robot assisted training HOH.
- Portable brain-computer interface-based hand robot system with Conventional therapy and neuromuscular electrical stimulation may be beneficial for improving motor function after stroke when compared to Task-specific training with Conventional therapy and neuromuscular electrical stimulation.
- Brain-computer interface controlled hand exoskeleton with Mental practice and Occupational therapy may not be beneficial for improving motor function, dexterity, and performance of activities of daily living after stroke when compared to Occupational therapy.
- Immersive virtual reality (CUREO) with Conventional therapy may be beneficial for improving motor function after stroke when compared to Electromechanically assisted training (ARMEOSpring) with Conventional therapy.
- Cyproheptadine with EMG-controlled VAEDA glove may not be beneficial for improving motor function after stroke when compared to Placebo with EMG-controlled VAEDA glove or Placebo with passive stretching VAEDA with glove.
- Task-oriented training with force feedback hand rehab robot with Conventional upper limb rehabilitation may be beneficial for improving motor function and range of motion, but not stroke severity, muscle strength, spasticity, and performance of activities of daily living, after stroke when compared to Task-oriented training assisted by a therapist with Conventional upper limb rehabilitation.
- Non-robotic electromechanical devices may be beneficial for improving stroke severity, but not motor function, performance of activities of daily living, spasticity, and range of motion, after stroke when compared to conventional therapy.
- Robotics therapy (consisted a glove detecting hand movements) may not be beneficial for improving dexterity and proprioception after stroke when compared to Conventional therapy.
- Virtual Relaity Game (Vision Based Tracking) may be less beneficial than Virtual Reality (Haptic Feedback) for improving dexterity after stroke.
- Virtual Reality (Haptic Feedback) may be beneficial for improving dexterity after stroke when compared to Virtual Reality (Exoskelton).
- Virtual Relaity Game (Vision Based Tracking) may not be beneficial for improving dexterity after stroke when compared to Virtual Reality (Exoskelton).
- SMART arm with electrical stim may be beneficial for improving performance of activities of daily living and spasticity after stroke when compared to No Treatment.
- Bimanual motor skill learning with robot-assisted training and transcranial direct current stimulation may not be beneficial for improving muscle strength after stroke when compared to bimanual motor skill learning with sham stimulation.
- Bilateral Arm Light Exoskeleton Rehab Station (ALEx RS) with Conventional Therapy may not be beneficial for improving motor function, muscle strength, and spasticity after stroke when compared to Unilateral Arm Light Exoskeleton Rehab Station (ALEx RS) with Conventional Therapy.
- Robotic Therapy (Armeo Spring & Amadeo) with Task Oriented Training with Active Learning Program for Stroke (ALPS) may not be beneficial for improving spasticity and performance of activities of daily living after stroke when compared to Robotic Therapy with Active Learning Program for Stroke (ALPS); the literature is mixed regarding motor function.
- Robotic training (Armeo) with Muscle vibration may be beneficial for improving motor function, spasticity, and performance of activities of daily living after stroke when compared to Robotic training (Armeo) with Sham muscle vibration.

- Single joint arm exoskeleton may not be beneficial for improving motor function, performance of activities of daily living, and dexterity after stroke when compared to Multijoint arm exoskeleton; the literature is mixed regarding muscle strength.
- Exoskeleton robotics combined with other interventions may not be beneficial for improving motor function, muscle strength, and performance of activities of daily living after stroke when compared to stretching and positioning programs.
- Robotics combined with other interventions may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to botulinum toxin (botox).
- Robotics combined with other interventions may not be beneficial for improving motor function, muscle strength, spasticity, range of motion, and performance of activities of daily living after stroke when compared to robotics or video game training.
- Repetitive sensory stimulation with Robot-assisted arm training may not be beneficial for improving motor function, muscle strength, proprioception, and dexterity after stroke when compared to Sham stimulation with Robot-assisted arm training.
- The literature is mixed regarding the effect of High-definition tDCS with EMG-driven robotic hand (EMG-RH) on motor function and spasticity after stroke when compared to Sham tDCS with EMG-RH.
- EMG-Controlled FES during task oriented training with Robotic training may be beneficial for improving motor function, but not dexterity, after stroke when compared to Conventional rehab (TST).
- EMG driven NMES Robot arm may be beneficial for improving spasticity, but not performance of activities of daily living, after stroke when compared to Conventional Therapy; the literature is mixed regarding motor function.
- CTBS with robotic therapy may be beneficial for improving motor function after stroke when compared to Sham stimulation with robotic therapy.
- SMART Arm with outcome-triggered (OT) electrical stimulation may be beneficial for improving performance of activities of daily living after stroke when compared to SMART arm alone.
- Exoskeleton robotics may be beneficial for improving range of motion, but not motor function, stroke severity, muscle strength, spasticity, and performance of activities of daily living, after stroke when compared to conventional therapy; the literature is mixed regarding dexterity.
- Different approaches to robotics may not have a difference in efficacy when compared with one another for improving motor function, stroke severity, muscle strength, spasticity, range of motion, performance of activities of daily living, and dexterity.
- The literature is mixed regarding the effect of IronHand Assistive Glove on motor function and muscle strength after stroke when compared to No IronHand Glove.
- Different approaches to robotics combined with other interventions may not have a difference in efficacy when compared with one another for improving spasticity; the literature is mixed regarding motor function.
- The literature is mixed regarding the effect of robot training with forced field on spasticity after stroke when compared to robot training without force field.
- Enhanced upper limb therapy may be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Usual care.
- Robot-assisted training may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Usual care.
- Robot-assisted training may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Enhanced upper limb therapy.

Summary of Key Points: Robotics

Intervention	Control(s)	Function domain(s)	Effect
Robotics	conventional therapy	Range of motion, dexterity	+
Robotics	conventional therapy	Motor function, muscle strength, spasticity, proprioception, performance of activities of daily living	–

Robotics	conventional therapy	Stroke severity	=
Bi-Manu-Track(Bilateral robot training)	INMotion 3.0 (unilateral robot training)	Motor function, performance of activities of daily living, spasticity, muscle strength	–
Unilateral robot-assisted arm training	Bilateral robot-assisted arm training	Motor function	+
Unilateral robot-assisted arm training	Bilateral robot-assisted arm training	Performance of activities of daily living	–
High intensity robotic therapy (BiManu-Track)	Low intensity robotic therapy	Motor function	+
Unilateral Robotic Training (MIME)	Bilateral Robotic Training (MIME) or Combined Unilateral and Bilateral Robotic Training (MIME)	Motor function, spasticity, performance of activities of daily living	–
Exoskeleton robotics	conventional therapy	Range of motion	+
Exoskeleton robotics	conventional therapy	Motor function, stroke severity, muscle strength, spasticity, performance of activities of daily living	–
Exoskeleton robotics	conventional therapy	Dexterity	=
Unilateral robot-assisted training with conventional therapy	Bilateral robot-assisted training with conventional therapy	Motor function, performance of activities of daily living	–
Non-robotic electromechanical devices combined with other interventions	conventional therapy	Motor function, performance of activities of daily living, spasticity, muscle strength	–
IronHand Assistive Glove	No IronHand Glove	Dexterity	–
IronHand Assistive Glove	No IronHand Glove	Motor function, muscle strength	=
IronHand Assistive Glove	IronHand Therapeutic Glove	Motor function, dexterity	+
IronHand Assistive Glove	IronHand Therapeutic Glove	Muscle strength	–
Robotics	One another (different approaches compared)	Motor function, stroke severity, muscle strength, spasticity, range of motion, performance of activities of daily living, dexterity	–
Fast training	Slow training	Motor function	+
Fast training	Slow training	Performance of activities of daily living, spasticity	–
Robot-aided Progressive Resistance Training	Robot-aided Active-assisted Training	Motor function, spasticity, muscle strength	–
Robotics combined with other interventions	exercise and custom physiotherapy protocols	Motor function	+
Robotic arm therapy (NeReBot) with conventional therapy	Conventional therapy with proximal paretic arm exercise	Motor function, dexterity, performance of activities of daily living, spasticity, muscle strength	–
Robotics combined with other interventions	task-specific training	Motor function, stroke severity, muscle strength, spasticity, performance of activities of daily living, dexterity	–

Robot-Assisted Neurocognitive Therapy using a haptic device with Conventional Neurocognitive Therapy	Conventional Neurocognitive Therapy	Motor function, dexterity, spasticity, proprioception	–
Robotics	sham	Muscle strength, performance of activities of daily living	+
Robotics	sham	Motor function, spasticity	–
Exoskeleton robotics combined with other interventions	task-specific training	Motor function, spasticity, performance of activities of daily living, dexterity	–
Exoskeleton robotics combined with other interventions	task-specific training	Range of motion	+
Mechanical arm trainer	Electrical muscle stimulation of paretic wrist extensors	Dexterity	+
Mechanical arm trainer	Electrical muscle stimulation of paretic wrist extensors	Motor function, spasticity, muscle strength	–
Telemonitored hand robotic-assisted therapy (Hand mentor pro) with home exercise program	Home exercise program only	Motor function	–
Robotic orthosis	conventional therapy	Range of motion	+
Robotic orthosis	conventional therapy	Muscle strength	–
Robotic orthosis	conventional therapy	Motor function, spasticity, performance of activities of daily living, dexterity	=
Intensive Sensorimotor Arm Training Mediated by robot	Intensive Sensorimotor Arm Training Mediated by Therapist	Motor function, spasticity	–
Robotic orthosis combined with other interventions	conventional therapy	Motor function, muscle strength, spasticity, performance of activities of daily living, dexterity	–
Soft Robotic Glove with Conventional therapy	Low frequency repetitive transcranial magnetic stimulation with Conventional therapy	Motor function, performance of activities of daily living	–
Robotic Assisted Therapy (Bi-Manu-track robot)	electromyography-initiated electrical stimulation	Motor function, muscle strength	+
Robotic Assisted Therapy (Bi-Manu-track robot)	electromyography-initiated electrical stimulation	Spasticity	–
Exoskeleton robotics combined with other interventions	exercise and custom physiotherapy protocols	Motor function, performance of activities of daily living, spasticity	–
Exoskeleton robotics combined with other interventions	conventional therapy	Motor function, dexterity	+
Exoskeleton robotics combined with other interventions	conventional therapy	Performance of activities of daily living, muscle strength	–
Robotics combined with other interventions	conventional therapy	Motor function, performance of activities of daily living, spasticity	–
Robot therapy with distributed constraint induced therapy	robot therapy alone	Motor function, performance of activities of daily living	–
Robot-Assisted Therapy	Dose-matched Intensive Comparison Therapy	Motor function, spasticity	–
Robotics combined with other interventions	One another (different approaches compared)	Spasticity	–

Robotics combined with other interventions	One another (different approaches compared)	Motor function	=
Robot therapy with Electroymography-triggered neuromuscular electrical stimulation (ENMES)	Robot therapy or ENMES	Motor function	+
Neuromuscular electrical stimulation robotic to distal fingers	neuromuscular electrical stimulation robotic to proximal wrist-elbow joints	Spasticity	+
Neuromuscular electrical stimulation robotic to distal fingers	neuromuscular electrical stimulation robotic to proximal wrist-elbow joints	Motor function	=
External focus with robotic arm	Internal focus with robot	Motor function	–
Robot hand and arm separate training with virtual reality	Robot hand and arm together training with virtual reality	Motor function	–
AMES robot with torque biofeedback and muscle vibration	AMES robot with electromyography biofeedback and muscle vibration	Motor function, dexterity	–
Robotics combined with other interventions	sham or robotics	Muscle strength, spasticity, performance of activities of daily living, dexterity	–
X-Glove Orthosis Prolonged Stretching	Resting	Motor function, muscle strength	–
Robot-mediated therapy (GENTLE/s)	Sling suspension phase	Motor function	+
Robot-mediated therapy (GENTLE/s)	Sling suspension phase	Performance of activities of daily living, range of motion	–
Robotics combined with other interventions	robotics	Motor function, dexterity, performance of activities of daily living, spasticity, range of motion	–
Unilateral robot assisted therapy with modified constraint-induced movement therapy	Bilateral robot assisted therapy with bilateral arm training	Motor function, performance of activities of daily living	–
Unilateral robot assisted therapy with constraint-induced movement therapy (unilateral arm)	Bilateral robot assisted therapy with BAT (Bimanual tracking)	Motor function, performance of activities of daily living	–
Neuromuscular electrical stimulation electromyography robotic hand	electromyography robotic hand	Spasticity	+
Neuromuscular electrical stimulation electromyography robotic hand	electromyography robotic hand	Motor function, performance of activities of daily living	–
Robot assisted training with Botox	Conventional treatment with Botox	Motor function, muscle strength, spasticity	+
Progressive abduction loading therapy with horizontal-plance viscous resistance device	Progressive abduction loading therapy	Motor function, muscle strength	–
Robotic orthosis combined with other interventions	task-specific training	Motor function, spasticity, proprioception, performance of activities of daily living, dexterity	–
Robotic orthosis combined with other interventions	task-specific training	Range of motion	=
Distal (wrist or hand Functional Electrical Stimulation)	functional electrical stimulation with Robot assisted Whole arm	Motor function, performance of activities of daily living	–

Distal (wrist or hand Functional Electrical Stimulation)	Proximal (Shoulder or elbow) (Functional Electrical Stimulation with inMotion robot)	Motor function, performance of activities of daily living	−
End-effector robot with occupational therapy	Exoskeleton robot with occupational therapy	Motor function	−
Robotics combined with other interventions	robotics or sham	Motor function, muscle strength, spasticity, performance of activities of daily living, dexterity	−
Robotic training (InMotion ARM) with motor learning	Motor learning	Motor function, performance of activities of daily living	−
Robotics combined with other interventions	robotics or augmented feedback training	Dexterity	−
Robotics combined with other interventions	robotics or augmented feedback training	Motor function	=
Robot-Assisted Therapy with Bilateral Practice with Task-Specific Training	Conventional Care with Task-Specific Training	Motor function	+
Robot-Assisted Therapy with Bilateral Practice with Task-Specific Training	Conventional Care with Task-Specific Training	Performance of activities of daily living	=
Condensed Robot-assisted training with botulinum toxin A and Functional training	Distributed robot-assisted training with botulinum toxin A and Functional training	Motor function, performance of activities of daily living, spasticity	−
Robotic glove therapy	conventional therapy	Stroke severity	−
Robotic glove therapy	conventional therapy	Muscle strength, performance of activities of daily living	=
Robotic glove therapy	conventional therapy	Motor function, dexterity	+
Rejoyce system with occupational therapy	task based exercises with occupational therapy	Motor function, stroke severity	−
Games-based training using an exoskeleton with usual rehab	basic stretching and active exercises with usual rehab	Motor function, performance of activities of daily living, spasticity	−
Robotic Priming with mirror therapy (RMT)	Robotic Priming with Bilateral Upper Limb Training (RBULT)	Motor function, proprioception, performance of activities of daily living	−
Robot-assisted Therapy with conventional rehab	Constraint induced movement therapy with conventional rehab	Motor function, performance of activities of daily living, spasticity	−
Patient-centered Robot-assisted occupational therapy with conventional rehab	Robot-centered Robot-assisted therapy with conventional rehab or conventional rehab	Performance of activities of daily living	+
Patient-centered Robot-assisted occupational therapy with conventional rehab	Robot-centered Robot-assisted therapy with conventional rehab or conventional rehab	Range of motion, muscle strength	−
Patient-centered Robot-assisted occupational therapy with conventional rehab	Robot-centered Robot-assisted therapy with conventional rehab or conventional rehab	Motor function	=
Assisted Motion, Biofeedback, and Antagonist Muscle Vibration delivered by a Robotic Device with UL rehabilitation	Placebo intervention with UL rehabilitation	Motor function	+
Assisted Motion, Biofeedback, and Antagonist Muscle Vibration delivered by a Robotic Device with UL rehabilitation	Placebo intervention with UL rehabilitation	Muscle strength, spasticity, range of motion	−

Exoskeleton robotics combined with other interventions	exoskeleton robotics or sham	Performance of activities of daily living, spasticity, stroke severity, muscle strength	–
RMT	mirror therapy	Motor function, muscle strength	–
Smart hand joint training device with bilateral transcranial direct current stimulation	Smart hand joint training device	Motor function, stroke severity	+
Bilateral robotic priming training with mirror training (R-mirr)	Bilateral robotic priming training with movement oriented training	Motor function	+
Bilateral robotic priming training with mirror training (R-mirr)	Bilateral robotic priming training with movement oriented training	Performance of activities of daily living, muscle strength	–
Robotic rehab with trunk rehab	Conventional rehab with trunk rehab	Motor function	–
Exoskeleton robotics combined with other interventions	exoskeleton robotics	Motor function, range of motion, performance of activities of daily living, dexterity	+
Exoskeleton robotics combined with other interventions	exoskeleton robotics	Spasticity, stroke severity	–
Robotic training with Rebless	UE training with Motomed ergometer	Motor function	+
Robotic training with Rebless	UE training with Motomed ergometer	Performance of activities of daily living, spasticity, range of motion, muscle strength	–
Virtual reality-based robot therapy with smart glove with task-oriented therapy	Task-oriented therapy	Motor function	+
Virtual reality-based robot therapy with smart glove with task-oriented therapy	Task-oriented therapy	Performance of activities of daily living	=
Robotic training with force fields for error augmentation with Video game therapy and Conventional therapy	Robotic training without force fields for error augmentation with Video game therapy and Conventional therapy	Motor function	+
Robot assisted therapy (InMotion WRIST Robot) with Anodal transcranial direct current stimulation	Robot assisted therapy with sham transcranial direct current stimulation	Motor function, dexterity, spasticity, muscle strength	–
Anodal transcranial direct current stimulation with Robot-Assisted Arm Training	Sham stimulation with Robot-Asssited Arm Training	Motor function, dexterity, performance of activities of daily living, spasticity, muscle strength	–
Robot therapy with task specific training	Robot therapy with impairment oriented training	Muscle strength	–
Robot therapy with task specific training	Robot therapy with impairment oriented training	Motor function	=
Electromyography-driven Robot	Passive motion robot device on wrist	Spasticity	+
Electromyography-driven Robot	Passive motion robot device on wrist	Performance of activities of daily living	–
Electromyography-driven Robot	Passive motion robot device on wrist	Motor function	=
Anodal transcranial direct current stimulation on affected hemisphere with robot assisted arm training	Cathodal transcranial direct current stimulation on unaffected hemisphere with robot assisted arm training	Spasticity	+

Anodal transcranial direct current stimulation on affected hemisphere with robot assisted arm training	Cathodal transcranial direct current stimulation on unaffected hemisphere with robot assisted arm training	Motor function, performance of activities of daily living	−
EEG-based motor imargery brain-computer interface with Haptic Knob robotic arm rehabilitation	arm therapy	Motor function	−
EEG-based Motor Imagery Brain-Computer Interface with Robotic Feedback (MIT-MANUS)	Traditional Robotic Therapy	Motor function, performance of activities of daily living	−
Brain computer interface motor imagery with MITManus robotic training	MIT-Manus robotic training	Motor function	−
Bimanual robotic training with error augmentation	Bimanual robotic training	Motor function	−
Therapist-based Bilateral Arm Training	Control treatment	Motor function, performance of activities of daily living	−
Brain-computer interfaces-Exoskeleton-Based Training	Sham exoskeleton Training	Motor function	=
Transcutaneous Auricular Vagus Nerve Stimulation with Robotic Training	Sham transcutaneous auricular vagus nerve stimulation with Robotic Training	Spasticity	+
Transcutaneous Auricular Vagus Nerve Stimulation with Robotic Training	Sham transcutaneous auricular vagus nerve stimulation with Robotic Training	Motor function, muscle strength	−
Brain-computer interface Therapy with Robotic Hand Orthosis	Conventional Care	Motor function, muscle strength	−
Mirror Visual Feedback with Robot-Assisted Training	Sham-Mirror Visual Feedback with Robot-Assisted Training	Muscle strength	+
Mirror Visual Feedback with Robot-Assisted Training	Sham-Mirror Visual Feedback with Robot-Assisted Training	Performance of activities of daily living	−
Mirror Visual Feedback with Robot-Assisted Training	Sham-Mirror Visual Feedback with Robot-Assisted Training	Motor function	=
Trunk support with visual feedback SMART upper limb training system	Trunk restraint with visual feedback SMART upper limb training system	Motor function, performance of activities of daily living	+
Trunk support with visual feedback SMART upper limb training system	Trunk restraint with visual feedback SMART upper limb training system	Range of motion	−
Trunk support with visual feedback SMART upper limb training system	Trunk restraint with visual feedback SMART upper limb training system	Muscle strength	=
Brain-computer interface - Robotic with Conventional Rehab	Conventional Rehab	Motor function	+
Brain-computer interface - Robotic with Conventional Rehab	Conventional Rehab	Spasticity	−
Robotic self training with constraint-induced movement therapy	Conventional self training with conventional care	Performance of activities of daily living	+
Robotic self training with constraint-induced movement therapy	Conventional self training with conventional care	Motor function	−
Robotic self training with constraint-induced movement therapy	Robotic self training with conventional care	Motor function, performance of activities of daily living	−

Continuous theta burst stimulation with intermittent theta burst stimulation and robot assisted therapy	sham continuous theta burst stimulation with sham intermittent theta burst stimulation and robot-assisted therapy	Motor function	=
Continuous theta burst stimulation with intermittent theta burst stimulation and robot assisted therapy	sham continuous theta burst stimulation with intermittent theta burst stimulation and robot assisted training	Motor function	–
Glove orthosis graded repetitive arm supplementary program with Virtual reality with home based rehab with occupational therapy	Conventional Rehab	Performance of activities of daily living	+
Glove orthosis graded repetitive arm supplementary program with Virtual reality with home based rehab with occupational therapy	Conventional Rehab	Motor function, dexterity	–
Mirror therapy with robot assisted training HOH(Hand of Hope)	Sham mirror therapy with robot assisted training HOH	Motor function, performance of activities of daily living	–
Portable brain-computer interface-based hand robot system with Conventional therapy and neuromuscular electrical stimulation	Task-specific training with Conventional therapy and neuromuscular electrical stimulation	Motor function	+
Brain-computer interface controlled hand exoskeleton with Mental practice and Occupational therapy	Occupational therapy	Motor function, dexterity, performance of activities of daily living	–
Immersive virtual reality (CUREO) with Conventional therapy	Electromechanically assisted training (ARMEOSpring) with Conventional therapy	Motor function	+
Cyproheptadine with EMG-controlled VAEDA glove	Placebo with EMG-controlled VAEDA glove or Placebo with passive stretching VAEDA with glove	Motor function	–
Task-oriented training with force feedback hand rehab robot with Conventional upper limb rehabilitation	Task-oriented training assisted by a therapist with Conventional upper limb rehabilitation	Motor function, range of motion	+
Task-oriented training with force feedback hand rehab robot with Conventional upper limb rehabilitation	Task-oriented training assisted by a therapist with Conventional upper limb rehabilitation	Stroke severity, muscle strength, spasticity, performance of activities of daily living	–
Non-robotic electromechanical devices	conventional therapy	Stroke severity	+
Non-robotic electromechanical devices	conventional therapy	Motor function, performance of activities of daily living, spasticity, range of motion	–
Robotics therapy (consisted a glove detecting hand movements)	Conventional therapy	Dexterity, proprioception	–
Virtual Relaity Game (Vision Based Tracking)	Virtual Reality (Haptic Feedback)	Dexterity	–
Virtual Reality (Haptic Feedback)	Virtual Reality (Exoskelton)	Dexterity	+
Virtual Relaity Game (Vision Based Tracking)	Virtual Reality (Exoskelton)	Dexterity	–
SMART arm with electrical stim	No Treatment	Performance of activities of daily living, spasticity	+

Bimanual motor skill learning with robot-assisted training and transcranial direct current stimulation	bimanual motor skill learning with sham stimulation	Muscle strength	−
Bilateral Arm Light Exoskeleton Rehab Station (ALEx RS) with Conventional Therapy	Unilateral Arm Light Exoskeleton Rehab Station (ALEx RS) with Conventional Therapy	Motor function, muscle strength, spasticity	−
Robotic Therapy (Armeo Spring & Amadeo) with Task Oriented Training with Active Learning Program for Stroke (ALPS)	Robotic Therapy with Active Learning Program for Stroke (ALPS)	Spasticity, performance of activities of daily living	−
Robotic Therapy (Armeo Spring & Amadeo) with Task Oriented Training with Active Learning Program for Stroke (ALPS)	Robotic Therapy with Active Learning Program for Stroke (ALPS)	Motor function	=
Robotic training (Armeo) with Muscle vibration	Robotic training (Armeo) with Sham muscle vibration	Motor function, spasticity, performance of activities of daily living	+
Single joint arm exoskeleton	Multijoint arm exoskeleton	Motor function, performance of activities of daily living, dexterity	−
Single joint arm exoskeleton	Multijoint arm exoskeleton	Muscle strength	=
Exoskeleton robotics combined with other interventions	stretching and positioning programs	Motor function, muscle strength, performance of activities of daily living	−
Robotics combined with other interventions	botulinum toxin (botox)	Motor function, performance of activities of daily living	−
Robotics combined with other interventions	robotics or video game training	Motor function, muscle strength, spasticity, range of motion, performance of activities of daily living	−
Exoskeleton robotics	One another (different approaches compared)	Motor function	−
Repetitive sensory stimulation with Robot-assisted arm training	Sham stimulation with Robot-assisted arm training	Motor function, muscle strength, proprioception, dexterity	−
High-definition tDCS with EMG-driven robotic hand (EMG-RH)	Sham tDCS with EMG-RH	Motor function, spasticity	=
EMG-Controlled FES during task oriented training with Robotic training	Conventional rehab (TST)	Motor function	+
EMG-Controlled FES during task oriented training with Robotic training	Conventional rehab (TST)	Dexterity	−
EMG driven NMES Robot arm	Conventional Therapy	Spasticity	+
EMG driven NMES Robot arm	Conventional Therapy	Performance of activities of daily living	−
EMG driven NMES Robot arm	Conventional Therapy	Motor function	=
CTBS with robotic therapy	Sham stimulation with robotic therapy	Motor function	+
SMART Arm with outcome-triggered (OT) electrical stimulation	SMART arm alone	Performance of activities of daily living	+
Robotics combined with other interventions	sham or robotics	Motor function	+
Exoskeleton robotics combined with other interventions	exoskeleton robotics or sham	Motor function	=

Exoskeleton robotics combined with other interventions	exoskeleton robotics	Muscle strength	=
Robot training with forced field	robot training without force field	Spasticity	=
Enhanced upper limb therapy	Usual care	Motor function, performance of activities of daily living	+
Robot-assisted training	Usual care	Motor function, performance of activities of daily living	−
Robot-assisted training	Enhanced upper limb therapy	Motor function, performance of activities of daily living	−

Virtual Reality



Adapted from: https://philadelphia.cbslocal.com/2016/05/15/virtual-reality-stroke-rehab/

A total of 125 RCTs were found that evaluated virtual reality for upper extremity motor rehabilitation. Two RCTs compared smart gaming gloves combined with other interventions with exercise and custom physiotherapy protocols (Kang et al. (2020); Stockley et al. (2017)). 34 RCTs compared virtual reality training with conventional therapy (Tieri G. et al. (2024); Bai et al. (2022); Chen et al. (2022c); Huang et al. (2022a); Marques-Sule et al. (2021); Mekbib et al. (2021); Xie et al. (2021); Johnson et al. (2020); Keskin et al. (2020); Laffont et al. (2020); Lin et al. (2020); Long et al. (2020); Miclaus et al. (2020); Norouzi-Gheidari et al. (2020); Rogers et al. (2019); Askin et al. (2018); Cannell et al. (2018); Faria et al. (2018); Kiper et al. (2018); Lee et al. (2018a); Schuster-Amft et al. (2018); Ballester et al. (2017); Brunner et al. (2017); Standen et al. (2017); Wang et al. (2017c); Choi et al. (2016a); daSilvaRibeiro et al. (2015); Kiper et al. (2014); Yin et al. (2014); Duff et al. (2013); Crosbie et al. (2012); Jo et al. (2012); Levin et al. (2012); Piron et al. (2010)). 27 RCTs compared video game training with conventional therapy (Aguilera-Rubio et al. (2024); Amin et al. (2024); Um-Ul-Qura et al. (2024); Guo et al. (2023); Luo et al. (2023); Anwar et al. (2022); Lam et al. (2022); Leng et al. (2022); Teremetz et al. (2022); Li et al. (2021); HenriquePPB et al. (2019); Hung et al. (2019c); IkbaliAfsar et al. (2018); Turkbey et al. (2017); Givon et al. (2016); Lee et al. (2016f); Simsek et al. (2016); Bower et al. (2015); Iosa et al. (2015); Shin et al. (2015); Choi et al. (2014); Kottink et al. (2014); Popović et al. (2014); Shin et al. (2014); Lee et al. (2013a); Sin et al. (2013); Kwon et al. (2012)). Five RCTs compared virtual reality training combined with other interventions with conventional therapy (Jo et al. (2024); El-Kafy E.M.A. et al. (2021); Oh et al. (2019); Alves et al. (2018); Kiper et al. (2011)). One RCT compared virtual reality training combined with other interventions with task-specific training (Saposnik et al. (2016)). Six RCTs compared different approaches to virtual reality training (Yang et al. (2022a); Sheehy et al. (2020); Thielbar et al. (2020); Ballester et al. (2016); Lee et al. (2014a); Piron et al. (2008)). Nine RCTs compared smart gaming gloves with conventional therapy (Shin S. et al. (2022); Park et al. (2021); Rodriguez-Hernandez M. et al. (2021); Sanders et al. (2020); Park et al. (2019b); Park et al. (2018); Hee-TaeJung et al. (2017); Shin et al. (2016a); Zondervan et al. (2016)). One RCT compared video game training combined with other interventions with conventional therapy or task-specific training (Kong et al. (2016)). One RCT compared smart gaming gloves combined with other

interventions with task-specific training (Thielbar et al. (2014)). Three RCTs compared virtual reality training combined with other interventions with virtual reality training (Salvalaggio et al. (2022); Widmer et al. (2022); Park et al. (2016)). Two RCTs compared virtual reality training combined with other interventions with bilateral arm training (Song Y.-H. & Lee H.-M. (2021); Lee et al. (2016c)). Two RCTs compared video game training with sham (Kim et al. (2018b); Yavuzer et al. (2008a)). Two RCTs compared virtual reality training with sham (Ogun et al. (2019); In et al. (2012)). One RCT compared different approaches to smart gaming gloves (Lee et al. (2020d)). Two RCTs evaluated virtual reality training combined with other interventions (Ersoy & Iyigun (2021); Cameirao et al. (2012)). One RCT compared video game training combined with other interventions with cimt (McNulty et al. (2014)). One RCT evaluated video game training combined with other interventions (Junior et al. (2019)). Four RCTs compared video game training combined with other interventions with graded repetitive arm supplementary program (Allegue et al. (2022); Hernandez et al. (2022); Wilson et al. (2021); Adie et al. (2017)). Two RCTs compared video game training combined with other interventions with exercise and custom physiotherapy protocols (Pouplin S. et al. (2023); Krakauer et al. (2021)). Two RCTs compared video game training combined with other interventions with task-specific training (Ali et al. (2024); Hegazy R.M. et al. (2022)). Two RCTs compared video game training combined with other interventions with conventional therapy (Kuo et al. (2023b); Smith et al. (2021)). One RCT compared virtual reality training combined with other interventions with non-robotic electromechanical devices (Lülsdorff et al. (2023)). Two RCTs compared different approaches to video game training (Fluet et al. (2024); Lotay et al. (2019)). One RCT compared video game training combined with other interventions with thermal stimulation (Ayub I. et al. (2024)). Two RCTs compared virtual reality training with no treatment (Jang & Jang (2016); Jang et al. (2005)). One RCT compared virtual reality training with video game training (Chen et al. (2023d)). One RCT compared virtual reality training combined with other interventions with exercise and custom physiotherapy protocols (Cho et al. (2021)). One RCT compared virtual reality training combined with other interventions with FES (Lee et al. (2018c)). One RCT compared virtual reality training combined with other interventions with graded repetitive arm supplementary program (Rand et al. (2017)). One RCT compared virtual reality training with exercise and custom physiotherapy protocols (Lee et al. (2016d)). One RCT compared virtual reality training with conventional therapy or sham or no treatment (Fan et al. (2014)). One RCT compared smart gaming gloves combined with other interventions with conventional therapy (Friedman et al. (2014)). One RCT compared virtual reality training combined with other interventions with virtual reality training or sham (Viana et al. (2014)). One RCT compared smart gaming gloves with sham (daSilvaCameirao et al. (2011)).

In addition, 25 RCTs in which virtual reality formed part of a combined or comparative intervention are cross-referenced at the end of Table 17; their primary listings appear in other tables.

The methodological details and results of all 125 RCTs are presented in Table 17.

Table 17. RCTs Evaluating Virtual Reality for Upper Extremity Motor Rehabilitation

Authors (Year) **Study Design (PEDro Score)** **Sample Size start** **Sample Size end** **Time post stroke category** **Study design**	**Interventions** **Duration: Session length, frequency per week for total number of weeks**	**Outcome Measures** **Result (direction of effect)**
Smart gaming gloves combined with other interventions compared to exercise and custom physiotherapy protocols		
Kang et al. (2020) RCT (7) NStart=23 NEnd=23 TPS=Acute A vs B *Also in Table 3 (Exercise and Strength Training)*	E: Smart Glove Upper Extremity Training (RAPAEL)+ standard rehab C: Upper Extremity Self-Training at home + standard rehab Duration: 30min/d, 5d/wk, 2wks upper extremity training & 30min/d, 5d/wk, 2wks conventional therapy	E vs C: Fugl-Meyer Assessment- Upper Extremity (+exp) Proximal (-) Distal (+exp) Coordination/Speed (+exp) Jebsen Hand Function Test (-) Box and Block Test (-) Grip Strength (-) Modified Barthel Index- Upper Extremity (-) Carer Burden Scale (-)
Stockley et al. (2017) Pilot RCT (7)	E: VR (YOUgrabber) C: Gym training	E vs C: Motor Activity Log

NStart=12 NEnd=12 TPS=Chronic A vs B *Also in Table 3 (Exercise and Strength Training)*	Duration: 30 min, 18x over 12wk VR	Amount of Use (-) Quality of Use (-) Box and Block Test (-) Fatigue severity scale (-)
Virtual reality training compared to conventional therapy		
Tieri G. et al. (2024) RCT (8) NStart=40 NEnd=40 TPS=Subacute A vs 0	E: Virtual art-therapy C: Conventional therapy Duration: 1hr/session, 3 sessions/d, 6d/wk, 4wks	E vs C: Modified barthel index (+exp) MMT (+exp) Ashworth Scale (+exp)
Bai et al. (2022) RCT (4) NStart=50 NEnd=50 TPS=Subacute A vs 0	E: Virtual Reality Training (Multitouch Training Table) + Traditional Rehabilitation C: Traditional Rehabilitation Duration: 40-60min/d, 5d/wk, for 10wk Virtual Reality Training, 10wk Traditional Rehabilitation	E vs C: Fugl-Meyer Assessment Upper Extremity (FMA-UE) (+exp) Fugl-Meyer Assessment Lower Extremity (FMA-LE) (+exp) Functional Test for Hemiplegic Upper Extremity (FTHUE) (+exp) Barthel Index (BI) (+exp) Berg Balance Scale (BBS) (+exp) 10-Metre Walk Test (+con)
Chen et al. (2022c) RCT (8) NStart=36 NEnd=36 TPS=Subacute A vs 0	E: nonimmersive VR system (computer screen with a passive weight support exoskeleton arm) C: Conventional Therapy Duration: 60min/d, 5d/wk, 2wks	E vs C: EMG reaction (+exp) CNV latency (+exp) FMA-UL (+exp) ARAT (+exp) NIHSS (-)
Huang et al. (2022a) RCT (7) NStart=30 NEnd=30 TPS=Chronic A vs 0	E: VR training C: conventional OT Duration: 60min/d, 2-3d/wk (16 sessions)	E vs C: FMA-UE (-) AROM; shoulder (-) elbow (+exp) wrist (-) forearm pro (+exp) forearm sup (-) serum biomarkers IL-6 (-) ICAM-1 (-) HO-1 (-) 8-OHdG (-) BDNF (-)
Mekbib et al. (2021) RCT (6) NStart=28 NEnd=23 TPS=Subacute A vs 0	E: Virtual Reality + Occupational Therapy C: Occupational Therapy Duration: 2hr/d, 4d/wk, 2wks	E vs C: Barthel Index (-) Fugl-Meyer Assessment- Upper Extremity (+exp) fMRI measures
Marques-Sule et al. (2021) Pilot RCT (9) NStart=29 NEnd=29	E: Virtual Reality Wii Gaming (with lower limb involvement) C: Conventional Therapy Duration: 30min/d, 2d/wk, 4wks Wii Gaming	E vs C: Timed Up and Go (+exp) POMA (+exp) Gait (+exp)

TPS=Chronic A vs 0		Balance (+exp) Berg Balance Scale (+exp) Fugl-Meyer Assessment (-) ; -Upper Limb (-) ; -Shoulder-Forearm (-) ; -Hand (-) ; -Speed-Coordination (-) Barthel index (+exp) Frenchay Activity Index (+exp)
Xie et al. (2021) Pilot RCT (7) NStart=12 NEnd=12 TPS=Subacute A vs 0	E: Virtual reality glasses rehabilitation + conventional treatment C: conventional rehab Duration: 1hr(30m VR, 30m OT), 5d/wk, 3wks	E vs C: FMA-UE (+exp) TMS Cortex Latency (+exp) CMCT (+exp) MEP amplitude (-)
Johnson et al. (2020) RCT (8) NStart=60 NEnd=58 TPS=Chronic A vs 0	E: Virtual Therapy (Jintronix Rehabilitation) C: Usual Activity Duration: 45min/d, 2d/wk, 8wks	E vs C: Fugl-Meyer Assessment Upper Extremity (+exp) Action Research Arm Test (-) Box and Block Test (-) Modified Ashworth Scale Shoulder (+exp) Elbow (+exp) Wrist (-) Fingers (-) MAL-28 Amount of Arm Use (+exp) Quality of Movement (+exp) EQ5D5L (-) EQVAS (-)
Laffont et al. (2020) RCT (8) NStart=51 NEnd=51 TPS=Acute A vs 0	E: Non-immersive video gaming (VG) based OT session + Usual rehabilitation C: Conventional OT + Usual care Duration: 90-180min/d Usual care, 15-45min, 5d/wk, for 6wks additional OT/video gaming	E vs C: UL-FMS (-) Distal (+exp) Proximal (-) Box and Block Test: (+exp) Motor Activity Log: (-) Barthel Index: (-) Wolf Motor Function Test: (-) SF-36 (-)
Lin et al. (2020) RCT (8) NStart=152 NEnd=145 TPS=Acute A vs 0	E: Early VR Rehabilitation C: Early conventional rehabilitation Duration: 8hrs/wk for 4wks	E vs C: Muscle strength - Medical research council Affected upper (-) Affected lower (-) Unaffected Upper (+exp) Unaffected Lower (-) HADS Depression (+exp) Anxiety (+exp) PASS (-) Barthel index (-)
Long et al. (2020) RCT (8) NStart=60 NEnd=52 TPS=Acute	E: Virtual Reality C: Conventional Rehabilitation Duration: 45min/d, 5d/wk, 3wks	E vs C: Modified Barthel Index (+exp) Fugl-Meyer Assessment- Upper Extremity (-)

A vs 0		Functional test for the hemiplegic upper extremity (-) Canadian Occupational Performance Measure (-) Stroke self-efficacy scale total (+exp) daily activities (+exp) self-management (-)
Miclaus et al. (2020) RCT (5) NStart=55 NEnd=52 TPS=Chronic A1 vs A2 vs 0	E1: Non-Immersive Virtual Reality (Subacute) E2: Non-Immersive Virtual Reality (Chronic) C1: Conventional Physiotherapy (Subacute) C2: Conventional Physiotherapy (Chronic) Duration: 60 min/d, 10 days, 2wks	E1/E2 vs C1/C2: Active Range of Motion (+exp1) Manual Muscle Testing (+exp1) Fugl-Meyer Assessment-Upper Extremity (+exp1) Functional Independence Measure (+exp1) Functional Reach Test (+exp1,+exp2) Modified Ashworth Scale (+con1) Modified Rankin Scale (+exp2,+con2)
Keskin et al. (2020) Pilot RCT (5) NStart=24 NEnd=24 TPS=Chronic A vs 0	E: Virtual Reality (LeapMotion) C: Conventional Therapy Duration: 60min, 5x/wk, 6wks conventional + VR 2x/wk, 6wks	E vs C: Fugl-Meyer Assessment (-) Wrist (-) Hand (-) Barthel Index (-) Brunnstrom Recovery Stages Upper Extremity (-) Hand (-) Functional Ambulation Category (-) Range of motion (-)
Norouzi-Gheidari et al. (2020) Pilot RCT (6) NStart=23 NEnd=18 TPS=Chronic A vs 0	E: Jintronix VR C: Conventional therapy Duration: 2-3x/wk, 30-45min, 4wks add on to conventional therapy	E vs C: Fugl Meyer Assessment Upper Extremity (-) Box and Block Test (-) MAL Amount of Use (-) Quality of Movement: (+exp) Stroke Impact Scale total (+exp)
Rogers et al. (2019) RCT (6) NStart=21 NEnd=21 TPS=Acute A vs 0	E: Elements Virtual rehabilitation + Usual treatment C: Usual treatment Duration: VR: 30-40min/d, 3d/wk, 4wk	E vs C: Box and Block Test (+exp) Montreal Cognitive Assessment (+exp) CogState Groton Maze Learning Task (+exp) Neurobehavioral Functional Inventory Motor (+exp) Cognitive (+exp) Depression (-) Somatic (-) Communication (+exp) Aggression (-)
Askin et al. (2018) RCT (6) NStart=40 NEnd=38 TPS=Chronic A vs 0	E: Xbox Kinect-based virtual reality training + physical therapy C: Physical therapy Duration: 1Hr/d, 5d/wk, 4wk	E vs C: Fugl-Meyer Assessment (+exp) Motricity Index (+exp) Active range of motion (+exp) Brunnstrom Recovery Stages (-) Modified Ashworth Scale (-) Box and Block Test (-)

Cannell et al. (2018) RCT (8) NStart=81 NEnd=79 TPS=Acute A vs 0	E: Virtual Reality Training (Jintronix) C: Conventional Therapy Duration: 60min/d, up to 5d/wk, 8wks (mean 14 sessions)	E vs C: Functional Reach Test (-) Modified Motor Assessment Scale - Upper Arm Function (-) Box and Block Test (-) Sitting Balance Test (-) Lateral Reach Test (-) Step Test (-) 10m Walk Test velocity (-) Timed Up and Go Test (-)
Kiper et al. (2018) RCT (7) NStart=139 NEnd=136 TPS=Subacute A vs 0	E: Virtual Reality Reinforced Feedback C: Conventional Rehabilitation Duration: 2h/d, 5d/wk, 4wks	E vs C: Fugl-Meyer Assessment (+exp) National Institute of Health Stroke Scale (+exp) Functional Independance Measure (+exp) Kinematics Time (+exp) Speed (+exp) Peak (+exp) ESAS
Lee et al. (2018a) RCT (6) NStart=31 NEnd=30 TPS=Subacute A vs 0	E: VR game (wii) + conventional rehabilitation C: Conventional therapy Duration: 30min/d, 3d/wk for 5wks VR; 60min/d, 2x/d, 5d/w for 5 wks conventional therapy	E vs C: Manual function test (+exp) modified functional reach test (+exp) postural sway
Schuster-Amft et al. (2018) RCT (8) NStart=54 NEnd=52 TPS=Chronic A vs 0	E: Virtual reality-based training C: Conventional Therapy Duration: 45min, 4x/wk, 4wk	E vs C: Box and Block Test paretic side (-) non-paretic side (-) Cheodke Mcmaster Arm Hand Inventory: (-) Stroke Impact Scale Strength: (-) Activites of Daily Living: (-) Mobility: (-) Hand Function: (-) Stroke Recovery: (-)
Faria et al. (2018) Pilot RCT (4) NStart=32 NEnd=24 TPS=Chronic A vs 0	E: Virtual reality (Reh@Task) C: Time-matched standard occupational therapy Duration: 45min/d, 3d/wk for 4wk	E vs C: Fugl-Meyer Assessment (+exp) Chedoke Arm and Hand Activity Inventory (-) Barthel Index (-) Motricity Index (-) Modified Ashworth Scale (-) Montreal Cognitive Assessment (-) Cancelation Tests (-)
Brunner et al. (2017) RCT (7) NStart=120 NEnd=112 TPS=Subacute A vs 0	E: Virtual reality training+ standard rehabilitation C: Conventional therapy+ standard rehabilitation Duration: 45-60min/d, 4-5sessions/wk for 4wks	E vs C: Action Research Arm Test (-) BBT (-) FIM (-) ABILHAND (-) Patient Global Impression of Change (-)

Ballester et al. (2017) Pilot RCT (5) NStart=39 NEnd=35 TPS=Chronic A vs 0	E: Home-based VR therapy C: Home-based occupational therapy Duration: 30min/d, 5d/wk, 3wk	E vs C: Fugl-Meyer Assessment; Upper Extremity (-) Chedoke Arm and Hand Activity Inventory (+exp) Barthel Index (-) Hamilton Scale (-) Ashworth Scale Distal (-) Proximal (-) Medical Council Research Scale (-) Grip Force (-) Visual Analogue Scale for Pain (-)
Standen et al. (2017) Pilot RCT (6) NStart=27 NEnd=22 TPS=Subacute A vs 0	E: Home-based virtual reality C: Conventional therapy Duration: up to 60min, 7d/wk, 8wk	E vs C: WMFT NHPT MAL NEDAL
Wang et al. (2017c) Pilot RCT (6) NStart=26 NEnd=26 TPS=Subacute A vs 0	E: Leap motion-based virtual reality C: Conventional Therapy Duration: 45min, 5d/wk, 4wk	E vs C: Wolf Motor Function Test Score: (+exp) Time: (+exp) fMRI parameters
Choi et al. (2016a) RCT (7) NStart=24 NEnd=24 TPS=Not Reported A vs 0	E: VR program + conventional occupational therapy C: Conventional occupational therapy Duration: 30min/d, 5d/wk for 2wk	E vs C: FMA (+exp) LE (-) BRS (+exp) Manual muscle testing (+exp) mBI (-) EQ-5D (-) Beck Depression Inventory (-)
daSilvaRibeiro et al. (2015) RCT (7) NStart=30 NEnd=30 TPS=Chronic A vs 0	E: Nintendo Wii-based Virtual Rehabilitation + conventional rehab C: Conventional Rehabilitation Duration: 60 min/d, 2d/wk, 8 weeks	E vs C: Fugl-Meyer Assessment (-) SF-36 (-) Physical Functioning (+exp)
Kiper et al. (2014) RCT (5) NStart=46 NEnd=44 TPS=Chronic A vs 0	E: VR therapy + usual care C: Conventional therapy Duration: 2hr/d, 5d/wk for 4wk CT, 1h/d VR, 1h/d CT, 5d/wk, 4wks	E vs C: Fugl-Meyer Assessment Upper Extremity (+exp) Functional Independence Measure (+exp) Kinematic parameters Speed (-) Time (+exp) Peak (+exp)
Yin et al. (2014) Pilot RCT (6) NStart=26 NEnd=23	E: Upper extremity VR therapy + Conventional therapy C: Conventional therapy Duration: 30min/d, 5d/wk, for 2wks	E vs C: Fugl-Meyer Assessment (-) Action Research Arm Test (-) Motor Activity Log; Amount of Use (-)

TPS=Acute A vs 0		Quality of Movement (-) Functional Independence Measure (-)
Duff et al. (2013) RCT (5) NStart=25 NEnd=21 TPS=Chronic A vs 0	E: Adaptive mixed reality rehab (VR) C: Conventional Therapy Duration: 60min/d, 3d/wk, for 4wks	E vs C: FMA (+con) WMFT(-) SIS(-) Motor activity log(-) Kinematics
Jo et al. (2012) RCT (5) NStart=29 NEnd=29 TPS=Not Reported A vs 0	E: VR training + conventional C: Conventional Therapy Duration: 30min, 3x/wk, for 4wks traditional therapy, VR 60min, 5x/wk, 4wk	E vs C: WMFT (-) Motor free visual perception test (+exp)
Crosbie et al. (2012) Pilot RCT (8) NStart=18 NEnd=18 TPS=Chronic A vs 0	E: Virtual Reality C: Conventional Rehabilitation Duration: 30-45min/d, 3d/wk for 3wk	E vs C: Motricity Index (-) Action Research Arm Test (-)
Levin et al. (2012) Pilot RCT (6) NStart=14 NEnd=12 TPS=Chronic A vs 0	E: Virtual reality C: Conventional therapy Duration: 45min/session, 9 sessions in total, 3wks	E vs C: FMA (no stat) Composite Spasticity Index (CSI) (no stat) Reaching Performance Scale for Stroke (RPSS) (no stat) BBT (no stat) WMFT functional abilities score (no stat) Motor activities Log amount of use (no stat) quality of movement (no stat)
Piron et al. (2010) RCT (8) NStart=57 NEnd=50 TPS=Chronic A vs 0	E: Results feedback VR C: Conventional Therapy Duration: 1hr/d, 5d/wk, 4wk	E vs C: Fugl-Meyer Assessment Upper Extremity (+exp) Functional Independence Measure (-) Mean duration (+exp) Mean linear velocity (+exp) number of submovements (-)
Video game training compared to conventional therapy		
Aguilera-Rubio et al. (2024) RCT (8) NStart=36 NEnd=36 TPS=Chronic A vs 0	E: Virtual reality (Leap Motion Controller) C: Conventional therapy Duration: 30min/d, 2d/wk for 8wks	E vs C: Grip strength (-) BBT (-) ARAT (-) subtest A (-) subtest B (-) subtest C (-) subtest D (+exp) DASH (-) patient satisfaction (no stat)
Amin et al. (2024) RCT (6) NStart=52 NEnd=52	E: VR-based game + Conventional physical therapy C: Conventional physical therapy Duration: 48min/d 4d/wk for 2wks then 80min/d 4d/wk for 4wks	E vs C: FMA-UE (+exp) ARAT (+exp) BBT (+exp)

TPS=Subacute A vs 0		mBI (+exp) Stroke Specific QoL (+exp)
Um-Ul-Qura et al. (2024) RCT (4) NStart=18 NEnd=16 TPS=Not Reported A vs 0	E: Video games C: Conventional physiotherapy Duration: 30min/wk, 4wks	E vs C: no between group comparisons
Luo et al. (2023) RCT (4) NStart=18 NEnd=15 TPS=Chronic A vs 0	E: Virtual rehabilitation system C: Conventional training Duration: 10 sessions of 12min over 3 months	E vs C: WMFT functional ability score (-) time in seconds (-) weights in lbs (-) grip strength in kg (-) FMA-UE (-) UE (-) wrist (-) hand (-) coordination (-) ROM shoulder flexion (-) should horizontal abduction (-) shoulder horizontal adduction (-) elbow flexion (-) Stroke Rehabilitation Motivation Scale (-)
Guo et al. (2023) Pilot RCT (5) NStart=120 NEnd=109 TPS=Subacute A vs 0	E: Remote rehab training system (A wearable, sensor-based motion tracking system integrated with interactive computer-based rehabilitation games, using visual and auditory feedback.)+ conventional rehab C: conventional therapy Duration: 2hrs/d(1hr virtual training + 1hr conventional), 5d/wk, 3wks	E vs C: FMA (+exp) UE (+exp) LE (-)
Anwar et al. (2022) RCT (6) NStart=74 NEnd=68 TPS=Not Reported A vs 0	E: Virtual reality training using Wii C: Conventional Physiotherapy Duration: 60min/d, 3d/wk, 6wks	E vs C: Berg Balance Scale BBS (+exp) FMA-UE motor function (+exp) joint pain and range (+exp) sensation (-)
Lam et al. (2022) RCT (7) NStart=93 NEnd=86 TPS=Subacute A vs 0	E: bilateral movement-based computer game (BMCG) + CR program C: V: video-directed exercise (they considered it as "care as usual") + CR program Duration: 3.5h/day, 2d/wk, 8 wks (3h CR, 30min int)	E vs C: FMA-UE (+exp) ARAT (+exp) grip strength (-) SF-36 physical component summary (-) mental component summary (-)
Leng et al. (2022) RCT (5) NStart=70 NEnd=65 TPS=Subacute A vs 0	E: Virtual reality rehab + conventional rehab C: Conventional rehab Duration: 1hr/d(30min VR, 30min conventional rehab), 5d/wk, 3wks	E vs C: FMA-UE (-) BI (-) IADL (-)

Teremetz et al. (2022) RCT (6) NStart=43 NEnd=40 TPS=Chronic A vs 0	E: Wii-based video gaming C: Conventional care Duration: 1h /d, 3d/wk, 4wks	E vs C: FMA (-) ARAT (-) BBT (-) Motor Activity Log actual amount of use test (-) quality of movement (-) SIS (-) Kinematics Elbow extension (-) Trunk motion (-) Peak velocity (-) Movement duration (-) Curve index (-) Peaks (-)
Li et al. (2021) RCT (8) NStart=30 NEnd=30 TPS=Subacute A vs 0	E: Augmented reality video games + conventional rehab C: Conventional rehab Duration: 1hr(30mins VR, 30min OT)/d, 5d/wk, 2wks	E vs C: FMA-UE (+exp) ARAT (+exp) MMT (-) BS (-) MMSE (-) BI (-) Add vs Sub game (+exp) Stroop task (+exp)
HenriquePPB et al. (2019) RCT (5) NStart=31 NEnd=31 TPS=Chronic A vs 0	E: Exergame C: Conventional therapy Duration: 30min/d, 2d/wk for 12wks	E vs C: FMA (-) Mod Ashworth scale (+exp) Berg balance scale (+exp)
Hung et al. (2019c) RCT (8) NStart=33 NEnd=32 TPS=Chronic A vs 0	E: Kinect2Scratch game; VR video game C: Therapist-based training Duration: 30min/session, 24 sessions, 12wks	E vs C: Fugle-Meyers Assessment Upper Extremity Total: (-) Proximal (-) Distal (-) WMFT time (-) Functional activity scale (-) Motor activity Log quality of movement (-) amount of use (-)
IkbaliAfsar et al. (2018) RCT (6) NStart=42 NEnd=35 TPS=Subacute A vs 0	E: VR (Xbox Kinect) + Conventional therapy C: Conventional therapy Duration: C: 60min/d, 5x/wk for 4wks; E: 30min/d, 5x/week for 4 wks	E vs C: FMA UE (-) BBT (+exp) FIM (-) Brunnstrom stage (+exp)
Turkbey et al. (2017) Pilot RCT (7) NStart=20 NEnd=19 TPS=Subacute	E: Xbox Kinect virtual reality training + conventional rehabilitation C: Conventional rehabilitation Duration: 60min/d conventional + 60min Xbox, 5d/wk, 4wk	E vs C: Box and Block Test (+exp) Wolf Motor Function Test Functional Ability Score (+exp) Performance Time Score (-)

A vs 0		Brunnstrom Motor Recovery Stage- UE (+exp) Functional Independence Measure- self care (-)
Givon et al. (2016) RCT (7) NStart=47 NEnd=43 TPS=Chronic A vs 0	E: Video game treatment C: Conventional treatment Duration: 1h/d, 2d/wk, 3mo	E vs C: Feasibility (-) satisfaction (+exp) Adverse Effects (-) Grip strength dynamometer (+exp) gait speed (+exp) daily steps (-) Action Research Arm Test (-)
Simsek et al. (2016) RCT (7) NStart=44 NEnd=42 TPS=Subacute A vs 0	E: Nintendo Wii-based UE and balance therapy C: conventional treatment (Bobath NDT) Duration: 60min/d, 3d/wk, 10wk	E vs C: Functional Independence Measure (-) Nottingham Health Profile (-) Satisfaction with treatment-VAS
Lee et al. (2016f) Pilot RCT (5) NStart=14 NEnd=10 TPS=Subacute A vs 0	E: VR video game training + conventional therapy C: Conventional Therapy Duration: 30min/d, 3d/wk for 4wk	E vs C: FMA (+exp) Trunk impairment scale (+exp) Functional reach test (+exp) Berg balance scale (+exp) Timed up and go (+exp)
Shin et al. (2015) RCT (6) NStart=35 NEnd=32 TPS=Chronic A vs 0	E: Virtual reality + Conventional occupational therapy C: Conventional occupational therapy Duration: E: 60 min (30min VR + 30min OT), 5d/wk for 4wk; C: 60min OT, 5d/wk for 4wk	E vs C: SF-36 Physical function (-) physical role limitation (+exp) body pain (-) general health (-) vitality (-) social functioning emotional role limitation (-) mental health (-) Hamilton Depression Rating Scale (-) Fugl-Meyer Assessment (-)
Bower et al. (2015) Pilot RCT (4) NStart=16 NEnd=16 TPS=Subacute A vs 0	E: VR motion-controlled games - 3D depth camera + conventional therapy C: Conventional therapy Duration: 40min/d, 8 sessions VR gaming over 2wks & 1-3h/d, 1-5d/wk conventional therapy	E vs C: FIM (-) Motor Assessment Scale (-) Functional Reach (-) Step Test (-) 6-min Walk test (-)
Iosa et al. (2015) Pilot RCT (5) NStart=4 NEnd=4 TPS=Subacute A vs 0	E: Leap Motion Controlled (LMC) Video Game-Based Training C: Conventional Therapy Duration: 80 min/d, 5d/wk, 2wks conventional training + 30min/d, 3d/wk, 2 wks of LMC-based training	E vs C: Modified Ashworth Scale (-) Abilhand Scale (-) Nine Hole Peg Test (-) Grasp Force (+exp) Pinch Force (-) Stroke Upper Limb Capacity Scale (-)
Choi et al. (2014) RCT (8) NStart=20	E: Virtual reality therapy using Nintendo Wii+ conventional rehab C: Conventional occupational therapy	E vs C: Fugl-Meyer Assessment (-) Box and Block Test (-)

NEnd=20 TPS=Acute A vs 0	Duration: 30min/d, 5d/wk for 4wk	Manual Function Test (-) Grip Strength (-) Modified Bathel Index (-) Mini-Mental State Examination (-) Continuous Performance Test (-)
Popović et al. (2014) RCT (6) NStart=20 NEnd=20 TPS=Chronic A vs 0	E: Feedback motivated exercise C: No feedback exercise Duration: 5d/wk for 4wks	E vs C: Modified drawing test (+exp) Received therapy time (+exp) Intrinsic motivation inventory (+exp)
Shin et al. (2014) RCT (5) NStart=16 NEnd=16 TPS=Subacute A vs 0	E: Virtual reality training (a task-specific interactive game-based VR system) + conventional occupational therapy C: Occupational therapy only Duration: 30min/d, 5d/wk, 2wk	E vs C: Fugl-Meyer Assessment (-) Modified Barthel Index (-) Medical Research Council Score (-) Passive Range of Motion (-)
Kottink et al. (2014) Pilot RCT (6) NStart=20 NEnd=18 TPS=Chronic A vs 0	E: Rehabilitation Video Game C: Conventional Rehabilitation Duration: 30min/d, 3d/wk, 6wks	E vs C: Action Research Arm Test (+exp,+con) Fugl-Meyer Assessment (+exp,+con)
Lee et al. (2013a) RCT (4) NStart=14 NEnd=14 TPS=Chronic A vs 0	E: Xbox Kinect games + Conventional occupational therapy C: Conventional occupational therapy Duration: E: 60min/d; 3d/wk for 6wks; C: 30min/d, 3d/wk for 6wks	E vs C: Manual muscle test (-) Mod Ashworth scale (-) FIM (-)
Sin et al. (2013) RCT (6) NStart=40 NEnd=35 TPS=Chronic A vs 0	E: Xbox Kinect-based virtual reality training + Conventional occupational therapy C: Conventional occupational therapy Duration: 60min (30min xbox + 30min CT)/d, 3d/wk, 6wks	E vs C: Fugl-Meyer Assessment (+exp) Box and Block Test (+exp) AROM Shoulder flexion (+exp) shoulder extension (+exp) shoulder abduction (+exp) elbow flexion (+exp) wrist flexion (-) wrist extension (-)
Kwon et al. (2012) RCT (5) NStart=26 NEnd=26 TPS=Acute A vs 0	E: Intensive VR therapy + conventional therapy C: Conventional therapy Duration: 30min/d, 5d/wk, 4wk VR training & 70min/d, 5d/wk, 4wk conventional therapy	E vs C: FMA (-) Manual function test (-) Modified BI (-)
Virtual reality training combined with other interventions compared to conventional therapy		
Jo et al. (2024) RCT (6) NStart=45 NEnd=45 TPS=Subacute	E1: Virtual reality-based mirror therapy + conventional physical therapy E2: Traditional mirror therapy + conventional physical therapy C: Conventional physical therapy	E1/E2 vs C: FMA-UE (+exp1) Manual Function Test (+exp1) BBT (+exp1) E1 vs E2:

A vs B vs 0 *Also in Table 10 (Mirror Therapy)*	Duration: 30min/d, 3d/wk for 4wks MT + 60min/d 5d/wk for 4wks conventional therapy	FMA-UE (+exp1) Manual Function Test (+exp1) BBT (+exp1)
El-Kafy E.M.A. et al. (2021) RCT (6) NStart=40 NEnd=37 TPS=Chronic A + B vs 0 *Also in Table 3 (Exercise and Strength Training)*	E: Virtual reality therapy with ARMEO + combination of different exercises C: Conventional physiotherapy Duration: 2hr/d, 3d/wk, 12wks	E vs C: ARAT (+exp) WMFT (+exp) Grip Strength (-)
Oh et al. (2019) RCT (7) NStart=33 NEnd=31 TPS=Chronic A + B vs 0 *Also in Table 4 (Task-Specific Training)*	E: Joystim VR + real instrumentation training C: Conventional therapy Duration: 30min, 3x/wk for 6wk	E vs C: Tip Pinch Power (+exp) Grip, Palmar Pinch, Lateral Pinch (-) Modified Ashworth Scale (-) Manual Muscle Test (-) Fugl-Meyer Assessment Upper Extremity (-) Box and Block Test (-) Nine Hole Peg Test (-) Korean mini mental state examination MoCA
Alves et al. (2018) RCT (5) NStart=60 NEnd=42 TPS=Chronic A vs B vs 0 *Also in Table 11 (Mental Practice)*	E1: Virtual Reality (Wii) E2: Motor Imagery Training C: Conventional therapy Duration: 75min/d, 5d/wk, 2 wks	E1 vs C: Fugl-Meyer Assessment (+exp1) E2 vs C: Fugl-Meyer Assessment (-) E1 vs E2: Fugl-Meyer Assessment (-)
Kiper et al. (2011) RCT (5) NStart=80 NEnd=80 TPS=Not Reported A + B vs 0 *Also in Table 20 (Feedback-Based Training)*	E: reinforced feedback in Virtual Reality environment + traditional neuromotor rehabilitation C: traditional neuromotor rehabilitation Duration: 1 hr RFVE and 1 hr TNR, 5d/wk for 4wks, 2 hr TNR 5d/wk for 4wks Control	E vs C: Fugl-Meyer Assessment Upper Extremity (+exp) Modified Ashworth scale (-) Functional Independence Measure Scale (+exp)
Virtual reality training combined with other interventions compared to task-specific training		
Saposnik et al. (2016) RCT (7) NStart=141 NEnd=121 TPS=Acute A + B vs A/B *Also in Table 4 (Task-Specific Training)*	E: task-oriented training with non-immersive virtual reality + conventional rehabilitation C: task-oriented training with simple recreational activities + conventional rehabilitation Duration: 60min, 5d/wk, 2wk	E vs C: Wolf Motor Function Test (-) Box and Block Test (+con) Stroke Impact Scale perception of recovery (-) hand function (-) subscale 16 (-) Barthel Index (-) Functional Independence Measure (-) Grip Strength (-)
Different approaches to virtual reality training compared against one another		
Yang et al. (2022a) RCT (6) NStart=129 NEnd=39	E: Augmented Reality Centre-based Rehab (AR-led) + conventional rehab	E vs C: FMA UE (-) LE (-)

TPS=Chronic A1 vs A2	C: Augmented Reality Home-based Rehab (human trainer-led) + conventional rehab (at home) Duration: 120 min/session, 2-5 sessions/wk, 4-10 wks	BBS (-) BI (no stat) SF-12 PCS (-) MCS (-) FAC (-)
Sheehy et al. (2020) RCT (7) NStart=76 NEnd=69 TPS=Subacute A1 vs A2	E: Virtual Reality Training (leaning and reaching while sitting) C: Virtual Reality Training (minimize UE and trunck movement) Duration: 45-60min/d, 5d/wk, 2wks	E vs C: Wolf Motor Function Test (-) Reaching Performance Scale (-) Function in Sitting Test (-) Ottawa Sitting Scale (-)
Thielbar et al. (2020) RCT Crossover (5) NStart=21 NEnd=20 TPS=Chronic A1 vs A2	E1: Multiuser VR Therapy E2: Single user VR Therapy Duration: 4hrs, 4/wk, 2wks/condition	E1 vs E2: Fugl-Meyer Assessment Upper Extremity (-) arm displacement session duration intrinsic motivation inventory
Ballester et al. (2016) RCT (5) NStart=23 NEnd=18 TPS=Chronic A1 vs A2	E: VR exercises + Movement amplification C: VR Exercises Duration: 30min/d, 5d/wk for 6wk	E vs C: Fugl-Meyer Assessment Upper Extremity (-) Chedoke Arm and Hand Activity Inventory (-) Barthel Index (-) Hamilton Scale (-)
Lee et al. (2014a) RCT (5) NStart=30 NEnd=24 TPS=Chronic A1 vs A2	E: Asymmetric training using virtual reality + Standard rehab (PT +FES) C: Symmetric training using virtual reality+ conventional physical therapy+FES Duration: 60min/d, 5d/wk for 4wks Conventional PT, 25min/d, 5d/wk, for 4wks FES therapy, 30min/d, 5d/wk, for 4wks asymmetric/symmetric training	E vs C: FMA Shoulder/elbow/forearm (+exp) Wrist (-) Hand (-) Coordination (-) BBT (+exp) Grip strength (+exp) Mod Ashworth scale (-) RoM (+exp)
Piron et al. (2008) Pilot RCT (5) NStart=10 NEnd=10 TPS=Chronic A1 vs A2	E: Home-Based Tele-Virtual Reality Training C: Therapist -Based Virtual Reality Training Duration: 60min/d, ~4wks	E vs C: Fugl-Meyer Assessment (No stats) patient satisfaction questionnaire
Smart gaming gloves compared to conventional therapy		
Shin S. et al. (2022) RCT (7) NStart=42 NEnd=36 TPS=Acute A vs 0	E: RAPAEL smart glove virtual reality + conventional therapy C: Conventional Physiotherapy Duration: 60min/d(30min VR+glove, 30min conventional), 5d/wk, 4wks	E vs C: FMA-UE (+exp) JTT (+exp) fNIRS (-)
Park et al. (2021) RCT (5) NStart=44	E: Game-Based Virtual Reality (VR) Rehabilitation Program using RAPAEL Smart GloveTM + Conventional PT C: Conventional PT	E vs C: E: FMA (-) Hand strength test (+exp)

NEnd=44 TPS=Acute A vs 0	Duration: 30minVR + 30minPT/d, 5d/wk, 4wks; con: 60min PT/d, 5d/wk, 4wks	Jebsen–Taylor hand function test (+exp) modified Barthel Index (+exp) Pittsburgh rehabilitation participation scale (-)
Rodriguez-Hernandez M. et al. (2021) RCT (6) NStart=46 NEnd=43 TPS=Subacute A vs 0	E: Virtual reality gaming using Smart glove "HandTutor" + Conventional Rehab C: Conventional rehabilitation Duration: 150min(100min conventional therapy + 50min virtual reality therapy)/d, 5d/wk, 3wks	E vs C: FMA-UE (+exp) MAS (+exp) SIS (+exp) ARAT (+exp) AS (+exp) EQ-VAS (+exp)
Sanders et al. (2020) RCT Crossover (3) NStart=17 NEnd=11 TPS=Subacute A vs 0	E: Self-guided exercise with MusicGlove C: Conventional Home Hand Therapy Duration: 15-60 min/d 3wks, 3wk washout	E vs C: Box and Blocks Test (no stats)
Park et al. (2019b) Pilot RCT (7) NStart=26 NEnd=25 TPS=Chronic A vs 0	E: Virtual reality-based rehabilitation (Rapael Smart Board) C: Conventional care Duration: 30min/d VR training & 30min/d conventional therapy, 5d/wk, 4wk	E vs C: Fugl-Meyer Assessment (-) Wolf Motor Function Test (-) Active Range of Motion (-) Modified Barthel Index (-) Stroke Impact Scale (+exp)
Park et al. (2018) Pilot RCT (6) NStart=26 NEnd=17 TPS=Chronic A vs 0	E: Robot Rapael smart board VR C: Conventional therapy Duration: E: 30min/d, 5d/wk, 4wk RAPAEL training + 30min/d functional arm movement; C: 2x 30min/d, 5d/wk, 4wks conventional therapy	E vs C: Wolf Motor Function Test (-)
Hee-TaeJung et al. (2017) Pilot RCT (6) NStart=14 NEnd=13 TPS=Chronic A vs 0	E: RAPAEL glove exoskeleton with video game + conventional therapy C: Conventional therapy Duration: 2x30min sessions/d, 5d/wk, 3wk;	E vs C: WMFT (+exp) ActiveROM (+exp)
Shin et al. (2016a) RCT (7) NStart=46 NEnd=46 TPS=Chronic A vs 0	E: RAPAEL SmartGlove virtual reality task training + Standard OT C: Conventional OT Duration: 30min/d, 5d/wk, 4wks	E vs C: Jebsen–Taylor hand function test (+exp) gross (+exp) fine (-) Purdue pegboard test affected (-) both (-) assembly (-) Stroke Impact Scale (+exp) strength (-) hand function (-) mobility (+exp) ADL (-) memory (-) communication (-) emotion (-) social participation (+exp)

		composite (+exp) Fugl–Meyer assessment (+exp) proximal (+exp) Distal (+exp)
Zondervan et al. (2016) RCT Crossover (6) NStart=18 NEnd=17 TPS=Chronic A vs 0	E: Home-based training with a MusicGlove (the description is consistent with smart gaming glove) C: Conventional tabletop exercise Duration: 25min/d, 6d/wk, 4wk	E vs C: Motor Activity Log (+exp) Box and Block Test (-) 9-Hole Peg Test (-) Action Research Arm Test (-)
Video game training combined with other interventions compared to conventional therapy or task-specific training		
Kong et al. (2016) RCT (5) NStart=105 NEnd=103 TPS=Acute A vs B vs 0 *Also in Table 4 (Task-Specific Training)*	E: Nintendo Wii virtual reality training + Usual Care (conventional OT) C1: dose matched task oriented therapy (as Conventional therapy) + Usual Care (conventional OT) C2: Usual Care (conventional OT) Duration: 60min/d, 4d/wk for 3wk	E vs C: FMA (-) ARAT (-) SIS (-) FIM (-) VAS Pain (-)
Smart gaming gloves combined with other interventions compared to task-specific training		
Thielbar et al. (2014) RCT (6) NStart=16 NEnd=14 TPS=Chronic A vs B *Also in Table 4 (Task-Specific Training)* *Also in Table 14 (Music Therapy and Rhythmic Auditory Stimulation)*	E: Virtual reality keypad/glove (PneuGlove) C: Task Specific Training Occupational Therapy Duration: 60min, 3d/wk for 6wk	E vs C: Action Research Arm Test (+exp) Jebsen-Taylor Hand Function Test (-) Fugl-Meyer Assessment (-) Grip strength (-) pinch strength (-)
Virtual reality training combined with other interventions compared to virtual reality training		
Salvalaggio et al. (2022) RCT (8) NStart=124 NEnd=114 TPS=Chronic A + B vs A/B *Also in Table 20 (Feedback-Based Training)*	E: Teacher-supervised Virtual reality + conventional rehab C: Non-supervised virtual reality + conventional rehab Duration: 2hr/d(1hr VR, 1hr conventional), 5 d/wk, 4 wks	E vs C: FMA-UE (-) BBT (-) RPS (-) MAS (-) FIM (-) Movement duration (-) Completion time (-) Linear velocity (-) sub-movements (-)
Widmer et al. (2022) RCT (7) NStart=37 NEnd=31 TPS=Subacute A + B vs A/B *Also in Table 20 (Feedback-Based Training)*	E: Virtual reality training (ArmeoSenso + monetary feedback rewards) + conventional care C: virtual reality training (without rewards) + conventional care Duration: 1h/d, 5d/wk, 3wks	E vs C: UE AROM (-) FMA (-) WMFT Score (-) Time (-) BBT (+exp) Motor activity log Actual amount of use test (-) Quality of movement (-) Barthel index (-) NIHSS (-) modified Rankin scale (-)

Park et al. (2016) RCT (8) NStart=30 NEnd=30 TPS=Chronic A + B vs A/B *Also in Table 11 (Mental Practice)*	E: VR game (Wii) + mental practice C: VR game (Wii) Duration: 30min/d, 5d/wk for 4wks Wii, 5 min/d, 5d/wk for 4 wks mental practice	E vs C: FMA (+exp) Motor activity log (+exp) BBT (+exp)
Virtual reality training combined with other interventions compared to bilateral arm training		
Song Y.-H. & Lee H.-M. (2021) RCT (5) NStart=12 NEnd=10 TPS=Chronic A + B vs A/B *Also in Table 2 (Bilateral Arm Training)*	E: VR-based bilateral arm training + conventional rehab C: bilateral arm training Duration: 30min/d, 5d/wk, 4wks	E vs C: MFT (-) Two-point discrimination test (-) EMG (-) Proprioceptive test (+exp) EEG (-)
Lee et al. (2016c) RCT (6) NStart=20 NEnd=18 TPS=Chronic A + B vs A/B *Also in Table 2 (Bilateral Arm Training)*	E: VR bilateral arm training + conventional therapy C: Bilateral arm training + conventional therapy Duration: 30min/d, 3d/wk for 6wks bilateral training & 30min/d, 5d/wk for 6 wks conventional therapy	E vs C: JTHF (+exp) BBT (+exp) Grooved pegboard test (+exp) Digital manual muscle test (+exp)
Video game training compared to sham		
Kim et al. (2018b) Pilot RCT (8) NStart=23 NEnd=20 TPS=Acute A vs 0	E: Kinect-based virtual reality + conventional therapy C: Sham VR + conventional therapy Duration: 30min/d occupational therapy & 30min/d VR training, 5d/wk for 2wk	E vs C: FMA (-) Brunnstrom stages of recovery arm and hand (-) BBT (-) Korean mBI (-)
Yavuzer et al. (2008a) RCT (7) NStart=20 NEnd=20 TPS=Subacute A vs 0	E: Playstation EyeToy games + conventional therapy C: Sham therapy + conventional therapy Duration: 30min/d, 5d/wk, 4wk	E vs C: Brunnstrom Recovery Stages (-) Functional Independence Measure (+exp)
Virtual reality training compared to sham		
Ogun et al. (2019) RCT (6) NStart=84 NEnd=65 TPS=Chronic A vs 0	E: Leap motion VR C: Sham VR Duration: 60min/d, 3d/wk, 6wks	E vs C: Action Research Arm Test (+exp) Functional Independence measure (+exp) Fugl-Meyer Upper Extremity Scale (+exp) Performance Assessment of Self-Care Skills (+exp)
In et al. (2012) RCT (4) NStart=24 NEnd=19 TPS=Chronic A vs 0	E: Virtual reality reflection therapy + conventional therapy C: Sham + conventional therapy Duration: 30min/d, 5d/wk, 4wk	E vs C: FMA UE (+exp) Mod Ashwroth Scale (-) BBT (-) JHFT (-) Manual function test (+exp)

Different approaches to smart gaming gloves compared against one another		
Lee et al. (2020d) RCT (7) NStart=36 NEnd=36 TPS=Chronic A1 vs A2	E: Non-immersive VR smart glove training (RAPAEL) C: Recreational video games + Conventional rehabilitation Duration: 30min/d, 3d/wk, for 8wks VR/recreation, 30min/d, 3d/wk, for 8wks conventional	E vs C: BBT (+exp) Grip strength (+exp) JTHFT (-) WMFT (+exp) Trail-making test (-)
Virtual reality training combined with other interventions compared to control		
Ersoy & Iyigun (2021) RCT (6) NStart=40 NEnd=40 TPS=Chronic A vs B *Also in Table 3 (Exercise and Strength Training)*	E1: Virtual Reality Boxing (Xbox Kinect) E2: Boxing Practice with Therapist Duration: 30min/d, 3d/wk, 8wks conventional therapy, 30min/d, 3d/wk, 8wks Virtual or in-person boxing	E1 vs E2: Wolf Motor Function Test (-) Minnesota Manual Dexterity Test (-) Fullerton Advanced Balance Scale (-) Addenbrooke's Cognitive Assessment (-) virtual boxing analysis
Cameirao et al. (2012) RCT (6) NStart=48 NEnd=44 TPS=Chronic A + B vs A + C vs A *Also in Table 20 (Feedback-Based Training); Table 16 (Robotics)*	E1: Virtual Relaity Game (Vision Based Tracking) E2: Virtual Reality (Haptic Feedback) E3: Virtual Reality (Exoskelton) Duration: 35min/d, 5d/wk, 4wks	E1 vs E2: Fugl-Meyer Arm (No stats) -Wrist/hand (No stats) , Chedoke Arm and Hand Activity Inventory (-) Box and Block Test (+exp2) E2 vs E3: Fugl-Meyer Arm (No stats) -Wrist/hand (No stats) Chedoke Arm and Hand Activity Inventory (-) Box and Block Test (+exp2) E1 vs E3: Fugl-Meyer Arm (No stats) -Wrist/hand Chedoke Arm and Hand Activity Inventory (-) Box and Block Test (-)
Video game training combined with other interventions compared to cimt		
McNulty et al. (2014) RCT (7) NStart=41 NEnd=40 TPS=Chronic A vs B *Also in Table 6 (Constraint-Induced Movement Therapy (CIMT))*	E: Nintendo Wii-based movement therapy C: Modified constraint-induced movement therapy Duration: 60min/d, 5d/wk for 2wk	E vs C: Wolf Motor Function Test sub max strength (-) max strength (-) timed tasks (-) Motor Activity Log (+exp) Fugl-Meyer Assessment (-) Modified Ashworth Scale (-) Box and Block Test (-) Grooved Pegboard Test (-) Active Range of motion (-) Passive ROM (-)
Video game training combined with other interventions compared to control		
Junior et al. (2019) RCT (6) NStart=48 NEnd=40 TPS=Chronic	E1: PNF + VR (Nintendo Wii) E2: PNF E3: Wii Duration: 50min, 2x/wk, 2mo	E1 vs E2 vs E3: E1/E2/E3: Fugl-Meyers Assessment (-) Passive Motion and Pain (-) Sensory (-)

A + B vs A vs B *Also in Table 1 (Neurodevelopmental Techniques)*		Upper Extremity (-) Lower Extremity (-) Balance (-)
Video game training combined with other interventions compared to graded repetitive arm supplementary program		
Hernandez et al. (2022) RCT (8) NStart=53 NEnd=51 TPS=Chronic A vs B *Also in Table 3 (Exercise and Strength Training)*	E: Jintronix Virtual reality C: GRASP rehab Duration: 20min/d, 5d/wk, 4wks	E vs C: FMA-UE (-) SIS (-) MAL (-)
Allegue et al. (2022) Pilot RCT (2) NStart=11 NEnd=9 TPS=Chronic A vs B *Also in Table 3 (Exercise and Strength Training)*	E: Telerehabilitation videogames VirTele C: GRASP program Duration: 30min/d, 5d/wk, 8wks	E vs C: FMA-UE (no stat) MAL (no stat) SIS (no stat) TSRQ (no stat)
Wilson et al. (2021) RCT (7) NStart=19 NEnd=17 TPS=Subacute A vs B *Also in Table 3 (Exercise and Strength Training)*	E: Home-Based (Virtual) Rehabilitation + Treatment As Usual C: Graded Repetitive Arm Supplementary Program + Treatment As Usual Duration: 30min/d,3-4d/wk, 8wks	E vs C: BBT MAH (+exp) LAH (-), 9HPT MAH (-) LAH (-) MoCA (+exp) SIS (-)
Adie et al. (2017) RCT (7) NStart=235 NEnd=209 TPS=Subacute A vs B *Also in Table 3 (Exercise and Strength Training)*	E: Wii arm exercises C: Home-based arm exercises Duration: 45min/d for 6wk	E vs C: Action Research Arm Test (-) Stroke Impact Questionnaire (-) Canadian Occupational Performance Measure (-) Motor Activity Log (-) EQ 5D 3L Visual Analogue Scale (-)
Video game training combined with other interventions compared to exercise and custom physiotherapy protocols		
Pouplin S. et al. (2023) Pilot RCT (8) NStart=28 NEnd=24 TPS=Chronic A vs B *Also in Table 3 (Exercise and Strength Training)*	E: Ergotact system (Videogames) C: Home-based self-rehabilitation program Duration: 30mins/d, 5d/wk, 2wks	E vs C: FMA-UE (-) Modified Ashworth Scale elbow flexor (-) wrist flexor (-) metacarpal phalangeal flexors (-) flexor digitorum superficialis (-) flexor digitorum profundus (-) Pain-VAS (-) Fatigue severity scale (-) WMFT (-) proximal section (-) distal section (-) BBT (-) FAI (-) domestic chores (-)

		leisure/work (-) outdoor activities (-) SF12 (-) patient satisfaction/motivation-VAS (-)
Krakauer et al. (2021) RCT (7) NStart=24 NEnd=21 TPS=Acute A vs B *Also in Table 3 (Exercise and Strength Training)*	E: Neuroanimation therapy using ARMEO exoskeleton C: Modified Occupational therapy (stretching, task specific training) Duration: 2hr/d, 5d/wk, 3wks	E vs C: FMA-UE (-) ARAT (-) Grip strength (-) SIS (-) Reaching AMD (-) Finger maximum voluntary force (-) Finger individuation (-)
Video game training combined with other interventions compared to task-specific training		
Ali et al. (2024) RCT (8) NStart=120 NEnd=115 TPS=Acute A vs B *Also in Table 4 (Task-Specific Training)*	E: Gamified training with ArmAble + Conventional therapy C: UE task-based training + Conventional therapy Duration: 45-60min/d, 6d/wk for 2wks	E vs C: FMA-UE (+exp) Motricity Index (-) ARAT (-) modified Rankin Scale (-) SIS (-) gamer user experience satisfaction scale (no stat)
Hegazy R.M. et al. (2022) RCT (8) NStart=20 NEnd=20 TPS=Subacute A + B vs A/B *Also in Table 4 (Task-Specific Training)*	E: Virtual reality + task based training C: Task-specific Training Duration: 75min/d(15min VR, 60min TST), 3d/wk, 6wks	E vs C: UEFI (+exp) Grip strength (+exp)
Video game training combined with other interventions compared to conventional therapy		
Kuo et al. (2023b) RCT (8) NStart=37 NEnd=34 TPS=Chronic A + B vs 0 *Also in Table 20 (Feedback-Based Training)*	E: Virtual reality games + Audio feedback + conventional therapy C: Conventional Rehab Duration: 60min/d (30min VR, 30min conventional), 2ds/wk, 18wks	E vs C: FMA-UE (-) AROM shoulder extension (-) shoulder flexion (+exp) shoulder abduction (-) elbow flexion (-) elbow extension (-) supination (-) pronation (+exp) Grip strength (-) BBT (+exp) SIS (-) M-PEAS (-)
Smith et al. (2021) Pilot RCT (6) NStart=23 NEnd=19 TPS=Acute A + B vs 0 *Also in Table 2 (Bilateral Arm Training)*	E: Bimanual, lever-driven wheelchair (LARA) for stationary arm exercise and overground ambulation + Videogame C: Conventional Arm Exercises Duration: 30min/d, 5d/wk, 3wks	E vs C: FMA-UE (-) BBT (-) Grip Strength (-) MAS (-) Pain VAS (-) 10MWT (-)

Virtual reality training combined with other interventions compared to non-robotic electromechanical devices		
Lülsdorff et al. (2023) RCT (5) NStart=60 NEnd=45 TPS=Subacute A vs B *Also in Table 16 (Robotics)*	E: Immersive virtual reality (CUREO) + Conventional therapy C: Electromechanically assisted training (ARMEOSpring) + Conventional therapy Duration: 20min/d for 10 sessions over 3wks VR or exoskeleton + 20min/d conventional UE therapy + 1-2hrs/d 5d/wk standard rehabilitation	E vs C: ARAT (+exp) User Experience Questionnaire (UEQ) attractiveness (-) perspicuity (-) efficiency (-) dependability (-) stimulation (-) novelty (-)
Different approaches to video game training compared against one another		
Fluet et al. (2024) RCT (7) NStart=33 NEnd=28 TPS=Chronic A1 vs A2	E: Virtual reality games (Leap Motion Controller) - enhanced motivation, gradually increasing difficulty C: Virtual reality games (Leap Motion Controller) - algorithm control, difficulty was modified using adaptive algorithms based on maintaining 80% success rate Duration: 20min/d for 12wks	E vs C: ARAT (-) FMA-UE (-) SIS hand (-) ADL (-) participation (-) Intrinsic Motivation Inventory (-)
Lotay et al. (2019) Pilot RCT (4) NStart=15 NEnd=12 TPS=Acute A1 vs A2	E: video game with Challenge Point Framework (Varied Schedule)- Game difficulty adapted to performance using the Challenge Point Framework (CPF) to increase task difficulty based on success. C: Training With A Fixed Schedule (Game difficulty stayed constant during training) Duration: ~20min, 5x over 3d	E vs C: Root Mean Square Error (RMSE) during Finger Flexion/Extension (-) Wrist Supination/Pronation (-) Wrist Radial/Ulnar Deviation (-) - Task Accuracy (-)
Video game training combined with other interventions compared to thermal stimulation		
Ayub I. et al. (2024) RCT (6) NStart=26 NEnd=23 TPS=Chronic A vs B *Also in Table 24 (Thermal Stimulation)*	E: Nintendo Wii Sports C: Neutral warmth Duration: E: 15min/d, 5d/wk, 4wks; C: 3hr/d, 3d/wk, 4wks	E vs C: mAS (-) Fatigue severity scale (+exp) BBT (-) AROM Shoulder abduction (+exp) Shoulder flexion (-) Shoulder extrenal rotation (+exp) Elbow flexion (-) Wrist flexion (+exp) Wrist extension (+exp)
Virtual reality training compared to no treatment		
Jang & Jang (2016) RCT (5) NStart=21 NEnd=21 TPS=Chronic A vs 0	E: Virtually Augmented Stretching Exercises C: No treatment Duration: 31min/d,6d/wk, 4wk	E vs C: Manual Muscle Test: Wrist Flexion (-) Wrist Extension (+exp) Finger Flexion (-) Finger Extension (+exp) Manual Function Test (+exp) Purdue Pegboard Test (+exp)
Jang et al. (2005) RCT (5) NStart=10 NEnd=10	E: Virtual reality training C: No treatment Duration: 60min/d, 5d/wk, 4wk	E vs C: BBT(+exp) FMA(+exp) MFT(+exp)

TPS=Chronic A vs 0		Motor Activity Log (+exp) fMRI parameters
Virtual reality training compared to video game training		
Chen et al. (2023d) Pilot RCT (6) NStart=50 NEnd=28 TPS=Subacute A vs 0	E: Immersive virtual reality (VR)-based upper limb exercise system + Conventional therapy C: Commercial video games + Conventional therapy Duration: 245-410 mins/d (210-375 mins a day of conventional therapy, 35 mins of virtual reality or video games), 6ds/wk, 2wks	E vs C: FMA-UE (-) shoulder/elbow/forearm (-) wrist (-) hand (-) coordination/speed (-) Active range of motion shoulder flexion (-) shoulder abduction (-) elbow flexion (-) forearm pronation (-) forearm supination (-) wrist flexion (-) wrist extension (-) muscle strength shoulder flexors (-) shoulder abductors (-) elbow flexors (-) wrist flexors (-) wrist extensors (-) WMFT task completion time (-) quality of movement (-) Perceived Upper limb function (-) EQ-5D-5L (-)
Virtual reality training combined with other interventions compared to exercise and custom physiotherapy protocols		
Cho et al. (2021) Pilot RCT (7) NStart=24 NEnd=24 TPS=Acute A vs B *Also in Table 3 (Exercise and Strength Training)*	E: Virtual Reality Training (Nintendo Wii) + general physical therapy C: OT + general physical therapy Duration: 30min, 5x/wk, 4wks	E vs C: Jebsen-Taylor Hand Function Test (-) Fugl-Meyer Assessment (-) Grip Strength (+exp) Modified Bathel Index (-)
Virtual reality training combined with other interventions compared to FES		
Lee et al. (2018c) Pilot RCT (7) NStart=48 NEnd=41 TPS=Chronic A + B vs A/B *Also in Table 22 (Neuromuscular Electrical Stimulation (NMES))*	E: Virtual Reality + Functional Electrical Stimulation C: Functional Electrical Stimulation Duration: 30min/d, 5d/wk for 4wk	E vs C: Fugl-Meyer Assessment; Proximal (-) Distal (+exp) Wolf Motor Function Test (-) Box and Block Test (-) Jebsen Taylor Hand Function Test (-) Stroke Impact Scale (-)
Virtual reality training combined with other interventions compared to graded repetitive arm supplementary program		
Rand et al. (2017) Pilot RCT (7) NStart=24 NEnd=23 TPS=Chronic	E: Video game self training C: Graded repetitive arm supplementary program Duration: 60min/d, 6d/wk, 5wk	E vs C: ARAT (-) Motor activity log (-) BBT (-)

A vs B *Also in Table 3 (Exercise and Strength Training)*		
Virtual reality training compared to exercise and custom physiotherapy protocols		
Lee et al. (2016d) Pilot RCT (8) NStart=26 NEnd=26 TPS=Chronic A vs B *Also in Table 3 (Exercise and Strength Training)*	E: VR based rehab C: Group based rehab Duration: 30min/d, 3d/wk 8wk	E vs C: FMA (+exp) BBT (-) mBI (-) Manual function test (+exp) SF-12 (-)
Virtual reality training compared to conventional therapy or sham or no treatment		
Fan et al. (2014) Pilot RCT (5) NStart=27 NEnd=20 TPS=Chronic A vs 0	E: Virtual reality Wii gaming C1: Placebo board game C2: Conventional therapy C3: No treatment Duration: 60min/d, 3d/wk, 3wks	E vs C1: TTP contractions of sEMG; -biceps brachium (+exp); triceps brachii (-); deltoid (-); Flexor carpi radialis (-); Extensor carpi radialis (-); [SIS; -specific (-); -global (-) ; Jebson Taylor hand function test (-); Intrinsic motivation inventory (+exp) E vs C2: TTP contractions of sEMG; -biceps brachium (+exp); triceps brachii (-); deltoid (-); Flexor carpi radialis (+exp); Extensor carpi radialis (-); [SIS; -specific (-); -global (-) ; Jebsen Taylor hand function test (-); Intrinsic motivation inventory (-)
Smart gaming gloves combined with other interventions compared to conventional therapy		
Friedman et al. (2014) Pilot RCT (4) NStart=12 NEnd=12 TPS=Chronic A vs B vs 0 *Also in Table 3 (Exercise and Strength Training)*	E1: Music glove E2: Isometric hand therapy C: Conventional care Duration: 1hr, 3x/wk, 2wk	E1 vs C: Box and Block Test (+exp1) Fugl-Meyer Asessment (-) Wolf Motor Function Test (-) Action Research Arm Test (-) Nine Hole Peg Test (+exp1) Pinch Strength (-) E2 vs C: Box and Block Test (-) Fugl-Meyer Asessment (-) Wolf Motor Function Test (-) Action Research Arm Test (-) Nine Hole Peg Test (-) Pinch Strength (-) E1 vs E2: Box and Block Test (-) Fugl-Meyer Asessment (-) Wolf Motor Function Test (-) Action Research Arm Test (-) Nine Hole Peg Test (-) Pinch Strength (-) User satisfaction questionnaire
Virtual reality training combined with other interventions compared to virtual reality training or sham		
Viana et al. (2014)	E: virtual reality + aNodal tDCS	E vs C:

Pilot RCT (9) NStart=20 NEnd=20 TPS=Chronic A + B vs A/B *Also in Table 31 (Transcranial Direct Current Stimulation (tDCS))*	C: virtual reality + sham Duration: 1hr/d, 3d/wk for 5wk	Fugl-Meyer Assessment (-) Wolf Motor Function Test (-) Modified Ashworth Scale (-) Grip Strength (-) Stroke Specific Quality of Life Scale (+exp) Stroke Specific Quality of Life Scale-UL (-)
Smart gaming gloves compared to sham		
daSilvaCameirao et al. (2011) Pilot RCT (5) NStart=19 NEnd=16 TPS=Acute A vs 0	E: VR gaming Gloves + Standard rehabilitation C1: Intensive Occupational therapy (the same movement in the VR gaming group without any game) C2: regular video game (movements with the paretic arm that did not show any virtual body in response to their actions) Duration: 20min/3x/wk for 12wk	E vs C: Barthel Index (-) Medical Research Council (-) Motricity Index (-) Fugl-Meyer Assessment-UE (+exp) Arm (-) Wrist/Hand (+exp) Chedoke Arm and Hand Activity Inventory (-) Relative Paretic speed (+exp)
Cross-Referenced RCTs: Combined or Comparative Interventions Involving Virtual Reality (results included in this table's levels of evidence)		
Knutson et al. (2024) RCT (5) NStart=52 NEnd=39 TPS=Chronic A + B vs X *Primary listing: Table 22 (Neuromuscular Electrical Stimulation (NMES))*	E: Contralaterally controlled FES (CCFES) + Hand therapy video games C: CCFES Duration: 51min/d, 10sessions/wk for 12wks at home & 80min/d, 2d/wk, 12wks lab sessions	E vs C: BBT (-) FMA-UE (-) ARAT (-) Stroke Upper Limb Capacity Scale (-) Arm Motor Abilities Test (-) Delis-Kaplan Executive Functions Systems-Tower Test (-) SIS (-) perceived UE and LE strength (-) perceived memory and thinking ability (-) perceived mood and control of emotions (-) perceived ability to communicate and understand (-) perceived ability to perform ADLs (-) perceived ability to be mobile at home and in the community (-) perceived ability to use the affected hand (-) perceived ability to participate in meaningful activities (-) perceived percentage of recovery from stroke (-)
Simpson L.A. et al. (2024) RCT (6) NStart=73 NEnd=66 TPS=Chronic A + B vs 0 *Primary listing: Table 3 (Exercise and Strength Training)*	E: Vitrual Arm Boot Camp (home exercise program + feedback from TENZR +conventional therpay) C: Waitlist (conventional care) Duration: E: 2hr/d, 5d/wk (6 sessions), 3wks; C: 1d/wk, 3wks	E vs C: Reach-to-grasp counts (+exp) Rating of everyday arm-use in the community and home (REACH) Scale (+exp) Arm capacity and movement test (ArmCAM) (+exp) SIS Hand subscale (-) UE strength subscale (-)

Carmeli et al. (2024) RCT (4) NStart=22 NEnd=16 TPS=Acute A + B1 vs A + B2 *Primary listing: Table 16 (Robotics)*	E: Robotic training with force fields for error augmentation + Video game therapy + Conventional therapy C: Robotic training without force fields for error augmentation + Video game therapy + Conventional therapy Duration: 20 mins/d, 3ds/wk, 2wks	E vs C: FMA (no stat) Motor assessment scale (no stat) Hand trajectory deviation (+exp) Number of movement units (+exp) Normalized jerk score (-) Movement time (+exp)
Vanoglio et al. (2024) Pilot RCT (5) NStart=21 NEnd=21 TPS=Acute A + B vs C *Primary listing: Table 16 (Robotics)*	E: Gloreha Aria (Robotic exoskeleton) + Virtual reality + Conventional therapy C: Self mobilization + Conventional therapy Duration: Total motor therapy (330 mins/week, 6 days/week, 6 weeks); Upper Limb rehab (150 mins/week, 5ds/wk, 6 wks); Speech rehabilitation (200 mins/wk, 4ds/wk, 6 wks); Gloreha aria/self mobilization (30 mins/d, 5ds/wk, 6wks)	E vs C: FMA-UE (-) wrist (-) hand (-) coordination/speed (-) motor skills (-) sensation (-) passive joint motion (-) joint pain (-) MES-UE (-) Grip strength (-) Barthel Index (-) FIM (-) Quick-DASH (-)
Adams et al. (2023) RCT (5) NStart=21 NEnd=18 TPS=Chronic A + B vs 0 *Primary listing: Table 15 (Telerehabilitation and Education)*	E: Glove orthosis GRASP with Virtual reality + home based rehab with OT C: Conventional Rehab Duration: 45min/d, 4d/wk, 8wks	E vs C: FMA (+exp) WMFT time (-) functional ability (-) BBT (-) MAL amount (+exp) how well (+exp)
Levin et al. (2023) RCT (8) NStart=52 NEnd=46 TPS=Subacute A + B1 vs A + B2 vs A *Primary listing: Table 4 (Task-Specific Training)*	E1: Personalized reach training (active control-restricted range) + anodal tDCS + Virtual reality games E2: Non personalized (entire range of motion) + anodal tDCS + Virtual reality games C: Personal reach training (active control-restricted range) + Sham tDCS + video games Duration: 80min/d(50min training, 30min tDCS), 5d/wk, 2wks	E1/E2 vs C: Tonic Stretch Reflex Threshold angle by EMG (-) arm kinematics (-) velocity of TSRT (-) Tactile sensation (-) PROM (-) FMA-UE (-) WMFT (-)
Dhanusia et al. (2023) RCT (4) NStart=14 NEnd=14 TPS=Subacute A vs B *Primary listing: Table 3 (Exercise and Strength Training)*	E: Graded repetitive arm supplementary program (GRASP) C: Virtual reality Duration: 60min/d, 6d/wk for 8wks	E vs C: FMA-UE (+exp) ARAT (+exp) Hand help dynamometer (+exp) EMG extensor digitorum (+exp) triceps (+exp) biceps (+exp)
Lee & Cha (2022) RCT (9) NStart=20 NEnd=20	E: Anodal tDCS + Virtual Reality C: sham tDCS + Virtual Reality Duration: 20min/d, 5d/wk, 4wks	E vs C: BBT (+exp) JTHFT (-) ST (+exp)

TPS=Subacute A + B vs X *Primary listing: Table 31 (Transcranial Direct Current Stimulation (tDCS))*		TMT (-)
Chen et al. (2021b) RCT (6) NStart=24 NEnd=23 TPS=Chronic A + B vs A/B *Primary listing: Table 30 (Theta Burst Stimulation (TBS))*	E: iTBS + Virtual reality-based cycling training (bilateral upper limb) C: sham iTBS + VCT Duration: 60min, 5d/wk, 3wks	E vs C: Modified Ashworth Scale-UE (+exp) FMA-UE (-) ARAT (-) BBT (-) 9HPT (-) MAL Amount of Use (+exp) MAL Quality of Movement (-) SIS (+exp)
Gueye et al. (2021) RCT (5) NStart=50 NEnd=50 TPS=Acute A + B vs 0 *Primary listing: Table 16 (Robotics)*	E: virtual reality with arm exoskeleton C: conventional physiotherapy(2 sessions) Duration: 45min/d, 4d/wk, 3 wks	E vs C: FMA-UE (+exp) FIM (-) MoCA (-)
Llorens et al. (2021) RCT (7) NStart=32 NEnd=29 TPS=Chronic A + B vs 0 *Primary listing: Table 31 (Transcranial Direct Current Stimulation (tDCS))*	E: Anodal tDCS + VR-based therapy + conventional PT C: conventional physiotherapy Duration: 60min/d,3-5d/wk,(25 days)	E vs C: FMA-UL (+exp) Wolf motor function test (+exp) Nottingham sensory assessment (+exp)
Anjum A.F. et al. (2021) RCT (3) NStart=40 NEnd=40 TPS=Subacute A + B vs 0 *Primary listing: Table 6 (Constraint-Induced Movement Therapy (CIMT))*	E: CIMT using augmented reality "Nintendo Wii" C: Conventional physiotherapy Duration: 20min/d, 4d/wk, 4wks	E vs C: BI feeding (+exp) grooming (+exp)
Chen et al. (2021h) Pilot RCT (6) NStart=15 NEnd=14 TPS=Chronic A + B1 vs A + B2 *Primary listing: Table 16 (Robotics)*	E: Low dose exoskeleton robot HEXORR II (12 sessions) + videogames C: High dose exoskeleton robot HEXORR II (24 sessions) + video games Duration: 15h/d, 2d/wk, 6wks or 12wks	E vs C: ARAT (-) FMA (-) MAL (-) MAS (-) Grip strength (-) Finger ROM (-) Trunk ROM (-)
Yao et al. (2020) RCT (7) NStart=42 NEnd=40 TPS=Subacute A + B vs A/B *Primary listing: Table 31 (Transcranial Direct Current Stimulation (tDCS))*	E: Cathodal tDCS + VR C: Sham tDCS + VR Duration: 20min tDCS/sham + VR 5d/wk, for 2wks	E vs C: Fugl Meyer Assessment Upper Extremity (+exp) Action Research Arm Test (+exp) Barthel Index (+exp)

Maier et al. (2020) Pilot RCT (5) NStart=38 NEnd=30 TPS=Chronic A + B vs A/B *Primary listing: Table 13 (Cognitive and Dual-Task Training)*	E: Adaptive conjuctive cognitive training C: Cognitive task training at home Duration: 30min/d, 7d/wk for 6wk	E vs C: BI (no stats) FMA (no stats) Neuropsychological battery (made of several smaller tasks, not sure what to code this as) + MOCA + HAMD + MMSE
Choi et al. (2019) RCT (7) NStart=36 NEnd=36 TPS=Chronic A + B vs A/B vs 0 *Primary listing: Table 10 (Mirror Therapy)*	E1: Leap motion VR + mirror therapy E2: Mirror therapy C: Sham Duration: 30min, 3x/wk for 5wk	E1 vs C: MFT (+exp1) Neck discomfort scale (+exp1) SF8(+exp1) E2 vs C: MFT (+exp2) Neck discomfort scale (-) SF8(+exp2) E1 vs E2: MFT (+exp1) Neck discomfort scale (+exp) SF8(-)
Lin et al. (2018a) RCT (5) NStart=15 NEnd=15 TPS=Chronic A + B vs A + C vs 0 *Primary listing: Table 20 (Feedback-Based Training)*	E1: Motion tracking device+ VR game E2: Motion tracking device + braincomputer interface attention monitoring electroencephalogram device + VR game C: Conventional therapy Duration: 35min/d, 3d/wk for 4wk	E1 vs E2: Fugl-Meyer Assessment (+exp2) E2 vs C: Fugl-Meyer Assessment (+exp2) E1 vs C: Fugl-Meyer Assessment (-)
Nijenhuis et al. (2017) Pilot RCT (6) NStart=20 NEnd=19 TPS=Chronic A + B vs 0 *Primary listing: Table 9 (Orthotics and Taping)*	E: Hand orthosis + computerised gaming exercises C: Conventional home exercise Duration: 30min/d, 6d/wk for 6wk	E vs C: Action Research Arm Test (-) Fugl-Meyer Assessment (-) Grip Strength (-) Box and Block Test (-) Motor Activity Log (-) Stroke Impact Scale (-) intrinsic motivation inventory
Samuel et al. (2017) Pilot RCT (3) NStart=8 NEnd=6 TPS=Acute A + B vs A/B *Primary listing: Table 38 (Levodopa)*	E: virtual reality training + levodopa C: Levodopa Duration: 30min, 5d/wk, 2wk	E vs C: Fugl-Meyer Upper Extremity (no stat) Action Research Arm Test (no stat) kinematics: and-path ratio score no. of flexion-extension movements no. of velocity peaks per movement time taken for each flexion-extension
Prange et al. (2015) RCT (7) NStart=70 NEnd=68 TPS=Subacute A + B vs 0 *Primary listing: Table 16 (Robotics)*	E: weight supported Arm training (ArmeoBoom device is a sling suspension system) C: Conventional therapy Duration: 30min/d, 3d/wk, 6wk	E vs C: Maximal Reaching distance (-) Fugl Meyer Assessment (-) Stroke Upper Limb Capacity Scale (-) Visual Analogue Scale-pain (-) Intrinsic Motivation Inventory (+exp)
Zheng et al. (2015) RCT (6) NStart=112	E: Low frequency rTMS + VR C: Sham rTMS + VR Duration: 45min/d, 6d/wk, 4wk	E vs C: Fugl-Meyer Assessment (+exp) Wolf Motor Function Test (+exp)

NEnd=108 TPS=Acute A + B vs A/B *Primary listing: Table 29 (Repetitive Transcranial Magnetic Stimulation (rTMS))*		Modified Barthel Index (-) SF-36 Physical Functioning (+exp) Role-Limitations (-) Bodily Pain (-) General Health (+exp) Vitality (-) Social Functioning (-) Role Limitation (-) Mental Health (-)
Fluet et al. (2014) RCT (5) NStart=41 NEnd=40 TPS=Chronic A + B1 vs A + B2 *Primary listing: Table 16 (Robotics)*	E1: Robot hand and arm separate training with VR E2: Robot hand and arm together training with VR Duration: 2hr/d1; 3hr/d4-d8	E1 vs E2: WMFT (+HAT) Jebsen hand function (-) kinematic outcomes: Finger Fractionation, Time to Task completion, Reaching Trajectory Smoothness, End point deviation
Lee et al. (2014b) Pilot RCT (6) NStart=64 NEnd=59 TPS=Acute A + B vs A/B *Primary listing: Table 31 (Transcranial Direct Current Stimulation (tDCS))*	E1: Cathodal tDCS E2: VR: E3: Cathodal tDCS+VR Duration: 30min/d, 5d/wk, 3wks	E3 vs E2/E1: Manual Function Test (+exp3) Fugl-Meyer Assessment (+exp3) Modified Barthel Index (-) Manual Muscle Test (-) Modified Ashworth Scale (-) Box and Block Test (-) E1 vs E2: Manual Function Test (+exp1) Fugl-Meyer Assessment (+exp1) Modified Barthel Index (-) Manual Muscle Test (-) Modified Ashworth Scale (-) Box and Block Test (-)
Byl et al. (2013) Pilot RCT (5) NStart=18 NEnd=15 TPS=Chronic A + B1 vs A + B2 vs 0 *Primary listing: Table 16 (Robotics)*	E1: Robotic orthosis + Task-Specific training + Videogames (Unilateral) E2: Robotic orthosis + Task-Specific Training + Videogames (Bilateral) C: Usual Physical Therapy Duration: 2x/wk, for 6wk	E1/E2 vs C: Upper Limb Fugl Meyer (FMA) (-) Saint Louis University Mental Status Exam (SLUMS) (-) Stroke impact scale (-) California Functional Independence Scale (CAFE-40) (-) Active Range of Motion (-) Muscle Strength (-) Pain NRS (-) Box and Block (-) Finger Tapper Test (-) Wolf Motor Function Test (-) Digital Reaction Time Test (-) Modified Ashworth Scale (-)
Piron et al. (2009) RCT (7) NStart=36 NEnd=36 TPS=Chronic A vs 0	E: Remote VR treatment C: Traditional PT Duration: 60min/d, 5d/wk, for 4wks	E vs C: FMA UE (-) Ashworth scale (-) ABILHAND (+exp)

Primary listing: Table 15 *(Telerehabilitation and Education)*		

Abbreviations and table notes: C=control group; D=days; E=experimental group; H=hours; Min=minutes; RCT=randomized controlled trial; TPS=time post stroke category (Acute: less than 30 days, Subacute: more than 1 month but less than 6 months, Chronic: over 6 months); Wk=weeks.

+exp indicates a statistically significant between groups difference at α=0.05 in favour of the experimental group

+exp1/+exp2/+exp3 indicates a statistically significant between groups difference at α=0.05 in favour of the first, second or third experimental group

+con indicates a statistically significant between groups difference at α=0.05 in favour of the control group

- indicates no statistically significant between groups differences at α=0.05

1. Body Functions and Structures

MOTOR FUNCTION			
LoE	**Conclusion Statement**	**RCTs**	**References**
1b	Smart Glove Upper Extremity Training (RAPAEL) with rehab may produce greater improvements in motor function than Upper Extremity Self-Training at home with rehab.	1	Kang et al. (2020)
1a	There is conflicting evidence about the effect of Virtual reality training when compared to conventional therapy for improving motor function.	27	Bai et al. (2022); Chen et al. (2022c); Huang et al. (2022a); Marques-Sule et al. (2021); Mekbib et al. (2021); Xie et al. (2021); Johnson et al. (2020); Keskin et al. (2020); Laffont et al. (2020); Long et al. (2020); Miclaus et al. (2020); Norouzi-Gheidari et al. (2020); Askin et al. (2018); Faria et al. (2018); Kiper et al. (2018); Lee et al. (2018a); Ballester et al. (2017); Brunner et al. (2017); Wang et al. (2017c); Choi et al. (2016a); daSilvaRibeiro et al. (2015); Kiper et al. (2014); Yin et al. (2014); Duff et al. (2013); Crosbie et al. (2012); Jo et al. (2012); Piron et al. (2010)
1a	Video game training may not have a difference in efficacy when compared to conventional therapy for improving motor function.	22	Aguilera-Rubio et al. (2024); Amin et al. (2024); Guo et al. (2023); Luo et al. (2023); Anwar et al. (2022); Lam et al. (2022); Leng et al. (2022); Terematz et al. (2022); Li et al. (2021); HenriquePPB et al. (2019); Hung et al. (2019c); IkbaliAfsar et al. (2018); Turkbey et al. (2017); Givon et al. (2016); Lee et al. (2016f); Iosa et al. (2015); Shin et al. (2015); Choi et al. (2014); Kottink et al. (2014); Shin et al. (2014); Sin et al. (2013); Kwon et al. (2012)
1a	Virtual reality training combined with other interventions may produce greater improvements in motor function than conventional therapy.	5	Jo et al. (2024); El-Kafy E.M.A. et al. (2021); Oh et al. (2019); Alves et al. (2018); Kiper et al. (2011)
1b	Virtual reality-based mirror therapy with conventional physical therapy may produce greater improvements in motor function than Traditional mirror therapy with conventional physical therapy.	1	Jo et al. (2024)
2	Virtual Reality (Wii) may not have a difference in efficacy when compared to Motor Imagery Training for improving motor function.	1	Alves et al. (2018)

1b	Task-oriented training with non-immersive virtual reality with conventional rehabilitation may not have a difference in efficacy when compared to task-oriented training with simple recreational activities with conventional rehabilitation for improving motor function.	1	Saposnik et al. (2016)
1a	Different approaches to virtual reality training may not have a difference in efficacy when compared with one another for improving motor function.	4	Yang et al. (2022a); Sheehy et al. (2020); Ballester et al. (2016); Lee et al. (2014a)
2	Multiuser virtual reality Therapy may not have a difference in efficacy when compared to Single user virtual reality Therapy for improving motor function.	1	Thielbar et al. (2020)
1a	Smart gaming gloves may produce greater improvements in motor function than conventional therapy.	8	Shin S. et al. (2022); Park et al. (2021); Rodriguez-Hernandez M. et al. (2021); Park et al. (2019b); Park et al. (2018); Hee-TaeJung et al. (2017); Shin et al. (2016a); Zondervan et al. (2016)
2	Nintendo Wii virtual reality training with Usual Care (conventional occupational therapy) may not have a difference in efficacy when compared to dose matched task oriented therapy (as Conventional therapy) with Usual Care (conventional occupational therapy) or Usual Care (conventional occupational therapy) for improving motor function.	1	Kong et al. (2016)
1b	Virtual reality keypad or glove (PneuGlove) may not have a difference in efficacy when compared to Task Specific Training Occupational Therapy for improving motor function.	1	Thielbar et al. (2014)
1a	Virtual reality training combined with other interventions may not have a difference in efficacy when compared to virtual reality training for improving motor function.	3	Salvalaggio et al. (2022); Widmer et al. (2022); Park et al. (2016)
1b	There is conflicting evidence about the effect of Virtual reality training combined with other interventions when compared to bilateral arm training for improving motor function.	2	Song Y.-H. & Lee H.-M. (2021); Lee et al. (2016c)
1b	Virtual reality training may produce greater improvements in motor function than sham.	2	Ogun et al. (2019); In et al. (2012)
1b	There is conflicting evidence about the effect of Non-immersive virtual reality smart glove training (RAPAEL) when compared to Recreational video games with Conventional rehabilitation for improving motor function.	1	Lee et al. (2020d)
1b	Virtual Reality Boxing (Xbox Kinect) may not have a difference in efficacy when compared to Boxing Practice with Therapist for improving motor function.	1	Ersoy & Iyigun (2021)
1b	Nintendo Wii-based movement therapy may not have a difference in efficacy when compared to Modified constraint-induced movement therapy for improving motor function.	1	McNulty et al. (2014)
1b	Proprioceptive neuromuscular facilitation with virtual reality (Nintendo Wii) may not have a difference in efficacy when compared to proprioceptive neuromuscular facilitation or Wii for improving motor function.	1	Junior et al. (2019)
1a	Video game training combined with other interventions may not have a difference in efficacy when compared to graded repetitive arm supplementary program for improving motor function.	2	Hernandez et al. (2022); Adie et al. (2017)
1b	Neuroanimation therapy using ARMEO exoskeleton may not have a difference in efficacy when compared to Modified Occupational therapy (stretching, task specific training) for improving motor function.	1	Krakauer et al. (2021)

1a	Video game training combined with other interventions may produce greater improvements in motor function than task-specific training.	2	Ali et al. (2024); Hegazy R.M. et al. (2022)
1b	Virtual reality games with Audio feedback and conventional therapy may not have a difference in efficacy when compared to Conventional Rehab for improving motor function.	1	Kuo et al. (2023b)
2	Immersive virtual reality (CUREO) with Conventional therapy may produce greater improvements in motor function than Electromechanically assisted training (ARMEOSpring) with Conventional therapy.	1	Lülsdorff et al. (2023)
1b	Virtual reality games (Leap Motion Controller) - enhanced motivation, gradually increasing difficulty may not have a difference in efficacy when compared to Virtual reality games (Leap Motion Controller) - algorithm control, difficulty was modified using adaptive algorithms based on maintaining 80% success rate for improving motor function.	1	Fluet et al. (2024)
1b	Weight supported Arm training (ArmeoBoom device is a sling suspension system) may not have a difference in efficacy when compared to Conventional therapy for improving motor function.	1	Prange et al. (2015)
1b	Cathodal transcranial direct current stimulation with virtual reality may produce greater improvements in motor function than Sham transcranial direct current stimulation with virtual reality.	1	Yao et al. (2020)
2	There is conflicting evidence about the effect of Motion tracking device with virtual reality game when compared to Conventional therapy for improving motor function.	1	Lin et al. (2018a)
2	Motion tracking device with virtual reality game may result in lesser improvements in motor function when compared to Motion tracking device with braincomputer interface attention monitoring electroencephalogram device and virtual reality game.	1	Lin et al. (2018a)
1b	Remote virtual reality treatment may not have a difference in efficacy when compared to Traditional physical therapy for improving motor function.	1	Piron et al. (2009)
1b	Leap motion virtual reality with mirror therapy may produce greater improvements in motor function than Sham.	1	Choi et al. (2019)
1b	Leap motion virtual reality with mirror therapy may produce greater improvements in motor function than Mirror therapy.	1	Choi et al. (2019)
2	Robot hand and arm separate training with virtual reality may not have a difference in efficacy when compared to Robot hand and arm together training with virtual reality for improving motor function.	1	Fluet et al. (2014)
1b	Low frequency repetitive transcranial magnetic stimulation with virtual reality may produce greater improvements in motor function than Sham repetitive transcranial magnetic stimulation with virtual reality.	1	Zheng et al. (2015)
1b	Intermittent theta burst stimulation with Virtual reality-based cycling training (bilateral upper limb) may not have a difference in efficacy when compared to sham intermittent theta burst stimulation with VCT for improving motor function.	1	Chen et al. (2021b)
2	Virtual reality with arm exoskeleton may produce greater improvements in motor function than conventional physiotherapy.	1	Gueye et al. (2021)
1b	Anodal transcranial direct current stimulation with virtual reality-based therapy and conventional physical therapy may produce greater improvements in motor function than conventional physiotherapy.	1	Llorens et al. (2021)
1b	Anodal transcranial direct current stimulation with Virtual Reality may not have a difference in efficacy when compared to sham	1	Lee & Cha (2022)

	transcranial direct current stimulation with Virtual Reality for improving motor function.		
2	Glove orthosis graded repetitive arm supplementary program with Virtual reality with home based rehab with occupational therapy may not have a difference in efficacy when compared to Conventional Rehab for improving motor function.	1	Adams et al. (2023)
1b	Personalized reach training (active control-restricted range) with anodal transcranial direct current stimulation and Virtual reality games may not have a difference in efficacy when compared to Personal reach training (active control-restricted range) with Sham transcranial direct current stimulation and video games for improving motor function.	1	Levin et al. (2023)
2	Graded repetitive arm supplementary program may produce greater improvements in motor function than Virtual reality.	1	Dhanusia et al. (2023)
2	Contralaterally controlled functional electrical stimulation with Hand therapy video games may not have a difference in efficacy when compared to contralaterally controlled functional electrical stimulation for improving motor function.	1	Knutson et al. (2024)
1b	Vitrual Arm Boot Camp (home exercise program with feedback from TENZR and conventional therpay) may produce greater improvements in motor function than Waitlist (conventional care).	1	Simpson L.A. et al. (2024)
2	Robotic training with force fields for error augmentation with Video game therapy and Conventional therapy may produce greater improvements in motor function than Robotic training without force fields for error augmentation with Video game therapy and Conventional therapy.	1	Carmeli et al. (2024)
2	Virtual reality training may produce greater improvements in motor function than no treatment.	2	Jang & Jang (2016); Jang et al. (2005)
1b	Immersive virtual reality (VR)-based upper limb exercise system with Conventional therapy may not have a difference in efficacy when compared to Commercial video games with Conventional therapy for improving motor function.	1	Chen et al. (2023d)
1b	Video game training combined with other interventions may not have a difference in efficacy when compared to exercise and custom physiotherapy protocols for improving motor function.	1	Pouplin S. et al. (2023)
1b	Virtual Reality Training (Nintendo Wii) with general physical therapy may not have a difference in efficacy when compared to OT with general physical therapy for improving motor function.	1	Cho et al. (2021)
1b	Video game training combined with other interventions may not have a difference in efficacy when compared to conventional therapy for improving motor function.	1	Smith et al. (2021)
2	Different approaches to video game training may not have a difference in efficacy when compared with one another for improving motor function.	1	Lotay et al. (2019)
1b	Video game training may not have a difference in efficacy when compared to sham for improving motor function.	1	Kim et al. (2018b)
1b	Virtual Reality with Functional Electrical Stimulation may not have a difference in efficacy when compared to Functional Electrical Stimulation for improving motor function.	1	Lee et al. (2018c)
1b	Video game self training may not have a difference in efficacy when compared to Graded repetitive arm supplementary program for improving motor function.	1	Rand et al. (2017)
1b	VR based rehab may produce greater improvements in motor function than Group based rehab.	1	Lee et al. (2016d)

2	Virtual reality Wii gaming may not have a difference in efficacy when compared to Conventional therapy for improving motor function.	1	Fan et al. (2014)
2	Music glove may not have a difference in efficacy when compared to Conventional care for improving motor function.	1	Friedman et al. (2014)
2	Isometric hand therapy may not have a difference in efficacy when compared to Conventional care for improving motor function.	1	Friedman et al. (2014)
2	Music glove may not have a difference in efficacy when compared to Isometric hand therapy for improving motor function.	1	Friedman et al. (2014)
1b	Virtual reality with aNodal tDCS may not have a difference in efficacy when compared to virtual reality with sham for improving motor function.	1	Viana et al. (2014)
2	VR gaming Gloves with Standard rehabilitation may produce greater improvements in motor function than Intensive Occupational therapy (the same movement in the VR gaming group without any game).	1	daSilvaCameirao et al. (2011)
2	Gloreha Aria (Robotic exoskeleton) with Virtual reality and Conventional therapy may not have a difference in efficacy when compared to Self mobilization with Conventional therapy for improving motor function.	1	Vanoglio et al. (2024)
1b	Low dose exoskeleton robot HEXORR II (12 sessions) with videogames may not have a difference in efficacy when compared to High dose exoskeleton robot HEXORR II (24 sessions) with video games for improving motor function.	1	Chen et al. (2021h)
1b	Hand orthosis with computerised gaming exercises may not have a difference in efficacy when compared to Conventional home exercise for improving motor function.	1	Nijenhuis et al. (2017)
1b	Cathodal tDCS with VR may produce greater improvements in motor function than VR:.	1	Lee et al. (2014b)
1b	Cathodal tDCS with VR may produce greater improvements in motor function than Cathodal tDCS.	1	Lee et al. (2014b)
1b	Cathodal tDCS may produce greater improvements in motor function than VR:.	1	Lee et al. (2014b)
2	Robotic orthosis with Task-Specific training and Videogames (Unilateral) may not have a difference in efficacy when compared to Usual Physical Therapy for improving motor function.	1	Byl et al. (2013)
2	Robotic orthosis with Task-Specific Training and Videogames (Bilateral) may not have a difference in efficacy when compared to Usual Physical Therapy for improving motor function.	1	Byl et al. (2013)

STROKE SEVERITY			
LoE	**Conclusion Statement**	**RCTs**	**References**
1a	Virtual reality training may not have a difference in efficacy when compared to conventional therapy for improving stroke severity.	6	Chen et al. (2022c); Keskin et al. (2020); Miclaus et al. (2020); Askin et al. (2018); Kiper et al. (2018); Choi et al. (2016a)
1a	Video game training may produce greater improvements in stroke severity than conventional therapy.	3	Li et al. (2021); IkbaliAfsar et al. (2018); Turkbey et al. (2017)
1b	Virtual reality training combined with other interventions may not have a difference in efficacy when compared to virtual reality training for improving stroke severity.	1	Widmer et al. (2022)
1b	Playstation EyeToy games with conventional therapy may not have a difference in efficacy when compared to Sham therapy with conventional therapy for improving stroke severity.	1	Yavuzer et al. (2008a)

1b	Video game training combined with other interventions may not have a difference in efficacy when compared to task-specific training for improving stroke severity.	1	Ali et al. (2024)
1b	Video game training may not have a difference in efficacy when compared to sham for improving stroke severity.	1	Kim et al. (2018b)

MUSCLE STRENGTH			
LoE	**Conclusion Statement**	**RCTs**	**References**
1b	Smart Glove Upper Extremity Training (RAPAEL) with rehab may not have a difference in efficacy when compared to Upper Extremity Self-Training at home with rehab for improving muscle strength.	1	Kang et al. (2020)
1a	Virtual reality training may produce greater improvements in muscle strength than conventional therapy.	9	Tieri G. et al. (2024); Lin et al. (2020); Miclaus et al. (2020); Askin et al. (2018); Faria et al. (2018); Schuster-Amft et al. (2018); Ballester et al. (2017); Choi et al. (2016a); Crosbie et al. (2012)
1a	Video game training may not have a difference in efficacy when compared to conventional therapy for improving muscle strength.	8	Aguilera-Rubio et al. (2024); Lam et al. (2022); Li et al. (2021); Givon et al. (2016); Iosa et al. (2015); Choi et al. (2014); Shin et al. (2014); Lee et al. (2013a)
1a	Virtual reality training combined with other interventions may not have a difference in efficacy when compared to conventional therapy for improving muscle strength.	2	El-Kafy E.M.A. et al. (2021); Oh et al. (2019)
1b	Task-oriented training with non-immersive virtual reality with conventional rehabilitation may not have a difference in efficacy when compared to task-oriented training with simple recreational activities with conventional rehabilitation for improving muscle strength.	1	Saposnik et al. (2016)
2	Virtual reality training: some approaches may produce greater improvements in muscle strength than others.	1	Lee et al. (2014a)
1b	Virtual reality keypad or glove (PneuGlove) may not have a difference in efficacy when compared to Task Specific Training Occupational Therapy for improving muscle strength.	1	Thielbar et al. (2014)
1b	Virtual reality training combined with other interventions may produce greater improvements in muscle strength than bilateral arm training.	1	Lee et al. (2016c)
1b	Non-immersive virtual reality smart glove training (RAPAEL) may produce greater improvements in muscle strength than Recreational video games with Conventional rehabilitation.	1	Lee et al. (2020d)
1b	Neuroanimation therapy using ARMEO exoskeleton may not have a difference in efficacy when compared to Modified Occupational therapy (stretching, task specific training) for improving muscle strength.	1	Krakauer et al. (2021)
1a	There is conflicting evidence about the effect of Video game training combined with other interventions when compared to task-specific training for improving muscle strength.	2	Ali et al. (2024); Hegazy R.M. et al. (2022)
1b	Virtual reality games with Audio feedback and conventional therapy may not have a difference in efficacy when compared to Conventional Rehab for improving muscle strength.	1	Kuo et al. (2023b)
2	Graded repetitive arm supplementary program may produce greater improvements in muscle strength than Virtual reality.	1	Dhanusia et al. (2023)

2	Game-based virtual reality rehabilitation using a smart glove may produce greater improvements in muscle strength than conventional physiotherapy.	1	Park et al. (2021)
1b	Immersive virtual reality (VR)-based upper limb exercise system with Conventional therapy may not have a difference in efficacy when compared to Commercial video games with Conventional therapy for improving muscle strength.	1	Chen et al. (2023d)
1b	Virtual Reality Training (Nintendo Wii) with general physical therapy may produce greater improvements in muscle strength than OT with general physical therapy.	1	Cho et al. (2021)
1b	Video game training combined with other interventions may not have a difference in efficacy when compared to conventional therapy for improving muscle strength.	1	Smith et al. (2021)
2	There is conflicting evidence about the effect of Virtual reality training when compared to no treatment for improving muscle strength.	1	Jang & Jang (2016)
2	Music glove may not have a difference in efficacy when compared to Conventional care for improving muscle strength.	1	Friedman et al. (2014)
2	Isometric hand therapy may not have a difference in efficacy when compared to Conventional care for improving muscle strength.	1	Friedman et al. (2014)
2	Music glove may not have a difference in efficacy when compared to Isometric hand therapy for improving muscle strength.	1	Friedman et al. (2014)
1b	Virtual reality with aNodal tDCS may not have a difference in efficacy when compared to virtual reality with sham for improving muscle strength.	1	Viana et al. (2014)
2	VR gaming Gloves with Standard rehabilitation may not have a difference in efficacy when compared to Intensive Occupational therapy (the same movement in the VR gaming group without any game) for improving muscle strength.	1	daSilvaCameirao et al. (2011)
2	Gloreha Aria (Robotic exoskeleton) with Virtual reality and Conventional therapy may not have a difference in efficacy when compared to Self mobilization with Conventional therapy for improving muscle strength.	1	Vanoglio et al. (2024)
1b	Low dose exoskeleton robot HEXORR II (12 sessions) with videogames may not have a difference in efficacy when compared to High dose exoskeleton robot HEXORR II (24 sessions) with video games for improving muscle strength.	1	Chen et al. (2021h)
1b	Hand orthosis with computerised gaming exercises may not have a difference in efficacy when compared to Conventional home exercise for improving muscle strength.	1	Nijenhuis et al. (2017)
2	Robotic orthosis with Task-Specific training and Videogames (Unilateral) may not have a difference in efficacy when compared to Usual Physical Therapy for improving muscle strength.	1	Byl et al. (2013)
2	Robotic orthosis with Task-Specific Training and Videogames (Bilateral) may not have a difference in efficacy when compared to Usual Physical Therapy for improving muscle strength.	1	Byl et al. (2013)

SPASTICITY			
LoE	**Conclusion Statement**	**RCTs**	**References**
1a	Virtual reality training may not have a difference in efficacy when compared to conventional therapy for improving spasticity.	6	Tieri G. et al. (2024); Johnson et al. (2020); Miclaus et al. (2020); Askin et al. (2018); Faria et al. (2018); Ballester et al. (2017)

2	Video game training may not have a difference in efficacy when compared to conventional therapy for improving spasticity.	3	HenriquePPB et al. (2019); Iosa et al. (2015); Lee et al. (2013a)
1b	Virtual reality training combined with other interventions may not have a difference in efficacy when compared to conventional therapy for improving spasticity.	2	Oh et al. (2019); Kiper et al. (2011)
2	There is conflicting evidence about the comparative effects of different approaches to virtual reality training for improving spasticity.	1	Lee et al. (2014a)
1b	Smart gaming gloves may produce greater improvements in spasticity than conventional therapy.	1	Rodriguez-Hernandez M. et al. (2021)
1b	Virtual reality training combined with other interventions may not have a difference in efficacy when compared to virtual reality training for improving spasticity.	1	Salvalaggio et al. (2022)
1b	Nintendo Wii-based movement therapy may not have a difference in efficacy when compared to Modified constraint-induced movement therapy for improving spasticity.	1	McNulty et al. (2014)
1b	Nintendo Wii Sports may not have a difference in efficacy when compared to Neutral warmth for improving spasticity.	1	Ayub I. et al. (2024)
1b	Remote virtual reality treatment may not have a difference in efficacy when compared to Traditional physical therapy for improving spasticity.	1	Piron et al. (2009)
1b	Intermittent theta burst stimulation with Virtual reality-based cycling training (bilateral upper limb) may produce greater improvements in spasticity than sham intermittent theta burst stimulation with VCT.	1	Chen et al. (2021b)
2	Virtual reality training may not have a difference in efficacy when compared to sham for improving spasticity.	1	In et al. (2012)
1b	Video game training combined with other interventions may not have a difference in efficacy when compared to exercise and custom physiotherapy protocols for improving spasticity.	1	Pouplin S. et al. (2023)
1b	Video game training combined with other interventions may not have a difference in efficacy when compared to conventional therapy for improving spasticity.	1	Smith et al. (2021)
1b	Virtual reality with aNodal tDCS may not have a difference in efficacy when compared to virtual reality with sham for improving spasticity.	1	Viana et al. (2014)
1b	Low dose exoskeleton robot HEXORR II (12 sessions) with videogames may not have a difference in efficacy when compared to High dose exoskeleton robot HEXORR II (24 sessions) with video games for improving spasticity.	1	Chen et al. (2021h)
1b	Cathodal tDCS with VR may not have a difference in efficacy when compared to VR: for improving spasticity.	1	Lee et al. (2014b)
1b	Cathodal tDCS with VR may not have a difference in efficacy when compared to Cathodal tDCS for improving spasticity.	1	Lee et al. (2014b)
1b	Cathodal tDCS may not have a difference in efficacy when compared to VR: for improving spasticity.	1	Lee et al. (2014b)
2	Robotic orthosis with Task-Specific training and Videogames (Unilateral) may not have a difference in efficacy when compared to Usual Physical Therapy for improving spasticity.	1	Byl et al. (2013)
2	Robotic orthosis with Task-Specific Training and Videogames (Bilateral) may not have a difference in efficacy when compared to Usual Physical Therapy for improving spasticity.	1	Byl et al. (2013)

RANGE OF MOTION			
LoE	**Conclusion Statement**	**RCTs**	**References**
1a	Virtual reality training may produce greater improvements in range of motion than conventional therapy.	4	Huang et al. (2022a); Keskin et al. (2020); Miclaus et al. (2020); Askin et al. (2018)
1b	Video game training may not have a difference in efficacy when compared to conventional therapy for improving range of motion.	3	Luo et al. (2023); Shin et al. (2014); Sin et al. (2013)
2	Virtual reality training: some approaches may produce greater improvements in range of motion than others.	1	Lee et al. (2014a)
1b	Nintendo Wii-based movement therapy may not have a difference in efficacy when compared to Modified constraint-induced movement therapy for improving range of motion.	1	McNulty et al. (2014)
1b	Virtual reality games with Audio feedback and conventional therapy may not have a difference in efficacy when compared to Conventional Rehab for improving range of motion.	1	Kuo et al. (2023b)
1b	Nintendo Wii Sports may produce greater improvements in range of motion than Neutral warmth.	1	Ayub I. et al. (2024)
1b	Personalized reach training (active control-restricted range) with anodal transcranial direct current stimulation and Virtual reality games may not have a difference in efficacy when compared to Personal reach training (active control-restricted range) with Sham transcranial direct current stimulation and video games for improving range of motion.	1	Levin et al. (2023)
1b	Virtual reality training (ArmeoSenso with monetary feedback rewards) and conventional care may not have a difference in efficacy when compared to virtual reality training (without rewards) with conventional care for improving range of motion.	1	Widmer et al. (2022)
1b	Immersive virtual reality (VR)-based upper limb exercise system with Conventional therapy may not have a difference in efficacy when compared to Commercial video games with Conventional therapy for improving range of motion.	1	Chen et al. (2023d)
1a	There is conflicting evidence about the effect of Smart gaming gloves when compared to conventional therapy for improving range of motion.	2	Park et al. (2019b); Hee-TaeJung et al. (2017)
1b	Low dose exoskeleton robot HEXORR II (12 sessions) with videogames may not have a difference in efficacy when compared to High dose exoskeleton robot HEXORR II (24 sessions) with video games for improving range of motion.	1	Chen et al. (2021h)

PROPRIOCEPTION			
LoE	**Conclusion Statement**	**RCTs**	**References**
2	There is conflicting evidence about the effect of Virtual reality training combined with other interventions when compared to bilateral arm training for improving proprioception.	1	Song Y.-H. & Lee H.-M. (2021)
1b	Anodal transcranial direct current stimulation with virtual reality-based therapy and conventional physical therapy may produce greater improvements in proprioception than conventional physiotherapy.	1	Llorens et al. (2021)

2. Activities

ACTIVITIES OF DAILY LIVING			
LoE	**Conclusion Statement**	**RCTs**	**References**
1b	Smart Glove Upper Extremity Training (RAPAEL) with rehab may not have a difference in efficacy when compared to Upper Extremity Self-Training at home with rehab for improving performance of activities of daily living.	1	Kang et al. (2020)
1a	Virtual reality training may not have a difference in efficacy when compared to conventional therapy for improving performance of activities of daily living.	22	Tieri G. et al. (2024); Bai et al. (2022); Marques-Sule et al. (2021); Mekbib et al. (2021); Johnson et al. (2020); Keskin et al. (2020); Laffont et al. (2020); Lin et al. (2020); Long et al. (2020); Miclaus et al. (2020); Norouzi-Gheidari et al. (2020); Cannell et al. (2018); Faria et al. (2018); Kiper et al. (2018); Schuster-Amft et al. (2018); Ballester et al. (2017); Brunner et al. (2017); Choi et al. (2016a); Kiper et al. (2014); Yin et al. (2014); Duff et al. (2013); Piron et al. (2010)
1a	Video game training may not have a difference in efficacy when compared to conventional therapy for improving performance of activities of daily living.	14	Amin et al. (2024); Leng et al. (2022); Terematz et al. (2022); Li et al. (2021); Hung et al. (2019c); IkbaliAfsar et al. (2018); Turkbey et al. (2017); Simsek et al. (2016); Bower et al. (2015); Iosa et al. (2015); Choi et al. (2014); Shin et al. (2014); Lee et al. (2013a); Kwon et al. (2012)
2	Virtual reality training combined with other interventions may produce greater improvements in performance of activities of daily living than conventional therapy.	1	Kiper et al. (2011)
1b	Task-oriented training with non-immersive virtual reality with conventional rehabilitation may not have a difference in efficacy when compared to task-oriented training with simple recreational activities with conventional rehabilitation for improving performance of activities of daily living.	1	Saposnik et al. (2016)
1b	Different approaches to virtual reality training may not have a difference in efficacy when compared with one another for improving performance of activities of daily living.	2	Yang et al. (2022a); Ballester et al. (2016)
1a	Smart gaming gloves may produce greater improvements in performance of activities of daily living than conventional therapy.	4	Park et al. (2021); Park et al. (2019b); Shin et al. (2016a); Zondervan et al. (2016)
2	Nintendo Wii virtual reality training with Usual Care (conventional occupational therapy) may not have a difference in efficacy when compared to dose matched task oriented therapy (as Conventional therapy) with Usual Care (conventional occupational therapy) or Usual Care (conventional occupational therapy) for improving performance of activities of daily living.	1	Kong et al. (2016)
1a	Virtual reality training combined with other interventions may not have a difference in efficacy when compared to virtual reality training for improving performance of activities of daily living.	3	Salvalaggio et al. (2022); Widmer et al. (2022); Park et al. (2016)

1b	Playstation EyeToy games with conventional therapy may produce greater improvements in performance of activities of daily living than Sham therapy with conventional therapy.	1	Yavuzer et al. (2008a)
1b	Virtual reality training may produce greater improvements in performance of activities of daily living than sham.	1	Ogun et al. (2019)
1b	Nintendo Wii-based movement therapy may produce greater improvements in performance of activities of daily living than Modified constraint-induced movement therapy.	1	McNulty et al. (2014)
1a	Video game training combined with other interventions may not have a difference in efficacy when compared to graded repetitive arm supplementary program for improving performance of activities of daily living.	2	Hernandez et al. (2022); Adie et al. (2017)
1b	Cathodal transcranial direct current stimulation with virtual reality may produce greater improvements in performance of activities of daily living than Sham transcranial direct current stimulation with virtual reality.	1	Yao et al. (2020)
1b	Remote virtual reality treatment may produce greater improvements in performance of activities of daily living than Traditional physical therapy.	1	Piron et al. (2009)
1b	Low frequency repetitive transcranial magnetic stimulation with virtual reality may not have a difference in efficacy when compared to Sham repetitive transcranial magnetic stimulation with virtual reality for improving performance of activities of daily living.	1	Zheng et al. (2015)
1b	There is conflicting evidence about the effect of Intermittent theta burst stimulation with Virtual reality-based cycling training (bilateral upper limb) when compared to sham intermittent theta burst stimulation with VCT for improving performance of activities of daily living.	1	Chen et al. (2021b)
2	Virtual reality with arm exoskeleton may not have a difference in efficacy when compared to conventional physiotherapy for improving performance of activities of daily living.	1	Gueye et al. (2021)
2	Constraint-induced movement therapy using augmented reality "Nintendo Wii" may produce greater improvements in performance of activities of daily living than Conventional physiotherapy.	1	Anjum A.F. et al. (2021)
2	Glove orthosis graded repetitive arm supplementary program with Virtual reality with home based rehab with occupational therapy may produce greater improvements in performance of activities of daily living than Conventional Rehab.	1	Adams et al. (2023)
2	Contralaterally controlled functional electrical stimulation with Hand therapy video games may not have a difference in efficacy when compared to contralaterally controlled functional electrical stimulation for improving performance of activities of daily living.	1	Knutson et al. (2024)
1b	Vitrual Arm Boot Camp (home exercise program with feedback from TENZR and conventional therpay) may produce greater improvements in performance of activities of daily living than Waitlist (conventional care).	1	Simpson L.A. et al. (2024)
2	Virtual reality training may produce greater improvements in performance of activities of daily living than no treatment.	1	Jang et al. (2005)
1b	Video game training combined with other interventions may not have a difference in efficacy when compared to exercise and custom physiotherapy protocols for improving performance of activities of daily living.	1	Pouplin S. et al. (2023)
1b	Virtual Reality Training (Nintendo Wii) with general physical therapy may not have a difference in efficacy when compared to OT with	1	Cho et al. (2021)

	general physical therapy for improving performance of activities of daily living.		
1b	Video game training may not have a difference in efficacy when compared to sham for improving performance of activities of daily living.	1	Kim et al. (2018b)
1b	Video game self training may not have a difference in efficacy when compared to Graded repetitive arm supplementary program for improving performance of activities of daily living.	1	Rand et al. (2017)
1b	Smart gaming gloves combined with other interventions may not have a difference in efficacy when compared to exercise and custom physiotherapy protocols for improving performance of activities of daily living.	1	Stockley et al. (2017)
1b	VR based rehab may not have a difference in efficacy when compared to Group based rehab for improving performance of activities of daily living.	1	Lee et al. (2016d)
2	VR gaming Gloves with Standard rehabilitation may not have a difference in efficacy when compared to Intensive Occupational therapy (the same movement in the VR gaming group without any game) for improving performance of activities of daily living.	1	daSilvaCameirao et al. (2011)
2	Gloreha Aria (Robotic exoskeleton) with Virtual reality and Conventional therapy may not have a difference in efficacy when compared to Self mobilization with Conventional therapy for improving performance of activities of daily living.	1	Vanoglio et al. (2024)
1b	Low dose exoskeleton robot HEXORR II (12 sessions) with videogames may not have a difference in efficacy when compared to High dose exoskeleton robot HEXORR II (24 sessions) with video games for improving performance of activities of daily living.	1	Chen et al. (2021h)
1b	Hand orthosis with computerised gaming exercises may not have a difference in efficacy when compared to Conventional home exercise for improving performance of activities of daily living.	1	Nijenhuis et al. (2017)
1b	Cathodal tDCS with VR may not have a difference in efficacy when compared to VR: for improving performance of activities of daily living.	1	Lee et al. (2014b)
1b	Cathodal tDCS with VR may not have a difference in efficacy when compared to Cathodal tDCS for improving performance of activities of daily living.	1	Lee et al. (2014b)
1b	Cathodal tDCS may not have a difference in efficacy when compared to VR: for improving performance of activities of daily living.	1	Lee et al. (2014b)
2	Robotic orthosis with Task-Specific training and Videogames (Unilateral) may not have a difference in efficacy when compared to Usual Physical Therapy for improving performance of activities of daily living.	1	Byl et al. (2013)
2	Robotic orthosis with Task-Specific Training and Videogames (Bilateral) may not have a difference in efficacy when compared to Usual Physical Therapy for improving performance of activities of daily living.	1	Byl et al. (2013)

DEXTERITY			
LoE	**Conclusion Statement**	**RCTs**	**References**
1b	Smart Glove Upper Extremity Training (RAPAEL) with rehab may not have a difference in efficacy when compared to Upper Extremity Self-Training at home with rehab for improving dexterity.	1	Kang et al. (2020)

1a	Virtual reality training may not have a difference in efficacy when compared to conventional therapy for improving dexterity.	8	Johnson et al. (2020); Laffont et al. (2020); Norouzi-Gheidari et al. (2020); Rogers et al. (2019); Askin et al. (2018); Cannell et al. (2018); Schuster-Amft et al. (2018); Brunner et al. (2017)
1a	There is conflicting evidence about the effect of Video game training when compared to conventional therapy for improving dexterity.	8	Aguilera-Rubio et al. (2024); Amin et al. (2024); Teremetz et al. (2022); IkbaliAfsar et al. (2018); Turkbey et al. (2017); Iosa et al. (2015); Choi et al. (2014); Sin et al. (2013)
1a	Virtual reality training combined with other interventions may not have a difference in efficacy when compared to conventional therapy for improving dexterity.	2	Jo et al. (2024); Oh et al. (2019)
1b	Virtual reality-based mirror therapy with conventional physical therapy may produce greater improvements in dexterity than Traditional mirror therapy with conventional physical therapy.	1	Jo et al. (2024)
1b	Task-oriented training with non-immersive virtual reality with conventional rehabilitation may result in lesser improvements in dexterity when compared to task-oriented training with simple recreational activities with conventional rehabilitation.	1	Saposnik et al. (2016)
2	Virtual reality training: some approaches may produce greater improvements in dexterity than others.	1	Lee et al. (2014a)
1a	Smart gaming gloves may not have a difference in efficacy when compared to conventional therapy for improving dexterity.	2	Shin et al. (2016a); Zondervan et al. (2016)
1a	Virtual reality training combined with other interventions may produce greater improvements in dexterity than virtual reality training.	3	Salvalaggio et al. (2022); Widmer et al. (2022); Park et al. (2016)
1b	Virtual reality training combined with other interventions may produce greater improvements in dexterity than bilateral arm training.	1	Lee et al. (2016c)
2	Virtual reality training may not have a difference in efficacy when compared to sham for improving dexterity.	1	In et al. (2012)
1b	Non-immersive virtual reality smart glove training (RAPAEL) may produce greater improvements in dexterity than Recreational video games with Conventional rehabilitation.	1	Lee et al. (2020d)
1b	Virtual Relaity Game (Vision Based Tracking) may result in lesser improvements in dexterity when compared to Virtual Reality (Haptic Feedback).	1	Cameirao et al. (2012)
1b	Virtual Reality (Haptic Feedback) may produce greater improvements in dexterity than Virtual Reality (Exoskelton).	1	Cameirao et al. (2012)
1b	Virtual Relaity Game (Vision Based Tracking) may not have a difference in efficacy when compared to Virtual Reality (Exoskelton) for improving dexterity.	1	Cameirao et al. (2012)
1b	Nintendo Wii-based movement therapy may not have a difference in efficacy when compared to Modified constraint-induced movement therapy for improving dexterity.	1	McNulty et al. (2014)
1b	Video game training combined with other interventions may not have a difference in efficacy when compared to graded repetitive arm supplementary program for improving dexterity.	1	Wilson et al. (2021)
1b	Virtual reality games with Audio feedback and conventional therapy may produce greater improvements in dexterity than Conventional Rehab.	1	Kuo et al. (2023b)

1b	Nintendo Wii Sports may not have a difference in efficacy when compared to Neutral warmth for improving dexterity.	1	Ayub I. et al. (2024)
1b	Intermittent theta burst stimulation with Virtual reality-based cycling training (bilateral upper limb) may not have a difference in efficacy when compared to sham intermittent theta burst stimulation with VCT for improving dexterity.	1	Chen et al. (2021b)
1b	Anodal transcranial direct current stimulation with Virtual Reality may produce greater improvements in dexterity than sham transcranial direct current stimulation with Virtual Reality.	1	Lee & Cha (2022)
2	Glove orthosis graded repetitive arm supplementary program with Virtual reality with home based rehab with occupational therapy may not have a difference in efficacy when compared to Conventional Rehab for improving dexterity.	1	Adams et al. (2023)
2	Contralaterally controlled functional electrical stimulation with Hand therapy video games may not have a difference in efficacy when compared to contralaterally controlled functional electrical stimulation for improving dexterity.	1	Knutson et al. (2024)
1b	Virtual Reality Boxing (Xbox Kinect) may not have a difference in efficacy when compared to Boxing Practice with Therapist for improving dexterity.	1	Ersoy & Iyigun (2021)
2	Virtual reality training may produce greater improvements in dexterity than no treatment.	2	Jang & Jang (2016); Jang et al. (2005)
1b	Video game training combined with other interventions may not have a difference in efficacy when compared to exercise and custom physiotherapy protocols for improving dexterity.	1	Pouplin S. et al. (2023)
1b	Video game training combined with other interventions may not have a difference in efficacy when compared to conventional therapy for improving dexterity.	1	Smith et al. (2021)
1b	Video game training may not have a difference in efficacy when compared to sham for improving dexterity.	1	Kim et al. (2018b)
1b	Virtual Reality with Functional Electrical Stimulation may not have a difference in efficacy when compared to Functional Electrical Stimulation for improving dexterity.	1	Lee et al. (2018c)
1b	Video game self training may not have a difference in efficacy when compared to Graded repetitive arm supplementary program for improving dexterity.	1	Rand et al. (2017)
1b	Smart gaming gloves combined with other interventions may not have a difference in efficacy when compared to exercise and custom physiotherapy protocols for improving dexterity.	1	Stockley et al. (2017)
1b	VR based rehab may not have a difference in efficacy when compared to Group based rehab for improving dexterity.	1	Lee et al. (2016d)
2	Music glove may produce greater improvements in dexterity than Conventional care.	1	Friedman et al. (2014)
2	Isometric hand therapy may not have a difference in efficacy when compared to Conventional care for improving dexterity.	1	Friedman et al. (2014)
2	Music glove may not have a difference in efficacy when compared to Isometric hand therapy for improving dexterity.	1	Friedman et al. (2014)
1b	Hand orthosis with computerised gaming exercises may not have a difference in efficacy when compared to Conventional home exercise for improving dexterity.	1	Nijenhuis et al. (2017)
1b	Cathodal tDCS with VR may not have a difference in efficacy when compared to VR: for improving dexterity.	1	Lee et al. (2014b)

1b	Cathodal tDCS with VR may not have a difference in efficacy when compared to Cathodal tDCS for improving dexterity.	1	Lee et al. (2014b)
1b	Cathodal tDCS may not have a difference in efficacy when compared to VR: for improving dexterity.	1	Lee et al. (2014b)
2	Robotic orthosis with Task-Specific training and Videogames (Unilateral) may not have a difference in efficacy when compared to Usual Physical Therapy for improving dexterity.	1	Byl et al. (2013)
2	Robotic orthosis with Task-Specific Training and Videogames (Bilateral) may not have a difference in efficacy when compared to Usual Physical Therapy for improving dexterity.	1	Byl et al. (2013)

Key Points

- Smart Glove Upper Extremity Training (RAPAEL) with rehab may be beneficial for improving motor function, but not dexterity, performance of activities of daily living, and muscle strength, after stroke when compared to Upper Extremity Self-Training at home with rehab.
- Virtual reality training may be beneficial for improving muscle strength and range of motion, but not stroke severity, spasticity, performance of activities of daily living, and dexterity, after stroke when compared to conventional therapy; the literature is mixed regarding motor function.
- Different approaches to video game training may not have a difference in efficacy when compared with one another for improving motor function.
- Virtual reality training combined with other interventions may be beneficial for improving motor function and performance of activities of daily living, but not dexterity, spasticity, and muscle strength, after stroke when compared to conventional therapy.
- Virtual reality-based mirror therapy with conventional physical therapy may be beneficial for improving motor function and dexterity after stroke when compared to Traditional mirror therapy with conventional physical therapy.
- Virtual Reality (Wii) may not be beneficial for improving motor function after stroke when compared to Motor Imagery Training.
- Task-oriented training with non-immersive virtual reality with conventional rehabilitation may not be beneficial for improving motor function, performance of activities of daily living, and muscle strength after stroke when compared to task-oriented training with simple recreational activities with conventional rehabilitation.
- Task-oriented training with non-immersive virtual reality with conventional rehabilitation may be less beneficial than task-oriented training with simple recreational activities with conventional rehabilitation for improving dexterity after stroke.
- Multiuser virtual reality Therapy may not be beneficial for improving motor function after stroke when compared to Single user virtual reality Therapy.
- Smart gaming gloves may be beneficial for improving motor function, spasticity, and performance of activities of daily living, but not dexterity, after stroke when compared to conventional therapy; the literature is mixed regarding range of motion.
- Nintendo Wii virtual reality training with Usual Care (conventional occupational therapy) may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to dose matched task oriented therapy (as Conventional therapy) with Usual Care (conventional occupational therapy) or Usual Care (conventional occupational therapy).
- Virtual reality keypad or glove (PneuGlove) may not be beneficial for improving motor function and muscle strength after stroke when compared to Task Specific Training Occupational Therapy.
- Virtual reality training combined with other interventions may be beneficial for improving dexterity, but not motor function, performance of activities of daily living, spasticity, and stroke severity, after stroke when compared to virtual reality training.
- Virtual reality training combined with other interventions may be beneficial for improving dexterity and muscle strength after stroke when compared to bilateral arm training; the literature is mixed regarding motor function and proprioception.

- Virtual reality training may be beneficial for improving motor function and performance of activities of daily living, but not dexterity and spasticity, after stroke when compared to sham.
- Non-immersive virtual reality smart glove training (RAPAEL) may be beneficial for improving dexterity and muscle strength after stroke when compared to Recreational video games with Conventional rehabilitation; the literature is mixed regarding motor function.
- Virtual Reality Boxing (Xbox Kinect) may not be beneficial for improving motor function and dexterity after stroke when compared to Boxing Practice with Therapist.
- Nintendo Wii-based movement therapy may be beneficial for improving performance of activities of daily living, but not motor function, dexterity, spasticity, and range of motion, after stroke when compared to Modified constraint-induced movement therapy.
- Proprioceptive neuromuscular facilitation with virtual reality (Nintendo Wii) may not be beneficial for improving motor function after stroke when compared to proprioceptive neuromuscular facilitation or Wii.
- Video game training combined with other interventions may not be beneficial for improving motor function, dexterity, and performance of activities of daily living after stroke when compared to graded repetitive arm supplementary program.
- Neuroanimation therapy using ARMEO exoskeleton may not be beneficial for improving motor function and muscle strength after stroke when compared to Modified Occupational therapy (stretching, task specific training).
- Video game training combined with other interventions may be beneficial for improving motor function, but not stroke severity, after stroke when compared to task-specific training; the literature is mixed regarding muscle strength.
- Virtual reality games with Audio feedback and conventional therapy may be beneficial for improving dexterity, but not motor function, range of motion, and muscle strength, after stroke when compared to Conventional Rehab.
- Immersive virtual reality (CUREO) with Conventional therapy may be beneficial for improving motor function after stroke when compared to Electromechanically assisted training (ARMEOSpring) with Conventional therapy.
- Virtual reality games (Leap Motion Controller) - enhanced motivation, gradually increasing difficulty may not be beneficial for improving motor function after stroke when compared to Virtual reality games (Leap Motion Controller) - algorithm control, difficulty was modified using adaptive algorithms based on maintaining 80% success rate.
- Weight supported Arm training (ArmeoBoom device is a sling suspension system) may not be beneficial for improving motor function after stroke when compared to Conventional therapy.
- Cathodal transcranial direct current stimulation with virtual reality may be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Sham transcranial direct current stimulation with virtual reality.
- The literature is mixed regarding the effect of Motion tracking device with virtual reality game on improvement of motor function after stroke when compared to Conventional therapy.
- Motion tracking device with virtual reality game may be less beneficial than Motion tracking device with braincomputer interface attention monitoring electroencephalogram device and virtual reality game for improving motor function after stroke.
- Remote virtual reality treatment may be beneficial for improving performance of activities of daily living, but not motor function and spasticity, after stroke when compared to Traditional physical therapy.
- Leap motion virtual reality with mirror therapy may be beneficial for improving motor function after stroke when compared to Sham.
- Leap motion virtual reality with mirror therapy may be beneficial for improving motor function after stroke when compared to Mirror therapy.
- Robot hand and arm separate training with virtual reality may not be beneficial for improving motor function after stroke when compared to Robot hand and arm together training with virtual reality.
- Low frequency repetitive transcranial magnetic stimulation with virtual reality may be beneficial for improving motor function, but not performance of activities of daily living, after stroke when compared to Sham repetitive transcranial magnetic stimulation with virtual reality.

- Intermittent theta burst stimulation with Virtual reality-based cycling training (bilateral upper limb) may be beneficial for improving spasticity, but not motor function and dexterity, after stroke when compared to sham intermittent theta burst stimulation with VCT; the literature is mixed regarding performance of activities of daily living.
- Virtual reality with arm exoskeleton may be beneficial for improving motor function, but not performance of activities of daily living, after stroke when compared to conventional physiotherapy.
- Anodal transcranial direct current stimulation with virtual reality-based therapy and conventional physical therapy may be beneficial for improving motor function and proprioception after stroke when compared to conventional physiotherapy.
- Anodal transcranial direct current stimulation with Virtual Reality may be beneficial for improving dexterity, but not motor function, after stroke when compared to sham transcranial direct current stimulation with Virtual Reality.
- Glove orthosis graded repetitive arm supplementary program with Virtual reality with home based rehab with occupational therapy may be beneficial for improving performance of activities of daily living, but not motor function and dexterity, after stroke when compared to Conventional Rehab.
- Personalized reach training (active control-restricted range) with anodal transcranial direct current stimulation and Virtual reality games may not be beneficial for improving motor function and range of motion after stroke when compared to Personal reach training (active control-restricted range) with Sham transcranial direct current stimulation and video games.
- Graded repetitive arm supplementary program may be beneficial for improving motor function and muscle strength after stroke when compared to Virtual reality.
- Contralaterally controlled functional electrical stimulation with Hand therapy video games may not be beneficial for improving motor function, dexterity, and performance of activities of daily living after stroke when compared to contralaterally controlled functional electrical stimulation.
- Vitrual Arm Boot Camp (home exercise program with feedback from TENZR and conventional therpay) may be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Waitlist (conventional care).
- Robotic training with force fields for error augmentation with Video game therapy and Conventional therapy may be beneficial for improving motor function after stroke when compared to Robotic training without force fields for error augmentation with Video game therapy and Conventional therapy.
- Virtual reality training may be beneficial for improving motor function, performance of activities of daily living, and dexterity after stroke when compared to no treatment; the literature is mixed regarding muscle strength.
- Virtual Relaity Game (Vision Based Tracking) may be less beneficial than Virtual Reality (Haptic Feedback) for improving dexterity after stroke.
- Virtual Reality (Haptic Feedback) may be beneficial for improving dexterity after stroke when compared to Virtual Reality (Exoskelton).
- Virtual Relaity Game (Vision Based Tracking) may not be beneficial for improving dexterity after stroke when compared to Virtual Reality (Exoskelton).
- Nintendo Wii Sports may be beneficial for improving range of motion, but not dexterity and spasticity, after stroke when compared to Neutral warmth.
- Playstation EyeToy games with conventional therapy may be beneficial for improving performance of activities of daily living, but not stroke severity, after stroke when compared to Sham therapy with conventional therapy.
- Constraint-induced movement therapy using augmented reality "Nintendo Wii" may be beneficial for improving performance of activities of daily living after stroke when compared to Conventional physiotherapy.
- Virtual reality training (ArmeoSenso with monetary feedback rewards) and conventional care may not be beneficial for improving range of motion after stroke when compared to virtual reality training (without rewards) with conventional care.
- Game-based virtual reality rehabilitation using a smart glove may be beneficial for improving muscle strength after stroke when compared to conventional physiotherapy.

- Immersive virtual reality (VR)-based upper limb exercise system with Conventional therapy may not be beneficial for improving motor function, muscle strength, and range of motion after stroke when compared to Commercial video games with Conventional therapy.
- Virtual Reality Training (Nintendo Wii) with general physical therapy may be beneficial for improving muscle strength, but not motor function and performance of activities of daily living, after stroke when compared to OT with general physical therapy.
- Virtual Reality with Functional Electrical Stimulation may not be beneficial for improving motor function and dexterity after stroke when compared to Functional Electrical Stimulation.
- Video game self training may not be beneficial for improving motor function, performance of activities of daily living, and dexterity after stroke when compared to Graded repetitive arm supplementary program.
- VR based rehab may be beneficial for improving motor function, but not performance of activities of daily living and dexterity, after stroke when compared to Group based rehab.
- Virtual reality Wii gaming may not be beneficial for improving motor function after stroke when compared to Conventional therapy.
- Music glove may be beneficial for improving dexterity, but not motor function and muscle strength, after stroke when compared to Conventional care.
- Isometric hand therapy may not be beneficial for improving motor function, muscle strength, and dexterity after stroke when compared to Conventional care.
- Music glove may not be beneficial for improving motor function, muscle strength, and dexterity after stroke when compared to Isometric hand therapy.
- Virtual reality with aNodal tDCS may not be beneficial for improving motor function, muscle strength, and spasticity after stroke when compared to virtual reality with sham.
- VR gaming Gloves with Standard rehabilitation may be beneficial for improving motor function, but not muscle strength and performance of activities of daily living, after stroke when compared to Intensive Occupational therapy (the same movement in the VR gaming group without any game).
- Video game training combined with other interventions may not be beneficial for improving motor function, spasticity, performance of activities of daily living, and dexterity after stroke when compared to exercise and custom physiotherapy protocols.
- Video game training combined with other interventions may not be beneficial for improving motor function, muscle strength, spasticity, and dexterity after stroke when compared to conventional therapy.
- Video game training may not be beneficial for improving motor function, stroke severity, performance of activities of daily living, and dexterity after stroke when compared to sham.
- Smart gaming gloves combined with other interventions may not be beneficial for improving performance of activities of daily living and dexterity after stroke when compared to exercise and custom physiotherapy protocols.
- Gloreha Aria (Robotic exoskeleton) with Virtual reality and Conventional therapy may not be beneficial for improving motor function, muscle strength, and performance of activities of daily living after stroke when compared to Self mobilization with Conventional therapy.
- Low dose exoskeleton robot HEXORR II (12 sessions) with videogames may not be beneficial for improving motor function, muscle strength, spasticity, range of motion, and performance of activities of daily living after stroke when compared to High dose exoskeleton robot HEXORR II (24 sessions) with video games.
- Hand orthosis with computerised gaming exercises may not be beneficial for improving motor function, muscle strength, performance of activities of daily living, and dexterity after stroke when compared to Conventional home exercise.
- Cathodal tDCS with VR may be beneficial for improving motor function, but not spasticity, performance of activities of daily living, and dexterity, after stroke when compared to VR:.
- Cathodal tDCS with VR may be beneficial for improving motor function, but not spasticity, performance of activities of daily living, and dexterity, after stroke when compared to Cathodal tDCS.
- Cathodal tDCS may be beneficial for improving motor function, but not spasticity, performance of activities of daily living, and dexterity, after stroke when compared to VR:.

- Robotic orthosis with Task-Specific training and Videogames (Unilateral) may not be beneficial for improving motor function, muscle strength, spasticity, performance of activities of daily living, and dexterity after stroke when compared to Usual Physical Therapy.
- Robotic orthosis with Task-Specific Training and Videogames (Bilateral) may not be beneficial for improving motor function, muscle strength, spasticity, performance of activities of daily living, and dexterity after stroke when compared to Usual Physical Therapy.
- Video game training may be beneficial for improving stroke severity, but not motor function, muscle strength, spasticity, range of motion, and performance of activities of daily living, after stroke when compared to conventional therapy; the literature is mixed regarding dexterity.
- Virtual reality training: some approaches may be more beneficial than others for improving muscle strength, range of motion, and dexterity; different approaches to virtual reality training may not have a difference in efficacy when compared with one another for improving motor function and performance of activities of daily living; the literature is mixed regarding spasticity.

Summary of Key Points: Virtual Reality

Intervention	Control(s)	Function domain(s)	Effect
Smart Glove Upper Extremity Training (RAPAEL) with rehab	Upper Extremity Self-Training at home with rehab	Motor function	+
Smart Glove Upper Extremity Training (RAPAEL) with rehab	Upper Extremity Self-Training at home with rehab	Dexterity, performance of activities of daily living, muscle strength	–
Virtual reality training	conventional therapy	Muscle strength, range of motion	+
Virtual reality training	conventional therapy	Stroke severity, spasticity, performance of activities of daily living, dexterity	–
Virtual reality training	conventional therapy	Motor function	=
Video game training	conventional therapy	Stroke severity	+
Video game training	conventional therapy	Motor function, muscle strength, spasticity, range of motion, performance of activities of daily living	–
Video game training	conventional therapy	Dexterity	=
Virtual reality training combined with other interventions	conventional therapy	Motor function, performance of activities of daily living	+
Virtual reality training combined with other interventions	conventional therapy	Dexterity, spasticity, muscle strength	–
Virtual reality-based mirror therapy with conventional physical therapy	Traditional mirror therapy with conventional physical therapy	Motor function, dexterity	+
Virtual Reality (Wii)	Motor Imagery Training	Motor function	–
Task-oriented training with non-immersive virtual reality with conventional rehabilitation	task-oriented training with simple recreational activities with conventional rehabilitation	Motor function, dexterity, performance of activities of daily living, muscle strength	–
Virtual reality training	One another (different approaches compared)	Motor function, performance of activities of daily living	–
Multiuser virtual reality Therapy	Single user virtual reality Therapy	Motor function	–
Smart gaming gloves	conventional therapy	Motor function, spasticity, performance of activities of daily living	+
Smart gaming gloves	conventional therapy	Dexterity	–

Smart gaming gloves	conventional therapy	Range of motion	=
Nintendo Wii virtual reality training with Usual Care (conventional occupational therapy)	dose matched task oriented therapy (as Conventional therapy) with Usual Care (conventional occupational therapy) or Usual Care (conventional occupational therapy)	Motor function, performance of activities of daily living	–
Virtual reality keypad or glove (PneuGlove)	Task Specific Training Occupational Therapy	Motor function, muscle strength	–
Virtual reality training combined with other interventions	virtual reality training	Dexterity	+
Virtual reality training combined with other interventions	virtual reality training	Motor function, performance of activities of daily living, spasticity, stroke severity	–
Virtual reality training combined with other interventions	bilateral arm training	Dexterity, muscle strength	+
Virtual reality training combined with other interventions	bilateral arm training	Motor function, proprioception	=
Virtual reality training	sham	Motor function, performance of activities of daily living	+
Virtual reality training	sham	Dexterity, spasticity	–
Non-immersive virtual reality smart glove training (RAPAEL)	Recreational video games with Conventional rehabilitation	Dexterity, muscle strength	+
Non-immersive virtual reality smart glove training (RAPAEL)	Recreational video games with Conventional rehabilitation	Motor function	=
Virtual Reality Boxing (Xbox Kinect)	Boxing Practice with Therapist	Motor function, dexterity	–
Nintendo Wii-based movement therapy	Modified constraint-induced movement therapy	Performance of activities of daily living	+
Nintendo Wii-based movement therapy	Modified constraint-induced movement therapy	Motor function, dexterity, spasticity, range of motion	–
Proprioceptive neuromuscular facilitation with virtual reality (Nintendo Wii)	proprioceptive neuromuscular facilitation or Wii	Motor function	–
Video game training combined with other interventions	graded repetitive arm supplementary program	Motor function, dexterity, performance of activities of daily living	–
Neuroanimation therapy using ARMEO exoskeleton	Modified Occupational therapy (stretching, task specific training)	Motor function, muscle strength	–
Video game training combined with other interventions	task-specific training	Motor function	+
Video game training combined with other interventions	task-specific training	Stroke severity	–
Video game training combined with other interventions	task-specific training	Muscle strength	=
Virtual reality games with Audio feedback and conventional therapy	Conventional Rehab	Dexterity	+
Virtual reality games with Audio feedback and conventional therapy	Conventional Rehab	Motor function, range of motion, muscle strength	–

Immersive virtual reality (CUREO) with Conventional therapy	Electromechanically assisted training (ARMEOSpring) with Conventional therapy	Motor function	+
Virtual reality games (Leap Motion Controller) - enhanced motivation, gradually increasing difficulty	Virtual reality games (Leap Motion Controller) - algorithm control, difficulty was modified using adaptive algorithms based on maintaining 80% success rate	Motor function	−
Weight supported Arm training (ArmeoBoom device is a sling suspension system)	Conventional therapy	Motor function	−
Cathodal transcranial direct current stimulation with virtual reality	Sham transcranial direct current stimulation with virtual reality	Motor function, performance of activities of daily living	+
Motion tracking device with virtual reality game	Conventional therapy	Motor function	=
Motion tracking device with virtual reality game	Motion tracking device with braincomputer interface attention monitoring electroencephalogram device and virtual reality game	Motor function	−
Remote virtual reality treatment	Traditional physical therapy	Performance of activities of daily living	+
Remote virtual reality treatment	Traditional physical therapy	Motor function, spasticity	−
Leap motion virtual reality with mirror therapy	Sham	Motor function	+
Leap motion virtual reality with mirror therapy	Mirror therapy	Motor function	+
Robot hand and arm separate training with virtual reality	Robot hand and arm together training with virtual reality	Motor function	−
Low frequency repetitive transcranial magnetic stimulation with virtual reality	Sham repetitive transcranial magnetic stimulation with virtual reality	Motor function	+
Low frequency repetitive transcranial magnetic stimulation with virtual reality	Sham repetitive transcranial magnetic stimulation with virtual reality	Performance of activities of daily living	−
Intermittent theta burst stimulation with Virtual reality-based cycling training (bilateral upper limb)	sham intermittent theta burst stimulation with VCT	Spasticity	+
Intermittent theta burst stimulation with Virtual reality-based cycling training (bilateral upper limb)	sham intermittent theta burst stimulation with VCT	Motor function, dexterity	−
Intermittent theta burst stimulation with Virtual reality-based cycling training (bilateral upper limb)	sham intermittent theta burst stimulation with VCT	Performance of activities of daily living	=
Virtual reality with arm exoskeleton	conventional physiotherapy	Motor function	+
Virtual reality with arm exoskeleton	conventional physiotherapy	Performance of activities of daily living	−
Anodal transcranial direct current stimulation with virtual reality-based therapy and conventional physical therapy	conventional physiotherapy	Motor function, proprioception	+

Anodal transcranial direct current stimulation with Virtual Reality	sham transcranial direct current stimulation with Virtual Reality	Dexterity	+
Anodal transcranial direct current stimulation with Virtual Reality	sham transcranial direct current stimulation with Virtual Reality	Motor function	−
Glove orthosis graded repetitive arm supplementary program with Virtual reality with home based rehab with occupational therapy	Conventional Rehab	Performance of activities of daily living	+
Glove orthosis graded repetitive arm supplementary program with Virtual reality with home based rehab with occupational therapy	Conventional Rehab	Motor function, dexterity	−
Personalized reach training (active control-restricted range) with anodal transcranial direct current stimulation and Virtual reality games	Personal reach training (active control-restricted range) with Sham transcranial direct current stimulation and video games	Motor function, range of motion	−
Graded repetitive arm supplementary program	Virtual reality	Motor function, muscle strength	+
Contralaterally controlled functional electrical stimulation with Hand therapy video games	contralaterally controlled functional electrical stimulation	Motor function, dexterity, performance of activities of daily living	−
Vitrual Arm Boot Camp (home exercise program with feedback from TENZR and conventional therpay)	Waitlist (conventional care)	Motor function, performance of activities of daily living	+
Robotic training with force fields for error augmentation with Video game therapy and Conventional therapy	Robotic training without force fields for error augmentation with Video game therapy and Conventional therapy	Motor function	+
Virtual reality training	no treatment	Motor function, performance of activities of daily living, dexterity	+
Virtual reality training	no treatment	Muscle strength	=
Virtual reality training	One another (different approaches compared)	Muscle strength, range of motion, dexterity	+
Virtual reality training	One another (different approaches compared)	Spasticity	=
Virtual Relaity Game (Vision Based Tracking)	Virtual Reality (Haptic Feedback)	Dexterity	−
Virtual Reality (Haptic Feedback)	Virtual Reality (Exoskelton)	Dexterity	+
Virtual Relaity Game (Vision Based Tracking)	Virtual Reality (Exoskelton)	Dexterity	−
Nintendo Wii Sports	Neutral warmth	Range of motion	+
Nintendo Wii Sports	Neutral warmth	Dexterity, spasticity	−
Playstation EyeToy games with conventional therapy	Sham therapy with conventional therapy	Performance of activities of daily living	+
Playstation EyeToy games with conventional therapy	Sham therapy with conventional therapy	Stroke severity	−
Constraint-induced movement therapy using augmented reality "Nintendo Wii"	Conventional physiotherapy	Performance of activities of daily living	+

Virtual reality training (ArmeoSenso with monetary feedback rewards) and conventional care	virtual reality training (without rewards) with conventional care	Range of motion	−
Game-based virtual reality rehabilitation using a smart glove	conventional physiotherapy	Muscle strength	+
Immersive virtual reality (VR)-based upper limb exercise system with Conventional therapy	Commercial video games with Conventional therapy	Motor function, muscle strength, range of motion	−
Virtual Reality Training (Nintendo Wii) with general physical therapy	OT with general physical therapy	Muscle strength	+
Virtual Reality Training (Nintendo Wii) with general physical therapy	OT with general physical therapy	Motor function, performance of activities of daily living	−
Virtual Reality with Functional Electrical Stimulation	Functional Electrical Stimulation	Motor function, dexterity	−
Video game self training	Graded repetitive arm supplementary program	Motor function, performance of activities of daily living, dexterity	−
VR based rehab	Group based rehab	Motor function	+
VR based rehab	Group based rehab	Performance of activities of daily living, dexterity	−
Virtual reality Wii gaming	Conventional therapy	Motor function	−
Music glove	Conventional care	Dexterity	+
Music glove	Conventional care	Motor function, muscle strength	−
Isometric hand therapy	Conventional care	Motor function, muscle strength, dexterity	−
Music glove	Isometric hand therapy	Motor function, muscle strength, dexterity	−
Virtual reality with aNodal tDCS	virtual reality with sham	Motor function, muscle strength, spasticity	−
VR gaming Gloves with Standard rehabilitation	Intensive Occupational therapy (the same movement in the VR gaming group without any game)	Motor function	+
VR gaming Gloves with Standard rehabilitation	Intensive Occupational therapy (the same movement in the VR gaming group without any game)	Muscle strength, performance of activities of daily living	−
Video game training combined with other interventions	exercise and custom physiotherapy protocols	Motor function, spasticity, performance of activities of daily living, dexterity	−
Video game training combined with other interventions	conventional therapy	Motor function, muscle strength, spasticity, dexterity	−
Video game training	One another (different approaches compared)	Motor function	−
Video game training	sham	Motor function, stroke severity, performance of activities of daily living, dexterity	−
Smart gaming gloves combined with other interventions	exercise and custom physiotherapy protocols	Performance of activities of daily living, dexterity	−

Gloreha Aria (Robotic exoskeleton) with Virtual reality and Conventional therapy	Self mobilization with Conventional therapy	Motor function, muscle strength, performance of activities of daily living	–
Low dose exoskeleton robot HEXORR II (12 sessions) with videogames	High dose exoskeleton robot HEXORR II (24 sessions) with video games	Motor function, muscle strength, spasticity, range of motion, performance of activities of daily living	–
Hand orthosis with computerised gaming exercises	Conventional home exercise	Motor function, muscle strength, performance of activities of daily living, dexterity	–
Cathodal tDCS with VR	VR:	Motor function	+
Cathodal tDCS with VR	VR:	Spasticity, performance of activities of daily living, dexterity	–
Cathodal tDCS with VR	Cathodal tDCS	Motor function	+
Cathodal tDCS with VR	Cathodal tDCS	Spasticity, performance of activities of daily living, dexterity	–
Cathodal tDCS	VR:	Motor function	+
Cathodal tDCS	VR:	Spasticity, performance of activities of daily living, dexterity	–
Robotic orthosis with Task-Specific training and Videogames (Unilateral)	Usual Physical Therapy	Motor function, muscle strength, spasticity, performance of activities of daily living, dexterity	–
Robotic orthosis with Task-Specific Training and Videogames (Bilateral)	Usual Physical Therapy	Motor function, muscle strength, spasticity, performance of activities of daily living, dexterity	–

Brain Computer Interfaces



Adapted from: http://www.tech-faq.com/brain-computer-interface.html

Brain-computer interface (BCI) technology has only recently emerged as a potential rehabilitative treatment option following stroke. BCI records and decodes local brain activity during the performance of a motor movement (Van Dokkum et al. 2015). The decoded brain signals can be configured into visual, auditory or haptic feedback, and

even for the control of external devices to help facilitate movement (Van Dokkum et al. 2015). BCI promotes the recruitment of brain areas involved in motor planning and execution and facilitates neural plasticity of neural networks using these areas, helping patients learn to generate normal brain activity or use brain activity to operate training devices (Van Dokkum et al. 2015). The evidence base for this intervention is still however in its infancy. 13 RCTs were inditified that examined brain computer interfaces for upper extremity motor rehabilitation poststroke.

A total of 21 RCTs were found that evaluated brain computer interfaces for upper extremity motor rehabilitation. Two RCTs compared brain-computer interface combined with other interventions with fes (Zhan et al. (2022); Jang et al. (2016b)). Two RCTs compared brain-computer interface combined with other interventions with sham (Lyukmanov et al. (2019); Frolov et al. (2017)). Two RCTs compared brain-computer interface combined with other interventions with no treatment (Mohanty et al. (2018); Young et al. (2016)). Seven RCTs compared brain-computer interface combined with other interventions with conventional therapy (Brunner et al. (2024); Ma Z.-Z. et al. (2023); Zanona A.D.F. et al. (2023); Guo et al. (2022); Li et al. (2022c); Cantillo-Negrete J. et al. (2021); Ang et al. (2014)). Three RCTs compared brain-computer interface combined with other interventions with robotics (Cheng et al. (2020); Ang et al. (2015b); Ang et al. (2010)). One RCT compared brain-computer interface combined with other interventions with neuromuscular electrical stimulation (Chen et al. (2021e)). One RCT compared brain-computer interface combined with other interventions with mental practice (Hu Y.-Q. et al. (2021)). One RCT compared brain-computer interface combined with other interventions with fes or conventional therapy (Liu et al. (2023)). One RCT compared brain-computer interface combined with other interventions with task-specific training or neuromuscular electrical stimulation (Fu J. et al. (2023)). One RCT compared brain-computer interface combined with other interventions with sham or fes (Zhang et al. (2023a)).

In addition, 8 RCTs in which brain computer interfaces formed part of a combined or comparative intervention are cross-referenced at the end of Table 18; their primary listings appear in other tables.

The methodological details and results of all 21 RCTs are presented in Table 18.

Table 18. RCTs Evaluating Brain Computer Interfaces for Upper Extremity Motor Rehabilitation

Authors (Year) **Study Design (PEDro Score)** **Sample Size start** **Sample Size end** **Time post stroke category** **Study design**	**Interventions** **Duration: Session length, frequency per week for total number of weeks**	**Outcome Measures** **Result (direction of effect)**
Brain-computer interface combined with other interventions compared to fes		
Zhan et al. (2022) RCT (4) NStart=24 NEnd=24 TPS=Chronic A + B vs A/B *Also in Table 22 (Neuromuscular Electrical Stimulation (NMES))*	E: BCI-FES + Conventional rehab C: FES + Conventional Rehab Duration: E: 40min/d, 3d/wk, 4wks C: 30min/d, 3d/wk, 3wks	E vs C: FMA (-) EEG connectivity (+exp)
Jang et al. (2016b) RCT (6) NStart=23 NEnd=20 TPS=Subacute A + B vs A/B *Also in Table 22 (Neuromuscular Electrical Stimulation (NMES))*	E: Brain-computer interface (BCI) + functional electrical stimulation (FES) C: Functional Electrical Stimulation Duration: 30min/d, 5d/wk, 6wks	E vs C: Vertical Shoulder Subluxation (+exp) Horizontal Shoulder Subluxation (-) Visual Analogue Scale Pain (-) Modified Ashworth Scale (-) Manual Function Test (-) Shoulder Flexion (+exp) Shoulder Abduction (+exp) Touching the occiput with palm (-) Touching the back with palm (-) Grasping (-) Pinching (-) Carrying cubes (-)

		Pegboard Manipulation (-)
Brain-computer interface combined with other interventions compared to sham		
Lyukmanov et al. (2019) RCT (4) NStart=73 NEnd=55 TPS=Subacute A + B vs 0 *Also in Table 16 (Robotics)*	E: BCI-exoskeleton system C: Sham Duration: 40min/session, 12 sessions	E vs C: FMA (no stats) ARAT (no stats)
Frolov et al. (2017) RCT (5) NStart=89 NEnd=74 TPS=Chronic A + B vs 0 *Also in Table 16 (Robotics)*	E: brain-computer interfaces-Exoskeleton-Based Training C: Sham exoskeleton Training Duration: 30min/d, 10d	E vs C: ARAT (+exp) FMA (-)
Brain-computer interface combined with other interventions compared to no treatment		
Mohanty et al. (2018) RCT Crossover (3) NStart=20 NEnd=20 TPS=Chronic A + B vs 0 *Also in Table 22 (Neuromuscular Electrical Stimulation (NMES))*	E: EEG Brain-Computer Interface Feedback with Functional Electrical Stimulation C: No Treatment Duration: 2hrs, 3x/wk, 6wks	E vs C: Action Research Arm Test (no stat) Nine-Hole Peg Test (no stat) Barthel Index (no stat) Stroke Impact Scale (no stat)
Young et al. (2016) RCT Crossover (3) NStart=19 NEnd=10 TPS=Chronic A vs 0	E: Brain Computer Interface C: No therapy Duration: 2-4wk	E vs C: Stroke Impact Scale (-) Action Research Arm Test (ARAT) Nine Hole Peg Test (-)
Brain-computer interface combined with other interventions compared to conventional therapy		
Brunner et al. (2024) Pilot RCT (6) NStart=40 NEnd=35 TPS=Subacute A + B vs 0	E: BCI system (includes BCI, FES, with screen)+ conventional C: Standard physiotherapy and occupational therapy Duration: 3-4d/wk for 3-4wks	E vs C: ARAT (-) FMA-UE (-) EEG measures (no stat)
Ma Z.-Z. et al. (2023) RCT (6) NStart=46 NEnd=40 TPS=Chronic A + B vs 0 *Also in Table 11 (Mental Practice)*	E: BCI-motor imagery system + Conventional therapy C: Conventional therapy Duration: BCI (40 mins/d, 5d/wk, 2wks) + conventional therapy (5d/wk, 2wks)	E vs C: FMA-UE (+exp) rs-fMRI Subnetwork metrics Visual network γ (+con) Visual network σ (+con) Dorsal attention network assortativity (+exp)
Zanona A.D.F. et al. (2023) RCT (7) NStart=44 NEnd=44 TPS=Subacute A + B + C vs 0	E: BCI controlled hand exoskeleton + Mental practice + Occupational therapy C: Occupational therapy Duration: 80 mins/d (Experimental group - 30 mins BCI + 15 mins mental practice + 35 mins of OT; Control group 80 minutes of OT) 5d/wk for 2wks	E vs C: FMA-UE sensory function (-) motor function (-) FIM (-) MAL

Also in Table 11 (Mental Practice); Table 16 (Robotics)		amount of movement (-) quality of movement (-) BBT (-) Jebson Hand function test (-)
Guo et al. (2022) RCT (6) NStart=30 NEnd=30 TPS=Chronic A + B vs A/B vs 0 *Also in Table 16 (Robotics)*	E1: BCI - Robotic + Conventional Rehab E2: Robotic + Conventional Rehab C: Conventional Rehab Duration: 60min/d, 5d/w, 2wks	E1/E2 vs C: E1 vs E2/C: FMA (+exp1) MAS (-) WMFT (+exp1)
Li et al. (2022c) RCT (6) NStart=24 NEnd=24 TPS=Subacute A + B vs 0 *Also in Table 11 (Mental Practice)*	E: BCI motor imagery training + conventional rehab C: Conventional rehab Duration: 3hrs/d(1hr BCI, 2hr Conventional rehab), 5d/wk, 2wks	E vs C: FMA-UE (-) WMFT (-) MBI (-) EEG (no stat)
Cantillo-Negrete J. et al. (2021) RCT Crossover (6) NStart=11 NEnd=10 TPS=Subacute A + B vs 0 *Also in Table 16 (Robotics)*	E: BCI Therapy + Robotic Hand Orthosis C: Conventional Care Duration: 30-40min/d, 3d/wk 4wks	E vs C: FMA (-) ARAT (-) grip strength (-) pinch strength (-) MEP (-) EEG (-)
Ang et al. (2014) RCT (6) NStart=22 NEnd=21 TPS=Chronic A + B + C vs A/A + B vs 0 *Also in Table 16 (Robotics); Table 11 (Mental Practice)*	E1: EEG-based motor imargery brain-computer interface with Haptic Knob robotic arm rehabilitation E2: Haptic Knob robot-based arm rehabilitation C: Standard arm therapy Duration: 90min/d, 3d/wk for 6wks	E1/E2 vs C: E1 vs E2/C: Fugl-Meyer Assessment (-)
Brain-computer interface combined with other interventions compared to robotics		
Cheng et al. (2020) Pilot RCT (6) NStart=11 NEnd=10 TPS=Chronic A + B vs A/B	E: Brain computer interface-assisted soft robotic glove therapy C: Manual soft robotic glove Duration: 120min/session, 18session/6wk	E vs C: ARAT(-), FMA(-) Questionnaire on imagined hand movement
Ang et al. (2015b) RCT (6) NStart=26 NEnd=25 TPS=Chronic A + B + C vs A/A + B *Also in Table 16 (Robotics); Table 11 (Mental Practice)*	E: Brain computer interface motor imagery+ MITManus robotic training C: MIT-Manus robotic training Duration: 90min/d, 3d/wk for 4wk	E vs C: Fugl-Meyer Assessment Upper Extremity (-)
Ang et al. (2010) RCT (5) NStart=26 NEnd=25	E: EEG-based Motor Imagery Brain-Computer Interface with Robotic Feedback (MIT-MANUS) C: Traditional Robotic Therapy	E vs C: Fugl-Meyer Assessment (-) Wolf Motor Function Test (-) Active Range of Motion (-)

TPS=Chronic A + B + C vs A/A + B *Also in Table 16 (Robotics); Table 11 (Mental Practice)*	Duration: 60min, 12x, 4wks	Modified Barthel Index (-) Stroke Impact Scale (+exp)
Brain-computer interface combined with other interventions compared to neuromuscular electrical stimulation		
Chen et al. (2021e) RCT (6) NStart=32 NEnd=32 TPS=Chronic A + B vs C *Also in Table 22 (Neuromuscular Electrical Stimulation (NMES))*	E: FES + BCI C: NMES Duration: E:40min/d, 4d/wk, 3wks;	E vs C: FMA-UE (+exp) manual muscle testing (+exp) Modified Barthel Index (-)
Brain-computer interface combined with other interventions compared to mental practice		
Hu Y.-Q. et al. (2021) RCT (6) NStart=12 NEnd=12 TPS=Chronic A + B vs A/B *Also in Table 11 (Mental Practice)*	E: Motor Imagery based BCI + conventional rehab C: Motor Imagery + conventional rehab Duration: 30min/d	E vs C: FMA-UE (-) ARAT (-) MSS (-) BI (-) sEMG (-)
Brain-computer interface combined with other interventions compared to fes or conventional therapy		
Liu et al. (2023) RCT (8) NStart=60 NEnd=57 TPS=Acute A + B vs C *Also in Table 22 (Neuromuscular Electrical Stimulation (NMES)); Table 11 (Mental Practice)*	E: Motor imagery BCI + conventional rehab C: FES + conventional rehab Duration: 20min/d, 5d/wk, 3wks	E vs C: FMA-UE (+exp) WMFT (+exp) MBI (+exp) Attention Network test ANT (+exp) Shulte grid test (+exp) Symbol digit modalities test (+exp)
Brain-computer interface combined with other interventions compared to task-specific training or neuromuscular electrical stimulation		
Fu J. et al. (2023) RCT (7) NStart=66 NEnd=61 TPS=Subacute A + B + C vs A + D *Also in Table 16 (Robotics); Table 22 (Neuromuscular Electrical Stimulation (NMES)); Table 4 (Task-Specific Training)*	E: Portable BCI-based hand robot system + Conventional therapy + neuromuscular electrical stimulation C: Task-specific training + Conventional therapy + neuromuscular electrical stimulation Duration: 90mins/d (30 mins of BCI/task-specific training, 20 mins of physical therapy, 20 mins of occupational therapy + 20 mins of neuromuscular electrical stimulation), 5ds/wk, 4 wks	E vs C: FMA-UE (+exp) EEG-derived Laterality Index (no stat) BCI accuracy (no stat)
Brain-computer interface combined with other interventions compared to sham or fes		
Zhang et al. (2023a) RCT (8) NStart=33 NEnd=28 TPS=Subacute A + B vs A/B *Also in Table 22 (Neuromuscular Electrical Stimulation (NMES))*	E: BCI with FES C: Sham BCI with FES Duration: 40min/d, 5d/wk for 4wks	E vs C: FMA-UE (+exp) MMT (-) ROM (-) EEG signals (no stat)

Cross-Referenced RCTs: Combined or Comparative Interventions Involving Brain Computer Interfaces (results included in this table's levels of evidence)		
Lee et al. (2020b) RCT (6) NStart=28 NEnd=26 TPS=Chronic A + B + C vs A/A + B *Primary listing: Table 12 (Action Observation)*	E: Action Observation with EEG-Mediated Functional Electrical Stimulation Brain-Computer Interface C: Functional Electrical Stimulation Duration: 30min, 5x/wk, 4wks	E vs C: Fugl-Meyer Assessment (+exp) Wolf Motor Function Test (+exp) Motor Acitivty Log (+exp) Modified Barthel Index (+exp) EEG brain waves - Alpha prefrontal area left side (-) prefrontal area on the right side (-) frontal lobe left side (-) frontal lobe right side (-) central lobe left side (+exp) central lobe right side (no stat) EEG brain waves - beta prefrontal area left side (-) prefrontal area on the right side (-) frontal lobe left side (-) frontal lobe right side (-) central lobe left side (+exp) central lobe right side (no stat) EEG brain waves - concentration prefrontal area left side (-) prefrontal area on the right side (-) frontal lobe left side (+exp) frontal lobe right side (+exp) central lobe left side (no stat) central lobe right side (no stat) EEG brain waves - activation prefrontal area left side (-) prefrontal area on the right side (-) frontal lobe left side (-) frontal lobe right side (-) central lobe left side (-) central lobe right side (+exp)
Mugler et al. (2019) RCT (6) NStart=35 NEnd=33 TPS=Chronic A + B1 vs A + B2 *Primary listing: Table 19 (EMG Biofeedback)*	E1: Isometric myoelectric computer interface (60. EMG biofeedback training using a computer interface) E2: Isometric myoelectric computer interface (90) C: Non-restrained (freely moved) myoelectric computer Interface (90) Duration: 60 or 90 min 3x/wk, for 6wk	E1 vs E2 vs C: Fugl-Meyer Assessment Upper Extremity (-) Wolf Motor Function Test (-) Motor Activity Log (-) Modified Ashworth Scale (-) Kinematic measures Other EMG measures
Lin et al. (2018a) RCT (5) NStart=15 NEnd=15 TPS=Chronic A + B vs A + C vs 0 *Primary listing: Table 20 (Feedback-Based Training)*	E1: Motion tracking device+ VR game E2: Motion tracking device + braincomputer interface attention monitoring electroencephalogram device + VR game C: Conventional therapy Duration: 35min/d, 3d/wk for 4wk	E1 vs E2: Fugl-Meyer Assessment (+exp2) E2 vs C: Fugl-Meyer Assessment (+exp2) E1 vs C: Fugl-Meyer Assessment (-)
Wang et al. (2018) RCT (7)	E: action observation (AO) with EEG-guided robot-hand training	E vs C:

NStart=24 NEnd=24 TPS=Chronic A + B vs A/B *Primary listing: Table 16 (Robotics)*	C: robot-hand training without AO and EEG guidance Duration: 90min/d, 3d/wk for 4wk	Fugl Meyer Assessment Upper Extremity: (-) fMRI parameters
Kim et al. (2016b) RCT (7) NStart=34 NEnd=30 TPS=Chronic A + B + C vs 0 *Primary listing: Table 12 (Action Observation)*	E: FES with Action observation training and brain computer interface C: Conventional therapy Duration: E: 30min/session, 3sessions/wk, 4wks; C: 30min/session, 1session/d, 4wks;	E vs C: FMA (+exp) Motor activity log (+exp) mod BI (+exp) wrist flexion (+exp)
Pichiorri et al. (2015) RCT (6) NStart=32 NEnd=28 TPS=Subacute A + B vs A/B *Primary listing: Table 11 (Mental Practice)*	E: motor imagery with Brain-computer interface+ standard stroke treatment C: Motor imagery+ standard stroke treatment Duration: 30min/d, 3x/wk, for 4wks	E vs C: FMA (+exp) Medical research council scale (+exp) NIHSS (+exp) high density EEG assessment
Ang et al. (2015a) RCT (7) NStart=19 NEnd=19 TPS=Chronic A + B + C vs A/A + B *Primary listing: Table 31 (Transcranial Direct Current Stimulation (tDCS))*	E: Bilateral tDCS + motor imagery brain-computer interface C: Sham tDCS + motor imagery brain-computer interface Duration: 80min/d, 5d/wk for 4wk	E vs C: Fugl-Meyer Assessment Upper Extremity (-) EEG laterality coefficient (ERD) Resting Motor Threshold Ipsilesional M1 (+exp) Contralesional M1 (-) Neurophysiological Outcomes Short Intra-cortical inhibition and Short Intra-cortical Facilitation in Contralesional M1 (-) Cerebral blood flow (+exp1)
Li et al. (2014) RCT (5) NStart=15 NEnd=14 TPS=Subacute A + B + C vs A/A + B *Primary listing: Table 22 (Neuromuscular Electrical Stimulation (NMES))*	E: Motor Imagery-based Brain-computer Interface (BCI) + FES C: FES Duration: 1-1.5hr/d, 3d/wk BCI + FES & 20min/d, 3d/wk FES only & 5d/wk conventional therapy, 8wks	E vs C: ARAT (+exp) FMA UE (-), Event related desynchronization of sensorimotor cortex EEG

Abbreviations and table notes: C=control group; D=days; E=experimental group; H=hours; Min=minutes; RCT=randomized controlled trial; TPS=time post stroke category (Acute: less than 30 days, Subacute: more than 1 month but less than 6 months, Chronic: over 6 months); Wk=weeks.

+exp indicates a statistically significant between groups difference at α=0.05 in favour of the experimental group

+exp1/+exp2/+exp3 indicates a statistically significant between groups difference at α=0.05 in favour of the first, second or third experimental group

+con indicates a statistically significant between groups difference at α=0.05 in favour of the control group

- indicates no statistically significant between groups differences at α=0.05

1. Body Functions and Structures

MOTOR FUNCTION			
LoE	**Conclusion Statement**	**RCTs**	**References**
1b	Brain-computer interface combined with other interventions may not have a difference in efficacy when compared to fes for improving motor function.	2	Zhan et al. (2022); Jang et al. (2016b)
2	There is conflicting evidence about the effect of Brain-computer interface combined with other interventions when compared to sham for improving motor function.	1	Frolov et al. (2017)
1a	Brain-computer interface combined with other interventions may not have a difference in efficacy when compared to conventional therapy for improving motor function.	7	Brunner et al. (2024); Ma Z.-Z. et al. (2023); Zanona A.D.F. et al. (2023); Guo et al. (2022); Li et al. (2022c); Cantillo-Negrete J. et al. (2021); Ang et al. (2014)
1a	Brain-computer interface combined with other interventions may not have a difference in efficacy when compared to robotics for improving motor function.	3	Cheng et al. (2020); Ang et al. (2015b); Ang et al. (2010)
1b	Functional electrical stimulation with brain-computer interface may produce greater improvements in motor function than neuromuscular electrical stimulation.	1	Chen et al. (2021e)
1b	Motor Imagery based brain-computer interface with conventional rehab may not have a difference in efficacy when compared to Motor Imagery with conventional rehab for improving motor function.	1	Hu Y.-Q. et al. (2021)
1b	Motor imagery brain-computer interface with conventional rehab may produce greater improvements in motor function than functional electrical stimulation with conventional rehab.	1	Liu et al. (2023)
1b	Portable brain-computer interface-based hand robot system with Conventional therapy and neuromuscular electrical stimulation may produce greater improvements in motor function than Task-specific training with Conventional therapy and neuromuscular electrical stimulation.	1	Fu J. et al. (2023)
1b	Brain-computer interface with functional electrical stimulation may produce greater improvements in motor function than Sham brain-computer interface with functional electrical stimulation.	1	Zhang et al. (2023a)
2	There is conflicting evidence about the effect of Motor Imagery-based Brain-computer Interface with functional electrical stimulation when compared to functional electrical stimulation for improving motor function.	1	Li et al. (2014)
1b	Motor imagery with Brain-computer interface with stroke treatment may produce greater improvements in motor function than Motor imagery with stroke treatment.	1	Pichiorri et al. (2015)
2	There is conflicting evidence about the effect of Motion tracking device with virtual reality game when compared to Conventional therapy for improving motor function.	1	Lin et al. (2018a)
2	Motion tracking device with virtual reality game may result in lesser improvements in motor function when compared to Motion tracking device with braincomputer interface attention monitoring electroencephalogram device and virtual reality game.	1	Lin et al. (2018a)
1b	Bilateral transcranial direct current stimulation with motor imagery brain-computer interface may not have a difference in efficacy when compared to Sham transcranial direct current stimulation with motor imagery brain-computer interface for improving motor function.	1	Ang et al. (2015a)

1b	Action Observation with EEG-Mediated Functional Electrical Stimulation Brain-Computer Interface may produce greater improvements in motor function than Functional Electrical Stimulation.	1	Lee et al. (2020b)
1b	Functional electrical stimulation with Action observation training and brain computer interface may produce greater improvements in motor function than Conventional therapy.	1	Kim et al. (2016b)
1b	Isometric myoelectric computer interface may not have a difference in efficacy when compared to Non-restrained (freely moved) myoelectric computer Interface for improving motor function.	1	Mugler et al. (2019)
1b	Action observation with EEG-guided robot-hand training may not have a difference in efficacy when compared to robot-hand training without action observation and EEG guidance for improving motor function.	1	Wang et al. (2018)

STROKE SEVERITY			
LoE	**Conclusion Statement**	**RCTs**	**References**
1b	Motor imagery with Brain-computer interface with stroke treatment may produce greater improvements in stroke severity than Motor imagery with stroke treatment.	1	Pichiorri et al. (2015)

MUSCLE STRENGTH			
LoE	**Conclusion Statement**	**RCTs**	**References**
1b	Brain-computer interface combined with other interventions may not have a difference in efficacy when compared to conventional therapy for improving muscle strength.	1	Cantillo-Negrete J. et al. (2021)
1b	Functional electrical stimulation with brain-computer interface may produce greater improvements in muscle strength than neuromuscular electrical stimulation.	1	Chen et al. (2021e)
1b	Brain-computer interface with functional electrical stimulation may not have a difference in efficacy when compared to Sham brain-computer interface with functional electrical stimulation for improving muscle strength.	1	Zhang et al. (2023a)
1b	Motor imagery with Brain-computer interface with stroke treatment may produce greater improvements in muscle strength than Motor imagery with stroke treatment.	1	Pichiorri et al. (2015)

SPASTICITY			
LoE	**Conclusion Statement**	**RCTs**	**References**
1b	Brain-computer interface combined with other interventions may not have a difference in efficacy when compared to fes for improving spasticity.	1	Jang et al. (2016b)
1b	Brain-computer interface combined with other interventions may not have a difference in efficacy when compared to conventional therapy for improving spasticity.	1	Guo et al. (2022)
1b	Isometric myoelectric computer interface may not have a difference in efficacy when compared to Non-restrained (freely moved) myoelectric computer Interface for improving spasticity.	1	Mugler et al. (2019)

RANGE OF MOTION			
LoE	**Conclusion Statement**	**RCTs**	**References**
1b	Brain-computer interface with functional electrical stimulation may not have a difference in efficacy when compared to Sham brain-computer interface with functional electrical stimulation for improving range of motion.	1	Zhang et al. (2023a)

2. Activities

ACTIVITIES OF DAILY LIVING			
LoE	**Conclusion Statement**	**RCTs**	**References**
1a	Brain-computer interface combined with other interventions may not have a difference in efficacy when compared to conventional therapy for improving performance of activities of daily living.	2	Zanona A.D.F. et al. (2023); Li et al. (2022c)
1b	Functional electrical stimulation with brain-computer interface may not have a difference in efficacy when compared to neuromuscular electrical stimulation for improving performance of activities of daily living.	1	Chen et al. (2021e)
1b	Motor Imagery based brain-computer interface with conventional rehab may not have a difference in efficacy when compared to Motor Imagery with conventional rehab for improving performance of activities of daily living.	1	Hu Y.-Q. et al. (2021)
1b	Motor imagery brain-computer interface with conventional rehab may produce greater improvements in performance of activities of daily living than functional electrical stimulation with conventional rehab.	1	Liu et al. (2023)
1b	Action Observation with EEG-Mediated Functional Electrical Stimulation Brain-Computer Interface may produce greater improvements in performance of activities of daily living than Functional Electrical Stimulation.	1	Lee et al. (2020b)
1b	Functional electrical stimulation with Action observation training and brain computer interface may produce greater improvements in performance of activities of daily living than Conventional therapy.	1	Kim et al. (2016b)
1b	Isometric myoelectric computer interface may not have a difference in efficacy when compared to Non-restrained (freely moved) myoelectric computer Interface for improving performance of activities of daily living.	1	Mugler et al. (2019)
2	Brain-computer interface combined with other interventions may not have a difference in efficacy when compared to robotics for improving performance of activities of daily living.	1	Ang et al. (2010)

DEXTERITY			
LoE	**Conclusion Statement**	**RCTs**	**References**
1b	Brain-computer interface combined with other interventions may not have a difference in efficacy when compared to conventional therapy for improving dexterity.	1	Zanona A.D.F. et al. (2023)
2	Brain-computer interface training may not have a difference in efficacy when compared to no treatment for improving dexterity.	1	Young et al. (2016)

Key Points

- Brain-computer interface combined with other interventions may not be beneficial for improving motor function and spasticity after stroke when compared to fes.

- The literature is mixed regarding the effect of Brain-computer interface combined with other interventions on improvement of motor function after stroke when compared to sham.
- Brain-computer interface combined with other interventions may not be beneficial for improving motor function, dexterity, performance of activities of daily living, spasticity, and muscle strength after stroke when compared to conventional therapy.
- Brain-computer interface combined with other interventions may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to robotics.
- Functional electrical stimulation with brain-computer interface may be beneficial for improving motor function and muscle strength, but not performance of activities of daily living, after stroke when compared to neuromuscular electrical stimulation.
- Motor Imagery based brain-computer interface with conventional rehab may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Motor Imagery with conventional rehab.
- Motor imagery brain-computer interface with conventional rehab may be beneficial for improving motor function and performance of activities of daily living after stroke when compared to functional electrical stimulation with conventional rehab.
- Portable brain-computer interface-based hand robot system with Conventional therapy and neuromuscular electrical stimulation may be beneficial for improving motor function after stroke when compared to Task-specific training with Conventional therapy and neuromuscular electrical stimulation.
- Brain-computer interface with functional electrical stimulation may be beneficial for improving motor function, but not range of motion and muscle strength, after stroke when compared to Sham brain-computer interface with functional electrical stimulation.
- The literature is mixed regarding the effect of Motor Imagery-based Brain-computer Interface with functional electrical stimulation on improvement of motor function after stroke when compared to functional electrical stimulation.
- Motor imagery with Brain-computer interface with stroke treatment may be beneficial for improving motor function, stroke severity, and muscle strength after stroke when compared to Motor imagery with stroke treatment.
- The literature is mixed regarding the effect of Motion tracking device with virtual reality game on improvement of motor function after stroke when compared to Conventional therapy.
- Motion tracking device with virtual reality game may be less beneficial than Motion tracking device with braincomputer interface attention monitoring electroencephalogram device and virtual reality game for improving motor function after stroke.
- Bilateral transcranial direct current stimulation with motor imagery brain-computer interface may not be beneficial for improving motor function after stroke when compared to Sham transcranial direct current stimulation with motor imagery brain-computer interface.
- Action Observation with EEG-Mediated Functional Electrical Stimulation Brain-Computer Interface may be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Functional Electrical Stimulation.
- Functional electrical stimulation with Action observation training and brain computer interface may be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Conventional therapy.
- Isometric myoelectric computer interface may not be beneficial for improving motor function, performance of activities of daily living, and spasticity after stroke when compared to Non-restrained (freely moved) myoelectric computer Interface.
- Action observation with EEG-guided robot-hand training may not be beneficial for improving motor function after stroke when compared to robot-hand training without action observation and EEG guidance.
- Brain-computer interface training may not be beneficial for improving dexterity after stroke when compared to no treatment.

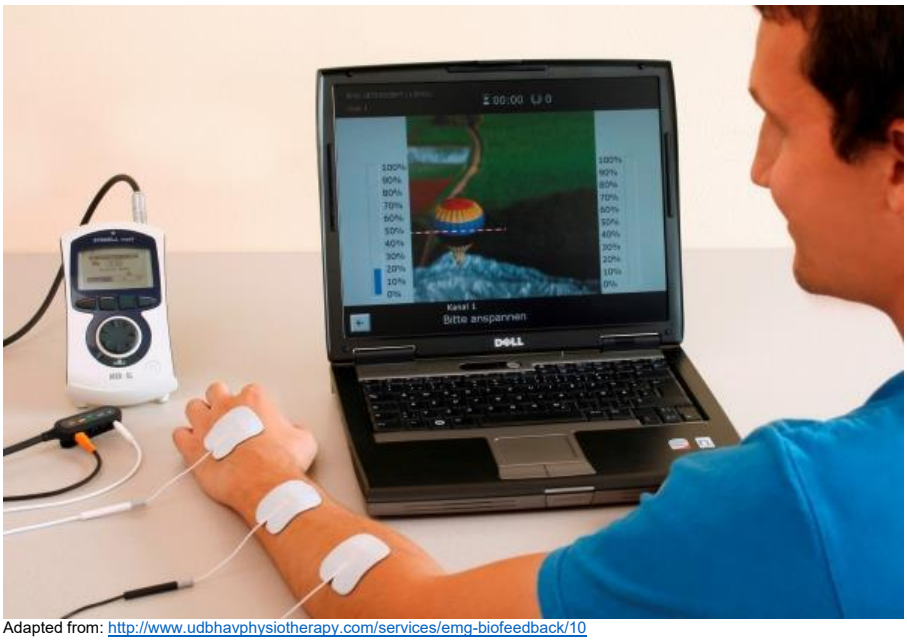
Summary of Key Points: Brain Computer Interfaces

Intervention	Control(s)	Function domain(s)	Effect

Brain-computer interface combined with other interventions	fes	Motor function, spasticity	–
Brain-computer interface combined with other interventions	sham	Motor function	=
Brain-computer interface combined with other interventions	conventional therapy	Motor function, dexterity, performance of activities of daily living, spasticity, muscle strength	–
Brain-computer interface combined with other interventions	robotics	Motor function, performance of activities of daily living	–
Functional electrical stimulation with brain-computer interface	neuromuscular electrical stimulation	Motor function, muscle strength	+
Functional electrical stimulation with brain-computer interface	neuromuscular electrical stimulation	Performance of activities of daily living	–
Motor Imagery based brain-computer interface with conventional rehab	Motor Imagery with conventional rehab	Motor function, performance of activities of daily living	–
Motor imagery brain-computer interface with conventional rehab	functional electrical stimulation with conventional rehab	Motor function, performance of activities of daily living	+
Portable brain-computer interface-based hand robot system with Conventional therapy and neuromuscular electrical stimulation	Task-specific training with Conventional therapy and neuromuscular electrical stimulation	Motor function	+
Brain-computer interface with functional electrical stimulation	Sham brain-computer interface with functional electrical stimulation	Motor function	+
Brain-computer interface with functional electrical stimulation	Sham brain-computer interface with functional electrical stimulation	Range of motion, muscle strength	–
Motor Imagery-based Brain-computer Interface with functional electrical stimulation	functional electrical stimulation	Motor function	=
Motor imagery with Brain-computer interface with stroke treatment	Motor imagery with stroke treatment	Motor function, stroke severity, muscle strength	+
Motion tracking device with virtual reality game	Conventional therapy	Motor function	=
Motion tracking device with virtual reality game	Motion tracking device with braincomputer interface attention monitoring electroencephalogram device and virtual reality game	Motor function	–
Bilateral transcranial direct current stimulation with motor imagery brain-computer interface	Sham transcranial direct current stimulation with motor imagery brain-computer interface	Motor function	–
Action Observation with EEG-Mediated Functional Electrical Stimulation Brain-Computer Interface	Functional Electrical Stimulation	Motor function, performance of activities of daily living	+
Functional electrical stimulation with Action observation training and brain computer interface	Conventional therapy	Motor function, performance of activities of daily living	+
Isometric myoelectric computer interface	Non-restrained (freely moved) myoelectric computer Interface	Motor function, performance of activities of daily living, spasticity	–
Action observation with EEG-guided robot-hand training	robot-hand training without action observation and EEG guidance	Motor function	–

Brain-computer interface training	no treatment	Dexterity	–

EMG Biofeedback



Adapted from: http://www.udbhavphysiotherapy.com/services/emg-biofeedback/10

EMG biofeedback for the treatment of hemiparesis after stroke is performed through the application of electrodes onto specific muscle groups important for a desired motor movement to monitor electrical activity during muscle contraction (Nelson, 2007). It then provides feedback of muscle activity back to the patient by conversion of myoelectrical activity into visual and/or auditory information to increase patient awareness and facilitate motor movement (Sturma et al. 2018). EMG biofeedback is particularly useful for small muscle contractions that are otherwise unnoticeable kinaesthetically or visually in the earlier stages of stroke recovery or in cases of severe paresis (Nelson, 2007) 17 RCTs were inditified that examined EMG biofeedback for upper extremity motor rehabilitation poststroke.

A total of twenty-three RCTs were found that evaluated EMG biofeedback for upper extremity motor rehabilitation. Nine RCTs compared EMG biofeedback with conventional therapy (Gamez et al. (2019); Kim et al. (2017d); Garrido-Montenegro et al. (2016); Dogan-Aslan et al. (2012); Harischandre & Singaravelan (2012); Inglis et al. (1984); Basmajian et al. (1982); Greenberg et al. (1980); Bowman et al. (1979)). One RCT compared EMG biofeedback with sham or conventional therapy (Hurd et al. (1980)). One RCT compared EMG biofeedback combined with other interventions with robotics (Hu et al. (2009)). Three RCTs compared EMG biofeedback with sham (Lirio-Romero et al. (2021); Armagan et al. (2003); Crow et al. (1989)). One RCT compared EMG biofeedback combined with other interventions with sham or task-specific training (Wolf et al. (1994)). One RCT compared EMG biofeedback combined with other interventions with neurodevelopmental techniques (bobath approach) (Basmajian et al. (1987)). One RCT compared EMG biofeedback combined with other interventions with emg biofeedback or brain-computer interface (Mugler et al. (2019)). Two RCTs evaluated EMG biofeedback combined with other interventions (Rayegani et al. (2014); Bate & Matyas (1992)). One RCT compared neurofeedback with sham (Sanders et al. (2022)). One RCT compared EMG biofeedback combined with other interventions with emg-triggered nmes (Zhao Q. et al. (2022)). One RCT compared EMG biofeedback combined with other interventions with mirror therapy (Kim et al. (2023a)). One RCT compared different approaches to EMG biofeedback (Seo et al. (2022)).

In addition, 8 RCTs in which EMG biofeedback formed part of a combined or comparative intervention are cross-referenced at the end of Table 19; their primary listings appear in other tables.

The methodological details and results of all twenty-three RCTs are presented in Table 19.

Table 19. RCTs Evaluating EMG Biofeedback for Upper Extremity Motor Rehabilitation

Authors (Year) Study Design (PEDro Score) Sample Size start Sample Size end Time post stroke category Study design	Interventions Duration: Session length, frequency per week for total number of weeks	Outcome Measures Result (direction of effect)
EMG biofeedback compared to conventional therapy		
Gamez et al. (2019) RCT (6) NStart=40 NEnd=28 TPS=Acute A vs 0	E: Surface EMG Biofeedback+ Conventional physiotherapy C: Conventional physiotherapy Duration: 60min/d, 2d/wk, 12wks	E vs C: EMG Activity hemiparetic-Upper Limb (+exp) hemiparetic- Lower Limb (+exp) contralateral-Lower Limb (-) Barthel Index (+exp) Fugl-Meyer Assessment - Upper Extremity (-) Lower Extremity (+exp) Daniels and Worthingham's Muscle Test (-) Kendall Manual Muscle Test (-) Lovett's Test (-) Isometric Wrist Strength (no stat)
Kim et al. (2017d) RCT (4) NStart=30 NEnd=30 TPS=Chronic A vs 0	E: EMG Biofeedback + Conventional Therapy C: Conventional Therapy Duration: 40min/d, 3d/wk, 4wk	E vs C: Fugl-Meyer Assessment (-) Manual Function Test (-) Functional Independence Measure (-)
Garrido-Montenegro et al. (2016) Pilot RCT (8) NStart=14 NEnd=14 TPS=Chronic A vs 0	E: EMG/Biofeedback + conventional occupational therapy C: Conventional occupational therapy Duration: 1 hr/d, 4d/wk for 4wk	E vs C: Barthel Index (+exp) Action Research Arm Test (+exp) Motor Activity Log: Amount of Use (+exp) Quality of Movement (+exp) Canadian Occupational Performance Measure: Performance (+exp) Satisfaction (+exp) instrumental activities of daily living
Dogan-Aslan et al. (2012) RCT (5) NStart=61 NEnd=40 TPS=Subacute A vs 0	E: EMG biofeedback + conventional therapy C: Conventional Therapy Duration: 20 min/d, 5d/wk for 3wks EMG biofeedback	E vs C: Ashworth scale (+exp) Brunnstroms stage (+exp) FMA UE (+exp) wrist extension active range of motion (+exp) Barthel Index (+exp) Upper extremity function test (+exp) EMG potentials
Harischandre & Singaravelan (2012) RCT (5) NStart=30 NEnd=28 TPS=Acute	E: EMG Biofeedback + Conventional Physiotherapy C: Conventional Physiotherapy Duration: 40min, 5d/wk, 4wks	E vs C: Action Research Arm Test (+exp) Voluntary Control Grading Scale (+exp)

A vs 0		
Inglis et al. (1984) RCT Crossover (3) NStart=30 NEnd=30 TPS=Chronic A vs 0	E: EMG Biofeedback+ physiotherapy C: Physiotherapy Duration: 20 treatment sessions of PT+EMG biofeedback	E vs C: Active Range of Motion (+exp) Brunnstrom stages (+exp) Oxford scale Muscle Strength (+exp) picture goniometry
Basmajian et al. (1982) Pilot RCT (6) NStart=37 NEnd=37 TPS=Subacute A vs 0	E: Behvioural physical therapy treatment program + EMG biofeedback C: Standard physiotherapy Duration: 40min/d, 3d/wk, for 5wks	E vs C: UEFT (-)
Greenberg et al. (1980) RCT (5) NStart=20 NEnd=20 TPS=Chronic A vs 0	E: EMG/Biofeedback Therapy C: Conventional occupational therapy Duration: 30min/d, 2d/wk for 4wk	E vs C: Active elbow extension (-)
Bowman et al. (1979) RCT (3) NStart=30 NEnd=30 TPS=Subacute A vs 0	E: Positional feedback electrical stimulation therapy + Conventional therapy C: Conventional Therapy Duration: 2x30min/d, 5d/wk, 4wks	E vs C: Active Range of motion (+exp) Isometric extension torque (+exp)
EMG biofeedback compared to sham or conventional therapy		
Hurd et al. (1980) RCT (6) NStart=24 NEnd=24 TPS=Subacute A vs 0	E: EMG biofeedback C1: Sham Biofeedback C2: Standard care Duration: Not Reported	E vs C1/C2: active range of motion (+exp1/2) muscle activity EMG (+exp1/2)
EMG biofeedback combined with other interventions compared to robotics		
Hu et al. (2009) RCT (5) NStart=27 NEnd=27 TPS=Chronic A + B vs A/B *Also in Table 16 (Robotics)*	E: EMG-driven Robot C: Passive motion robot device on wrist Duration: 3-5 session/wk; 20/ 7wk	E vs C: FMA (+exp) Mod Ashworth score (+exp) ARAT (-) FIM (-) EMG contraction records
EMG biofeedback compared to sham		
Lirio-Romero et al. (2021) RCT (8) NStart=38 NEnd=38 TPS=Subacute A vs 0	E: Surface EMG Biofeedback C: Sham Biofeedback Duration: 60min/d, 3d/wk, 6wks	E vs C: Fugl-Meyer Assessment- Upper Extremity (+exp) Shoulder Range of Motion GleNohumeral Flexion (+exp) GleNohumeral Internal Rotation (+exp) GleNohumeral External Rotation (+exp) GleNohumeral Abduction (+exp) Neuromuscular Amplitude of Activation

		Concentric Contractions- Trapezius (+exp) Eccentric Contractions- Trapezius (+exp) Isometric Contractions- Middle Deltoid (-)
Armagan et al. (2003) RCT (7) NStart=27 NEnd=27 TPS=Subacute A vs 0	E: EMG Biofeedback + conventional exercise program C: Sham EMG biofeedback + conventional exercise program Duration: 20min/d, 5d/wk for 4 weeks EMG biofeedback or placebo & 45min/d, 5d/wk for 4 wks exercise program	E vs C: AROM (+exp) Brunnstrom stages(-) complex movement (-) Changes in EMG surface potentials (+exp)
Crow et al. (1989) RCT (7) NStart=42 NEnd=40 TPS=Acute A vs 0	E: EMG/Biofeedback Therapy C: Sham EMG/biofeedback Duration: Not Reported	E vs C: Action Research Arm Test (+exp) Fugl-Meyer Assessment Upper Extremity (+exp)
EMG biofeedback combined with other interventions compared to sham or task-specific training		
Wolf et al. (1994) RCT (4) NStart=16 NEnd=16 TPS=Chronic A + B vs A/B *Also in Table 4 (Task-Specific Training)*	E: EMG biofeedback with task practice C: Sham biofeedback with task practice Duration: 25min, 2-4x/wk, 10x over 6wk	E vs C: Active Range of Motion: (-) Passive Range of Motion: (-) EMG activity of triceps and biceps Reaching task: (-) extension task resisted extension task
EMG biofeedback combined with other interventions compared to neurodevelopmental techniques (bobath approach)		
Basmajian et al. (1987) RCT (5) NStart=29 NEnd=29 TPS=Subacute A vs B *Also in Table 1 (Neurodevelopmental Techniques)*	E: Integrated behavioural and physical therapy with EMG biofeedback C: Exercise physical therapy (Bobath approach) Duration: 45min, 3d/wk, 5wk	E vs C: Upper extremity function test UEFT (-) finger oscillation test (-)
EMG biofeedback combined with other interventions compared to emg biofeedback or brain-computer interface		
Mugler et al. (2019) RCT (6) NStart=35 NEnd=33 TPS=Chronic A + B1 vs A + B2 *Also in Table 18 (Brain Computer Interfaces)*	E1: Isometric myoelectric computer interface (60. EMG biofeedback training using a computer interface) E2: Isometric myoelectric computer interface (90) C: Non-restrained (freely moved) myoelectric computer Interface (90) Duration: 60 or 90 min 3x/wk, for 6wk	E1 vs E2 vs C: Fugl-Meyer Assessment Upper Extremity (-) Wolf Motor Function Test (-) Motor Activity Log (-) Modified Ashworth Scale (-) Kinematic measures Other EMG measures
EMG biofeedback combined with other interventions compared to control		
Rayegani et al. (2014) RCT (5) NStart=46 NEnd=30 TPS=Chronic	E1: Ocupational Therapy E2: Ocupational Therapy + EMG-biofeedback; Neurofeedback E3: Ocupational Therapy + Neurofeedback Therapy Duration: 60min/d, 5d/wk, 2wk	E1 vs E2 vs E3: Jebsen Hand Function Test (-)

A1 vs A2 vs 0		
Bate & Matyas (1992) RCT (2) NStart=16 NEnd=16 TPS=Not Reported A + B vs A/B	E: EMG biofeedback + Elbow exercise tracking task C: Elbow exercise traking task only Duration: Single session	E vs C: EMG parameters: Mean absolute error (-) Muscle activity (-)
Neurofeedback compared to sham		
Sanders et al. (2022) RCT (8) NStart=27 NEnd=24 TPS=Chronic A vs 0	E: fMRI neurofeedback C: Sham fMRI neurofeedback Duration: 20min/d, 3 sessions/wk, 1wk	E vs C: JTT (-exp) ARAT (-) FMA-UE (-)
EMG biofeedback combined with other interventions compared to emg-triggered nmes		
Zhao Q. et al. (2022) RCT (6) NStart=24 NEnd=16 TPS=Subacute A vs B *Also in Table 22 (Neuromuscular Electrical Stimulation (NMES))*	E: EMG bridge therapy + conventional therapy C: NMES + conventional rehab Duration: 20min/d, 5d/wk, 4wks	E vs C: AROM (-) FMA-UE (-) MMT (-) BI (-)
EMG biofeedback combined with other interventions compared to mirror therapy		
Kim et al. (2023a) RCT (5) NStart=26 NEnd=24 TPS=Chronic A + B + C vs A/A + B *Also in Table 10 (Mirror Therapy); Table 22 (Neuromuscular Electrical Stimulation (NMES))*	E: FES-Biofeedback mirror therapy + conventional C: Mirror therapy + conventional rehab Duration: 30min/d, 5d/wk, 4wk	E vs C: Brunnstrom Motor Recovery Stage UE (-) hand (-) FMA-UE (+exp) MFT (+exp) AROM flexion (+exp) extension (+exp) pronation (+exp) supination (+exp) ulnar deviation (+exp) radial deviation (+exp) MBI (-)
Different approaches to EMG biofeedback compared against one another		
Seo et al. (2022) Pilot RCT (7) NStart=20 NEnd=20 TPS=Chronic A1 vs A2	E1: EMG biofeedback (unilateral) E2: EMG biofeedback (bilateral) Duration: 45min/wk, 3days/wk, 3wks	E1 vs E2: WMFT score (-) time (-) BBT (-)
Cross-Referenced RCTs: Combined or Comparative Interventions Involving EMG Biofeedback (results included in this table's levels of evidence)		
Hu et al. (2024) Pilot RCT (9) NStart=19 NEnd=18	E: High-definition tDCS + EMG-driven robotic hand (EMG-RH) C: Sham tDCS + EMG-RH	E vs C: FMA-UE (+exp) modified Ashworth Scale finger (+exp)

TPS=Chronic A + B + C vs A/A + B *Primary listing: Table 31 (Transcranial Direct Current Stimulation (tDCS))*	Duration: 20min/d stimulation + 60min/d EMG-RH 1-3d/wk for 20 sessions total	wrist (-) ARAT (-) task-based fMRI (+exp) EEG-EMG assessment (-) EMG assessments (+exp)
Murakami et al. (2023) RCT (7) NStart=20 NEnd=20 TPS=Chronic A + B vs A/B *Primary listing: Table 16 (Robotics)*	E: AI-based EMG hand robotic C: Passive robot hand robotic(no EMG) Duration: 40min/d, 2d/wk, 4wks	E vs C: FMA-UE (+exp) MAL (+exp) EMG - reflex parameters (-) MAS (-)
Chen et al. (2022b) RCT Crossover (5) NStart=31 NEnd=24 TPS=Chronic A + B vs C *Primary listing: Table 16 (Robotics)*	E: EMG-driven Robot-assisted Hand Training C: Task-Oriented intervention Duration: 70min/d, 3d/wk, 4wks (1mo washout)	E vs C: FMA-UE (+exp) WMFT (-) ARAT (-) MAL AOU (-) QOM (+exp)
Coskunsu et al. (2022) RCT (5) NStart=24 NEnd=20 TPS=Acute A + B vs 0 *Primary listing: Table 16 (Robotics)*	E: EMG- driven Exoskeleton Hand Robot + Rehabilitation Program C: Rehabilitation Program Duration: 60min/d, 5d/w, 3wks Robotic; 30min UE +30min LE/d, 5d/w, 3wks Rehab training	E vs C: FMA-UE (-) ARAT (-) MAL (-) EMG activities (-)
Huang et al. (2020) RCT (7) NStart=30 NEnd=30 TPS=Chronic A + B vs A + C *Primary listing: Table 16 (Robotics)*	E: NMES EMG robotic hand C: EMG robotic hand Duration: 3-5d/wk, 7wk (20session in total)	E vs C: FMA (-) ARAT (-) FIM (-) Modified Ashworth scale (+exp) EMG activity level (-) Co-contraction index (-)
Hu et al. (2015) RCT (6) NStart=26 NEnd=26 TPS=Chronic A + B vs A + C *Primary listing: Table 16 (Robotics)*	E1: EMG NMES robot E2: EMG robot Duration: 3-5 sessions/wk, 20 sessions total/7wks	E1 vs E2: FMA Shoulder/elbow (+exp1) Wrist/hand (-) Mod Ashworth score (-) ARAT (exp1+) EMG parameters
Cordo et al. (2013) RCT (5) NStart=46 NEnd=43 TPS=Chronic A + B1 vs A + B2 *Primary listing: Table 16 (Robotics)*	E1: AMES robot + torque biofeedback + muscle vibration E2: AMES robot + EMG biofeedback + muscle vibration Duration: 30min/d, 3d/wk, 10wk	E1 vs E2: Fugl-Meyer Assessment Upper Extremity (-)], Box and Block Test (-), [EMG Strength Test; - Flexion (+exp); - Extension (-) Stroke Impact Scale (-)
Wei et al. (2011) RCT (6) NStart=27 NEnd=27 TPS=Chronic	E: EMG-driven interactive robotic training C: passive robotic training Duration: 3-5x/wk, 20x over 4-7wk	E vs C: Action Research Arm Test (no stat) Functional Independence Measure (no stat) Fugl-Meyer Assessment (no stat)

A + B vs A/B *Primary listing: Table 16 (Robotics)*		Guyatt's Responsiveness Index (no stat) Modified Ashworth Scale (no stat) Motor Status Scale (no stat)

Abbreviations and table notes: C=control group; D=days; E=experimental group; H=hours; Min=minutes; RCT=randomized controlled trial; TPS=time post stroke category (Acute: less than 30 days, Subacute: more than 1 month but less than 6 months, Chronic: over 6 months); Wk=weeks.

+exp indicates a statistically significant between groups difference at α=0.05 in favour of the experimental group

+exp1/+exp2/+exp3 indicates a statistically significant between groups difference at α=0.05 in favour of the first, second or third experimental group

+con indicates a statistically significant between groups difference at α=0.05 in favour of the control group

- indicates no statistically significant between groups differences at α=0.05

1. Body Functions and Structures

MOTOR FUNCTION			
LoE	**Conclusion Statement**	**RCTs**	**References**
1a	Electromyography biofeedback may produce greater improvements in motor function than conventional therapy.	6	Gamez et al. (2019); Kim et al. (2017d); Garrido-Montenegro et al. (2016); Dogan-Aslan et al. (2012); Harischandre & Singaravelan (2012); Basmajian et al. (1982)
2	There is conflicting evidence about the effect of Electromyography-driven Robot when compared to Passive motion robot device on wrist for improving motor function.	1	Hu et al. (2009)
1a	Electromyography biofeedback may produce greater improvements in motor function than sham.	2	Lirio-Romero et al. (2021); Crow et al. (1989)
2	Integrated behavioural and physical therapy with electromyography biofeedback may not have a difference in efficacy when compared to Exercise physical therapy (Bobath approach) for improving motor function.	1	Basmajian et al. (1987)
1b	Isometric myoelectric computer interface may not have a difference in efficacy when compared to Non-restrained (freely moved) myoelectric computer Interface for improving motor function.	1	Mugler et al. (2019)
2	Ocupational Therapy may not have a difference in efficacy when compared to Ocupational Therapy with electromyography-biofeedback; Neurofeedback or Ocupational Therapy and Neurofeedback Therapy for improving motor function.	1	Rayegani et al. (2014)
1b	FMRI neurofeedback may not have a difference in efficacy when compared to Sham fMRI neurofeedback for improving motor function.	1	Sanders et al. (2022)
1b	Electromyography bridge therapy with conventional therapy may not have a difference in efficacy when compared to neuromuscular electrical stimulation with conventional rehab for improving motor function.	1	Zhao Q. et al. (2022)
2	Functional electrical stimulation-Biofeedback mirror therapy with conventional may produce greater improvements in motor function than Mirror therapy with conventional rehab.	1	Kim et al. (2023a)
1b	There is conflicting evidence about the effect of Electromyography neuromuscular electrical stimulation robot when compared to electromyography robot for improving motor function.	1	Hu et al. (2015)
1b	Neuromuscular electrical stimulation electromyography robotic hand may not have a difference in efficacy when compared to electromyography robotic hand for improving motor function.	1	Huang et al. (2020)

2	Electromyography-driven Robot-assisted Hand Training may not have a difference in efficacy when compared to Task-Oriented intervention for improving motor function.	1	Chen et al. (2022b)
2	Electromyography- driven Exoskeleton Hand Robot with Rehabilitation Program may not have a difference in efficacy when compared to Rehabilitation Program for improving motor function.	1	Coskunsu et al. (2022)
1b	AI-based electromyography hand robotic may produce greater improvements in motor function than Passive robot hand robotic(no electromyography).	1	Murakami et al. (2023)
1b	EMG biofeedback (unilateral) may not have a difference in efficacy when compared to EMG biofeedback (bilateral) for improving motor function.	1	Seo et al. (2022)
1b	There is conflicting evidence about the effect of High-definition tDCS with EMG-driven robotic hand (EMG-RH) when compared to Sham tDCS with EMG-RH for improving motor function.	1	Hu et al. (2024)
2	AMES robot with torque biofeedback and muscle vibration may not have a difference in efficacy when compared to AMES robot with EMG biofeedback and muscle vibration for improving motor function.	1	Cordo et al. (2013)

STROKE SEVERITY			
LoE	**Conclusion Statement**	**RCTs**	**References**
2	Electromyography biofeedback may produce greater improvements in stroke severity than conventional therapy.	2	Dogan-Aslan et al. (2012); Inglis et al. (1984)
2	Functional electrical stimulation-Biofeedback mirror therapy with conventional may not have a difference in efficacy when compared to Mirror therapy with conventional rehab for improving stroke severity.	1	Kim et al. (2023a)
1b	Electromyography biofeedback may not have a difference in efficacy when compared to sham for improving stroke severity.	1	Armagan et al. (2003)

MUSCLE STRENGTH			
LoE	**Conclusion Statement**	**RCTs**	**References**
1b	Electromyography biofeedback may produce greater improvements in muscle strength than conventional therapy.	3	Gamez et al. (2019); Inglis et al. (1984); Bowman et al. (1979)
1b	Electromyography bridge therapy with conventional therapy may not have a difference in efficacy when compared to neuromuscular electrical stimulation with conventional rehab for improving muscle strength.	1	Zhao Q. et al. (2022)
1b	Surface electromyography biofeedback may produce greater improvements in muscle strength than sham biofeedback.	1	Lirio-Romero et al. (2021)

SPASTICITY			
LoE	**Conclusion Statement**	**RCTs**	**References**
2	Electromyography biofeedback may produce greater improvements in spasticity than conventional therapy.	1	Dogan-Aslan et al. (2012)
2	Electromyography-driven Robot may produce greater improvements in spasticity than Passive motion robot device on wrist.	1	Hu et al. (2009)
1b	Isometric myoelectric computer interface may not have a difference in efficacy when compared to Non-restrained (freely moved) myoelectric computer Interface for improving spasticity.	1	Mugler et al. (2019)

1b	Electromyography neuromuscular electrical stimulation robot may not have a difference in efficacy when compared to electromyography robot for improving spasticity.	1	Hu et al. (2015)
1b	Neuromuscular electrical stimulation electromyography robotic hand may produce greater improvements in spasticity than electromyography robotic hand.	1	Huang et al. (2020)
1b	AI-based electromyography hand robotic may not have a difference in efficacy when compared to Passive robot hand robotic(no electromyography) for improving spasticity.	1	Murakami et al. (2023)
1b	There is conflicting evidence about the effect of High-definition tDCS with EMG-driven robotic hand (EMG-RH) when compared to Sham tDCS with EMG-RH for improving spasticity.	1	Hu et al. (2024)

RANGE OF MOTION			
LoE	**Conclusion Statement**	**RCTs**	**References**
2	Electromyography biofeedback may produce greater improvements in range of motion than conventional therapy.	4	Dogan-Aslan et al. (2012); Inglis et al. (1984); Greenberg et al. (1980); Bowman et al. (1979)
1b	Electromyography biofeedback may produce greater improvements in range of motion than Sham Biofeedback or care.	1	Hurd et al. (1980)
1a	Electromyography biofeedback may produce greater improvements in range of motion than sham.	2	Lirio-Romero et al. (2021); Armagan et al. (2003)
2	Electromyography biofeedback with task practice may not have a difference in efficacy when compared to Sham biofeedback with task practice for improving range of motion.	1	Wolf et al. (1994)
1b	Electromyography bridge therapy with conventional therapy may not have a difference in efficacy when compared to neuromuscular electrical stimulation with conventional rehab for improving range of motion.	1	Zhao Q. et al. (2022)
2	Functional electrical stimulation-Biofeedback mirror therapy with conventional may produce greater improvements in range of motion than Mirror therapy with conventional rehab.	1	Kim et al. (2023a)

2. Activities

ACTIVITIES OF DAILY LIVING			
LoE	**Conclusion Statement**	**RCTs**	**References**
1a	Electromyography biofeedback may produce greater improvements in performance of activities of daily living than conventional therapy.	4	Gamez et al. (2019); Kim et al. (2017d); Garrido-Montenegro et al. (2016); Dogan-Aslan et al. (2012)
2	Electromyography-driven Robot may not have a difference in efficacy when compared to Passive motion robot device on wrist for improving performance of activities of daily living.	1	Hu et al. (2009)
1b	Isometric myoelectric computer interface may not have a difference in efficacy when compared to Non-restrained (freely moved) myoelectric computer Interface for improving performance of activities of daily living.	1	Mugler et al. (2019)
1b	Electromyography bridge therapy with conventional therapy may not have a difference in efficacy when compared to neuromuscular electrical stimulation with conventional rehab for improving performance of activities of daily living.	1	Zhao Q. et al. (2022)

2	Functional electrical stimulation-Biofeedback mirror therapy with conventional may not have a difference in efficacy when compared to Mirror therapy with conventional rehab for improving performance of activities of daily living.	1	Kim et al. (2023a)
1b	Neuromuscular electrical stimulation electromyography robotic hand may not have a difference in efficacy when compared to electromyography robotic hand for improving performance of activities of daily living.	1	Huang et al. (2020)
2	There is conflicting evidence about the effect of Electromyography-driven Robot-assisted Hand Training when compared to Task-Oriented intervention for improving performance of activities of daily living.	1	Chen et al. (2022b)
2	Electromyography- driven Exoskeleton Hand Robot with Rehabilitation Program may not have a difference in efficacy when compared to Rehabilitation Program for improving performance of activities of daily living.	1	Coskunsu et al. (2022)
1b	AI-based electromyography hand robotic may produce greater improvements in performance of activities of daily living than Passive robot hand robotic(no electromyography).	1	Murakami et al. (2023)

DEXTERITY			
LoE	**Conclusion Statement**	**RCTs**	**References**
1b	EMG biofeedback (unilateral) may not have a difference in efficacy when compared to EMG biofeedback (bilateral) for improving dexterity.	1	Seo et al. (2022)
2	AMES robot with torque biofeedback and muscle vibration may not have a difference in efficacy when compared to AMES robot with EMG biofeedback and muscle vibration for improving dexterity.	1	Cordo et al. (2013)

Key Points

- Electromyography biofeedback may be beneficial for improving motor function, stroke severity, muscle strength, spasticity, range of motion, and performance of activities of daily living after stroke when compared to conventional therapy.
- Electromyography-driven Robot may be beneficial for improving spasticity, but not performance of activities of daily living, after stroke when compared to Passive motion robot device on wrist; the literature is mixed regarding motor function.
- Electromyography biofeedback may be beneficial for improving motor function and range of motion, but not stroke severity, after stroke when compared to sham.
- Integrated behavioural and physical therapy with electromyography biofeedback may not be beneficial for improving motor function after stroke when compared to Exercise physical therapy (Bobath approach).
- Isometric myoelectric computer interface may not be beneficial for improving motor function, performance of activities of daily living, and spasticity after stroke when compared to Non-restrained (freely moved) myoelectric computer Interface.
- Ocupational Therapy may not be beneficial for improving motor function after stroke when compared to Ocupational Therapy with electromyography-biofeedback; Neurofeedback or Ocupational Therapy and Neurofeedback Therapy.
- FMRI neurofeedback may not be beneficial for improving motor function after stroke when compared to Sham fMRI neurofeedback.
- Electromyography bridge therapy with conventional therapy may not be beneficial for improving motor function, performance of activities of daily living, range of motion, and muscle strength after stroke when compared to neuromuscular electrical stimulation with conventional rehab.

- Functional electrical stimulation-Biofeedback mirror therapy with conventional may be beneficial for improving motor function and range of motion, but not performance of activities of daily living and stroke severity, after stroke when compared to Mirror therapy with conventional rehab.
- Electromyography neuromuscular electrical stimulation robot may not be beneficial for improving spasticity after stroke when compared to electromyography robot; the literature is mixed regarding motor function.
- Neuromuscular electrical stimulation electromyography robotic hand may be beneficial for improving spasticity, but not motor function and performance of activities of daily living, after stroke when compared to electromyography robotic hand.
- Electromyography-driven Robot-assisted Hand Training may not be beneficial for improving motor function after stroke when compared to Task-Oriented intervention; the literature is mixed regarding performance of activities of daily living.
- Electromyography- driven Exoskeleton Hand Robot with Rehabilitation Program may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Rehabilitation Program.
- AI-based electromyography hand robotic may be beneficial for improving motor function and performance of activities of daily living, but not spasticity, after stroke when compared to Passive robot hand robotic(no electromyography).
- Electromyography biofeedback may be beneficial for improving range of motion after stroke when compared to Sham Biofeedback or care.
- Electromyography biofeedback with task practice may not be beneficial for improving range of motion after stroke when compared to Sham biofeedback with task practice.
- Surface electromyography biofeedback may be beneficial for improving muscle strength after stroke when compared to sham biofeedback.
- EMG biofeedback (unilateral) may not be beneficial for improving motor function and dexterity after stroke when compared to EMG biofeedback (bilateral).
- The literature is mixed regarding the effect of High-definition tDCS with EMG-driven robotic hand (EMG-RH) on motor function and spasticity after stroke when compared to Sham tDCS with EMG-RH.
- AMES robot with torque biofeedback and muscle vibration may not be beneficial for improving motor function and dexterity after stroke when compared to AMES robot with EMG biofeedback and muscle vibration.

Summary of Key Points: EMG Biofeedback

Intervention	Control(s)	Function domain(s)	Effect
Electromyography biofeedback	conventional therapy	Motor function, stroke severity, muscle strength, spasticity, range of motion, performance of activities of daily living	+
Electromyography-driven Robot	Passive motion robot device on wrist	Spasticity	+
Electromyography-driven Robot	Passive motion robot device on wrist	Performance of activities of daily living	–
Electromyography-driven Robot	Passive motion robot device on wrist	Motor function	=
Electromyography biofeedback	sham	Motor function, range of motion	+
Electromyography biofeedback	sham	Stroke severity	–
Integrated behavioural and physical therapy with electromyography biofeedback	Exercise physical therapy (Bobath approach)	Motor function	–
Isometric myoelectric computer interface	Non-restrained (freely moved) myoelectric computer Interface	Motor function, performance of activities of daily living, spasticity	–

Ocupational Therapy	Ocupational Therapy with electromyography-biofeedback; Neurofeedback or Ocupational Therapy and Neurofeedback Therapy	Motor function	–
FMRI neurofeedback	Sham fMRI neurofeedback	Motor function	–
Electromyography bridge therapy with conventional therapy	neuromuscular electrical stimulation with conventional rehab	Motor function, performance of activities of daily living, range of motion, muscle strength	–
Functional electrical stimulation-Biofeedback mirror therapy with conventional	Mirror therapy with conventional rehab	Motor function, range of motion	+
Functional electrical stimulation-Biofeedback mirror therapy with conventional	Mirror therapy with conventional rehab	Performance of activities of daily living, stroke severity	–
Electromyography neuromuscular electrical stimulation robot	electromyography robot	Spasticity	–
Electromyography neuromuscular electrical stimulation robot	electromyography robot	Motor function	=
Neuromuscular electrical stimulation electromyography robotic hand	electromyography robotic hand	Spasticity	+
Neuromuscular electrical stimulation electromyography robotic hand	electromyography robotic hand	Motor function, performance of activities of daily living	–
Electromyography-driven Robot-assisted Hand Training	Task-Oriented intervention	Motor function	–
Electromyography-driven Robot-assisted Hand Training	Task-Oriented intervention	Performance of activities of daily living	=
Electromyography- driven Exoskeleton Hand Robot with Rehabilitation Program	Rehabilitation Program	Motor function, performance of activities of daily living	–
AI-based electromyography hand robotic	Passive robot hand robotic(no electromyography)	Motor function, performance of activities of daily living	+
AI-based electromyography hand robotic	Passive robot hand robotic(no electromyography)	Spasticity	–
Electromyography biofeedback	Sham Biofeedback or care	Range of motion	+
Electromyography biofeedback with task practice	Sham biofeedback with task practice	Range of motion	–
Surface electromyography biofeedback	sham biofeedback	Muscle strength	+
EMG biofeedback (unilateral)	EMG biofeedback (bilateral)	Motor function, dexterity	–
High-definition tDCS with EMG-driven robotic hand (EMG-RH)	Sham tDCS with EMG-RH	Motor function, spasticity	=
AMES robot with torque biofeedback and muscle vibration	AMES robot with EMG biofeedback and muscle vibration	Motor function, dexterity	–

Feedback-Based Training



Adapted from: https://unsplash.com/photos/white-digital-device-at-19-0-0hjokXK6uLs

Feedback-based training provides augmented visual, auditory, or performance-related feedback (knowledge of results or performance) during upper limb motor practice, delivered through screens, cueing systems, or instrumented devices.

A total of twelve RCTs were found that evaluated Feedback-Based training for upper extremity motor rehabilitation. One RCT compared augmented feedback training combined with other interventions with task-specific training (Cruz et al. (2014)). Two RCTs compared different approaches to augmented feedback training (Durham et al. (2014); Mukherjee et al. (2013)). Two RCTs compared augmented feedback training combined with other interventions with conventional therapy (Feingold-Polak et al. (2024); Lin et al. (2018a)). Two RCTs compared augmented feedback training with conventional therapy (Zhu et al. (2020); Lin et al. (2018b)). One RCT compared augmented feedback training combined with other interventions with exercise and custom physiotherapy protocols (Cirstea et al. (2007)). One RCT evaluated augmented feedback training combined with other interventions (Alberti et al. (2022)). One RCT compared augmented feedback training combined with other interventions with stretching and positioning programs or augmented feedback training (Kim et al. (2024b)). One RCT compared augmented feedback training with sham (Ojardias et al. (2024)). One RCT compared augmented feedback training combined with other interventions with augmented feedback training or trunk restraint (Thielman et al. (2010)).

In addition, 22 RCTs in which Feedback-Based training formed part of a combined or comparative intervention are cross-referenced at the end of Table 20; their primary listings appear in other tables.

The methodological details and results of all twelve RCTs are presented in Table 20.

Table 20. RCTs Evaluating Feedback-Based Training for Upper Extremity Motor Rehabilitation

Authors (Year) **Study Design (PEDro Score)** **Sample Size start** **Sample Size end** **Time post stroke category** **Study design**	**Interventions** **Duration: Session length, frequency per week for total number of weeks**	**Outcome Measures** **Result (direction of effect)**
Augmented feedback training combined with other interventions compared to task-specific training		
Cruz et al. (2014) RCT Crossover (7) NStart=44 NEnd=43 TPS=Acute A + B vs A/B *Also in Table 4 (Task-Specific Training)*	E: Repetitive motor task under vibratory feedback C: Repetitive motor task Duration: 1 session, 20min washout	E vs C: Movement accuracy and movements per minute (+exp) Range of Motion (-) Fatigue VAS Pain VAS

Different approaches to augmented feedback training compared against one another		
Durham et al. (2014) RCT Crossover (4) NStart=42 NEnd=42 TPS=Chronic A1 vs A2	E1: External focus of attention E2: internal focus of attention Duration: 1 training session/ 96 attempts per session	E1 vs E2: Kinematic measurements (+exp1)
Mukherjee et al. (2013) RCT (5) NStart=12 NEnd=12 TPS=Chronic A vs B	E: Augmented visual feedback C: Conventional visual feedback Duration: 240 trials/d, 3d	E vs C: Movement entropy (-) Hand Movement Variability (-)
Augmented feedback training combined with other interventions compared to conventional therapy		
Feingold-Polak et al. (2024) Pilot RCT (4) NStart=33 NEnd=26 TPS=Subacute A + B1 vs A + B2 vs 0 *Also in Table 4 (Task-Specific Training)*	E1: Reach-To-Grasp with robot feedback + Conventional therapy E2: Reach-To-Grasp with computer feedback + Conventional therapy C: Conventional therapy Duration: 45-60min/d, 2-3d/wk for 5-7wks	E1/E2 vs C: FMA-UE (+exp1) ARAT (+exp1) Motor Activity Log quality of movement (-) amount of use (-) SIS (-) kinematic measurements; -velocity of movement (-); -smoothness of movement (+exp1/2); -trunk displacement (-) E1 vs E2: FMA-UE (-) ARAT (-) Motor Activity Log -quality of movement (-) -amount of use (-) SIS (-) kinematic measurements velocity of movement (-) smoothness of movement (-) trunk displacement (-)
Lin et al. (2018a) RCT (5) NStart=15 NEnd=15 TPS=Chronic A + B vs A + C vs 0 *Also in Table 17 (Virtual Reality); Table 18 (Brain Computer Interfaces)*	E1: Motion tracking device+ VR game E2: Motion tracking device + braincomputer interface attention monitoring electroencephalogram device + VR game C: Conventional therapy Duration: 35min/d, 3d/wk for 4wk	E1 vs E2: Fugl-Meyer Assessment (+exp2) E2 vs C: Fugl-Meyer Assessment (+exp2) E1 vs C: Fugl-Meyer Assessment (-)
Augmented feedback training compared to conventional therapy		
Zhu et al. (2020) RCT (6) NStart=46 NEnd=31 TPS=Subacute A vs 0	E: Visual Feedback Therapy C: Conventional therapy Duration: 30min, 6x/wk for 8wks	E vs C: Fugl-Meyer Upper Extremity (+exp) Barthel Index (+exp) Somatosensory evoked potential: N9 latency (+exp) N9 amplitude (+exp) N20 latency (+exp) N20 amplitude (+exp)

		fMRI parameters: precentral gyrus (+exp) parietal lobe (+exp) SMA (+exp) occipital lobe (-) basal ganglia (-)
Lin et al. (2018b) RCT (6) NStart=20 NEnd=18 TPS=Chronic A vs 0	E: wearable movement monitoring device (providing visual and audio feedback) C: Standard rehabilitation treatment Duration: 15 sessions/ d, 3d/wk for 5 wk	E vs C: Fugl-Meyer Assessment (-) Active Range of Motion (-) Maximal Elbow Extension Angle During Reach (+exp)
Augmented feedback training combined with other interventions compared to exercise and custom physiotherapy protocols		
Cirstea et al. (2007) RCT (6) NStart=28 NEnd=28 TPS=Chronic A + B vs A/B *Also in Table 3 (Exercise and Strength Training)*	E: Pointing movement practice with feedback C: Pointing movement practice without feedback Duration: 1hr/session, 10sessions over 2wk	E vs C: FMA (-) CSI (-) TEMPA (+exp) Shoulder horizontal adduction (+exp) shoulder flexion (+exp) TCI segment II amplitude (+exp) Trunk anterior displacement (-) Trunk rotation (-) Elbow extension (-) TCI Segment III duration (-)
Augmented feedback training combined with other interventions compared to control		
Alberti et al. (2022) RCT (3) NStart=14 NEnd=14 TPS=Not Reported A + B vs A vs B *Also in Table 3 (Exercise and Strength Training)*	E1: Lucid table personalized computer physio E2: Kinesiotherapy(TST) E3: Lucid table + kinesiotherapy Duration: 30min/d, 2d/wk, 7wks	E1 vs E2 vs E3: HAQ-DI (no stat) PROM (no stat) AROM (no stat) GMFM (no stat)
Augmented feedback training combined with other interventions compared to stretching and positioning programs or augmented feedback training		
Kim et al. (2024b) RCT (5) NStart=28 NEnd=28 TPS=Chronic A + B1 vs A + B2 *Also in Table 8 (Stretching Programs)*	E: Upper limb control of less-affected side with real-time feedback C: Upper limb control of affected side with real-time feedback Duration: 30min/d 5d/wk for 4wks	E vs C: Digital Manual Muscle Tester shoulder flexion (-) shoulder extension (+exp) ROM shoulder flexion (+exp) shoulder extension (-) Manual Function Test (-) respiratory function forced vital capacity (+exp) forced expiratory volume in 1s (+exp) peak expiratory flow (-) body sway (+exp) center of pressure path length (+exp) average velocity (-) Korean mBI (+exp)

Augmented feedback training compared to sham		
Ojardias et al. (2024) Pilot RCT (9) NStart=17 NEnd=17 TPS=Acute A vs 0	E: Visual feedback correction + conventional therapy C: Placebo video treatment + conventional therapy Duration: Intensive Visual Stimulation (200 repititions, 5ds/wk, 6wks); Conventional therapy (60mins/d, 5ds/wk, 6wks)	E vs C: 400-point Hand Assessment (-) BBT (-) PPT (-) Minnesota Rate of Manipulation Test (-)
Augmented feedback training combined with other interventions compared to augmented feedback training or trunk restraint		
Thielman et al. (2010) Pilot RCT (5) NStart=16 NEnd=16 TPS=Chronic A + B1 vs A + B2 *Also in Table 7 (Trunk Restraint)*	E: Trunk Restraint Training + auditory feedback C: Trunk Restraint Training + tactile feedback Duration: 40-45 min/d, 12 x total, 2-3d/wk	E vs C: Reaching Performance Scale near target (+exp) far target (-) Active range of motion (-) Fugl-Meyer Assessment (-) Motor activity Log (-) Grip strength (-) Wolf-motor function test (-) elbow extension (-)
Cross-Referenced RCTs: Combined or Comparative Interventions Involving Feedback-Based Training (results included in this table's levels of evidence)		
Simic-Panic et al. (2024) RCT (7) NStart=127 NEnd=119 TPS=Subacute A + B vs 0 *Primary listing: Table 3 (Exercise and Strength Training)*	E: Cycling exercise + feedback + Conventional therapy C: Conventional therapy Duration: E: 150 mins/d (120 mins of conventional rehabilitation + 30 mins of cycling), 6ds/wk, 3 wks; C: 120 mins/d, 6ds/wk, 3wks	E vs C: NIHSS (+exp) Modified Ashworth Scale (+exp) Brunnstrom motor evaluation scale arm (-) hand (-) leg (+exp) FMA-UE (-) FMA-LE (+exp) BI (-) Berg balance scale (+exp) 6-MWT (+exp) TUG (-)
Kuo et al. (2023b) RCT (8) NStart=37 NEnd=34 TPS=Chronic A + B vs 0 *Primary listing: Table 17 (Virtual Reality)*	E: Virtual reality games + Audio feedback + conventional therapy C: Conventional Rehab Duration: 60min/d (30min VR, 30min conventional), 2ds/wk, 18wks	E vs C: FMA-UE (-) AROM shoulder extension (-) shoulder flexion (+exp) shoulder abduction (-) elbow flexion (-) elbow extension (-) supination (-) pronation (+exp) Grip strength (-) BBT (+exp) SIS (-) M-PEAS (-)
Green et al. (2023) RCT (3) NStart=19	E1: Mental Practice + Visual feedback E2: Mental Practice + Audio feedback C: Repititive task-specific training	E1 vs E2 vs C1 vs C2: FMA-UE (no stat) WMFT (no stat)

NEnd=18 TPS=Acute A + B1 vs A + B2 vs C *Primary listing: Table 11 (Mental Practice)*	Duration: 30 repititions/d (20 mental practice, 10 physical practice), 3 days a week; 20 repititions of only mental training/d, 2 days a week; until patient is discharged	
Kim et al. (2023c) RCT (7) NStart=29 NEnd=26 TPS=Chronic A + B1 vs A + B2 *Primary listing: Table 4 (Task-Specific Training)*	E: Autonomy support (training with more-affected arm and could actively adjust task difficulty) + Verbal feedback C: Training with more-affected arm with no opportunity to adjust difficulty + General verbal feedback Duration: 60min/d, 3d/wk for 3wks	E vs C: IMES variables use (+exp) impairment (-) performance (-) Actual Amount of Use Test (-) FMA-UE (-) WMFT (-) Confidence in the Arm and Hand Movement (CAHM) (-)
Widmer et al. (2022) RCT (7) NStart=37 NEnd=31 TPS=Subacute A + B vs A/B *Primary listing: Table 17 (Virtual Reality)*	E: Virtual reality training (ArmeoSenso + monetary feedback rewards) + conventional care C: virtual reality training (without rewards) + conventional care Duration: 1h/d, 5d/wk, 3wks	E vs C: UE AROM (-) FMA (-) WMFT Score (-) Time (-) BBT (+exp) Motor activity log Actual amount of use test (-) Quality of movement (-) Barthel index (-) NIHSS (-) modified Rankin scale (-)
Salvalaggio et al. (2022) RCT (8) NStart=124 NEnd=114 TPS=Chronic A + B vs A/B *Primary listing: Table 17 (Virtual Reality)*	E: Teacher-supervised Virtual reality + conventional rehab C: Non-supervised virtual reality + conventional rehab Duration: 2hr/d(1hr VR, 1hr conventional), 5 d/wk, 4 wks	E vs C: FMA-UE (-) BBT (-) RPS (-) MAS (-) FIM (-) Movement duration (-) Completion time (-) Linear velocity (-) sub-movements (-)
Cho & Song (2020) RCT (6) NStart=42 NEnd=40 TPS=Chronic A + B1 vs A + B2 *Primary listing: Table 16 (Robotics)*	E: Robot Assisted Arm Training with high inertia (RAT-WAM) C: Robot Assisted Arm Training with low-inertia Proficio (RAT-P) Duration: 40min/d, 3d/wk, 4wks	E vs C: Fugl-Meyer (-) Proximal (-) Distal (+con) Box and Block Test (-) Action Research Arm Test (-) Kinematics - Curvilinearity ratio (-)
Choudhury et al. (2020) RCT (6) NStart=95 NEnd=61 TPS=Chronic A + B1 vs A + B2 vs 0 *Primary listing: Table 22 (Neuromuscular Electrical Stimulation (NMES))*	E1: NMES with Paired Auditory Stimuli E2: NMES with Random Auditory Stimuli C: Conventional Therapy Duration: 4hr/d, 4wks device	E1 vs E2 vs C: No between group comparisons: Action Research Arm Test (no stat) Modified Ashworth Scale (no stat) Grip/Pinch Strength (no stat) Range of Motion (no stat) Maximum Contraction Force (no stat)

Cho et al. (2019) RCT (8) NStart=42 NEnd=38 TPS=Chronic A + B1 vs A + B2 *Primary listing: Table 16 (Robotics)*	E: Robot therapy with assistance as needed C: Robot therapy with guidance forces all times Duration: 40min, 3x/wk for 6wk	E vs C: FMA (+exp) BBT (-) ARAT (+exp) Movement velocity (-)
Valdes et al. (2018) RCT Crossover (5) NStart=23 NEnd=14 TPS=Chronic A + B vs A/B *Primary listing: Table 16 (Robotics)*	E1: robotic arms with scores, visual, and force feedback E2: robotic arms without scores, visual, and force feedback Duration: Not Reported	E1 vs E2: Trunk displacement (-) Trunk rotation (-) bimanual symmetry RMS
Valdes et al. (2017) RCT Crossover (4) NStart=23 NEnd=15 TPS=Chronic A + B1 vs A + B2 *Primary listing: Table 16 (Robotics)*	E1: Robotic Training (JACO) With Force Feedback For Trunk Compensation E2: Robotic Training (JACO) With Visual Feedback For Trunk Compensation Duration: single session/condition	E1 vs E2: anterior trunk displacement, trunk rotation, index of curvature, RMS error, completion time, system usability scale
Bang et al. (2016) Pilot RCT (7) NStart=20 NEnd=20 TPS=Subacute A + B vs A/B *Primary listing: Table 6 (Constraint-Induced Movement Therapy (CIMT))*	E: mCIMT + auditory feedback C: mCIMT alone Duration: 60min/d, 5d/wk, 4wks	E vs C: ARAT (+exp) FMA UE (+exp) modified Barthel Index (+exp) Motor activity logs (+exp) modified Ashworth Scale (-)
Lin et al. (2015) RCT (7) NStart=33 NEnd=33 TPS=Chronic A + B vs 0 *Primary listing: Table 3 (Exercise and Strength Training)*	E: Bilateral Isometric Handgrip Force Training with Visual Feedback C: Routine Therapy Duration: 30min/d, 3d/wk for 4wk	E vs C: Fugl-Meyer Assessment (+exp) Wolf Motor Function Test (+exp) Motor Assessment Scale (+exp) Barthel Index (+exp)
Kim et al. (2015b) RCT (9) NStart=44 NEnd=40 TPS=Chronic A + B vs 0 *Primary listing: Table 4 (Task-Specific Training)*	E: Spatial target reaching training based on visual biofeedback + Routine therapy C: Routine Therapy Duration: 1h/d, 3d/wk for 4wk	E vs C: Fugl-Meyer Upper Extremity (+exp) Wolf Motor Function Test (+exp) Kinematic variables
Cordo et al. (2013) RCT (5) NStart=46 NEnd=43 TPS=Chronic A + B1 vs A + B2 *Primary listing: Table 16 (Robotics)*	E1: AMES robot + torque biofeedback + muscle vibration E2: AMES robot + EMG biofeedback + muscle vibration Duration: 30min/d, 3d/wk, 10wk	E1 vs E2: Fugl-Meyer Assessment Upper Extremity (-) Box and Block Test (-) EMG Strength Test Flexion (+exp) Extension (-) Stroke Impact Scale (-)

Hayward et al. (2013) Pilot RCT (7) NStart=10 NEnd=8 TPS=Subacute A + B vs A/B *Primary listing: Table 16 (Robotics)*	E: SMART Arm + outcome-triggered (OT) electrical stimulation C: SMART arm alone Duration: 60min, 5d/wk, 4wks	E1/E2 vs C: Motor Assessment Scale 6 (+exp1/2) MAS7 (no stat) MAS8 (no stat) triceps strength (no stat) modified ashworth scale (no stat) tardieu scale (no stat) Ritchie articular index (no stat) SIS (no stat) E1 vs E2: Motor assessment scale 6 (-) MAS7 (no stat) MAS8 (no stat) triceps strength (no stat) modified ashworth scale (no stat) tardieu scale (no stat) Ritchie articular index (no stat) SIS (no stat)
Chouhan et al. (2012) RCT (6) NStart=45 NEnd=45 TPS=Subacute A vs B vs 0 *Primary listing: Table 14 (Music Therapy and Rhythmic Auditory Stimulation)*	E1: Rhythmic auditory cueing E2: Visual cueing C: Conventional therapy Duration: 2hr, 3x/wk for 3wk	E1 vs C: FMA (+exp1) E2 vs C: FMA (+exp2) E1 vs E2: FMA (-) Dynamic gait index
Cameirao et al. (2012) RCT (6) NStart=48 NEnd=44 TPS=Chronic A + B vs A + C vs A *Primary listing: Table 17 (Virtual Reality)*	E1: Virtual Relaity Game (Vision Based Tracking) E2: Virtual Reality (Haptic Feedback) E3: Virtual Reality (Exoskelton) Duration: 35min/d, 5d/wk, 4wks	E1 vs E2: Fugl-Meyer Arm (No stats) -Wrist/hand (No stats) , Chedoke Arm and Hand Activity Inventory (-) Box and Block Test (+exp2) E2 vs E3: Fugl-Meyer Arm (No stats) -Wrist/hand (No stats) Chedoke Arm and Hand Activity Inventory (-) Box and Block Test (+exp2) E1 vs E3: Fugl-Meyer Arm (No stats) -Wrist/hand Chedoke Arm and Hand Activity Inventory (-) Box and Block Test (-)
Kiper et al. (2011) RCT (5) NStart=80 NEnd=80 TPS=Not Reported A + B vs 0 *Primary listing: Table 17 (Virtual Reality)*	E: reinforced feedback in Virtual Reality environment + traditional neuromotor rehabilitation C: traditional neuromotor rehabilitation Duration: 1 hr RFVE and 1 hr TNR, 5d/wk for 4wks, 2 hr TNR 5d/wk for 4wks Control	E vs C: Fugl-Meyer Assessment Upper Extremity (+exp) Modified Ashworth scale (-) Functional Independence Measure Scale (+exp)
Rozario et al. (2009) RCT Crossover (6) NStart=5 NEnd=5	E: Robotic Therapy with Haptic/Visual Feedback C: Robotic Therapy With No Feedback	E vs C: Box and Block Test (No stats) Fugl-Meyer Assessment (No stats) Wolf Motor Function Test (No stats)

TPS=Chronic A + B vs A/B *Primary listing: Table 16 (Robotics)*	Duration: 40min, 3x/wk, 3wks/condition - 1wk washout	Range of Motion (No stats)
Cirstea et al. (2006) RCT (6) NStart=37 NEnd=37 TPS=Chronic A + B1 vs A + B2 vs 0 *Primary listing: Table 3 (Exercise and Strength Training)*	E1: Pointing exercise with feedback at end E2: Pointing exercise with feedback throughout C: Conventional care Duration: 1hr/session, 10sessions over 2wk	E1 vs C: FMA (no stats) TEMPA (no stats) CSI (-) Movement time (+exp1) Velocity (+exp1) Precision Variability (+exp1) E2 vs C: FMA (no stats) TEMPA (no stats) CSI (+exp2) movement time (+exp2) velocity (+exp2) precision variability (+exp2)
Platz et al. (2001) RCT (6) NStart=74 NEnd=60 TPS=Subacute A + B vs A/B vs 0 *Primary listing: Table 4 (Task-Specific Training)*	E1: Arm ability training with knowledge of results (feedback on their performance presented as charts to them) E2: arm ability training without knowledge of results C: Routine Rehab Duration: 5d/wk, 3wks	E1 vs E2: TEMPA (-) Kinematic analysis (-) E1/E2 vs C: TEMPA (+exp1, +exp2) Kinematic analysis (-)

Abbreviations and table notes: C=control group; D=days; E=experimental group; H=hours; Min=minutes; RCT=randomized controlled trial; TPS=time post stroke category (Acute: less than 30 days, Subacute: more than 1 month but less than 6 months, Chronic: over 6 months); Wk=weeks.

+exp indicates a statistically significant between groups difference at α=0.05 in favour of the experimental group

+exp1/+exp2/+exp3 indicates a statistically significant between groups difference at α=0.05 in favour of the first, second or third experimental group

+con indicates a statistically significant between groups difference at α=0.05 in favour of the control group

- indicates no statistically significant between groups differences at α=0.05

1. Body Functions and Structures

MOTOR FUNCTION			
LoE	**Conclusion Statement**	**RCTs**	**References**
1b	Repetitive motor task under vibratory feedback may produce greater improvements in motor function than Repetitive motor task.	1	Cruz et al. (2014)
2	There is conflicting evidence about the effect of Motion tracking device with virtual reality game when compared to Conventional therapy for improving motor function.	1	Lin et al. (2018a)
2	Motion tracking device with virtual reality game may result in lesser improvements in motor function when compared to Motion tracking device with braincomputer interface attention monitoring electroencephalogram device and virtual reality game.	1	Lin et al. (2018a)
1b	Wearable movement monitoring device (providing visual and audio feedback) may not have a difference in efficacy when compared to rehabilitation treatment for improving motor function.	1	Lin et al. (2018b)
1b	Pointing movement practice with feedback may produce greater improvements in motor function than Pointing movement practice without feedback.	1	Cirstea et al. (2007)

2	Upper limb control of less-affected side with real-time feedback may not have a difference in efficacy when compared to Upper limb control of affected side with real-time feedback for improving motor function.	1	Kim et al. (2024b)
2	Reinforced feedback in Virtual Reality environment with traditional neuromotor rehabilitation may produce greater improvements in motor function than traditional neuromotor rehabilitation.	1	Kiper et al. (2011)
1b	There is conflicting evidence about the effect of Arm ability training with knowledge of results (feedback on their performance presented as charts to them) when compared to Rehab for improving motor function.	1	Platz et al. (2001)
1b	Arm ability training with knowledge of results (feedback on their performance presented as charts to them) may not have a difference in efficacy when compared to arm ability training without knowledge of results for improving motor function.	1	Platz et al. (2001)
1b	Rhythmic auditory cueing may produce greater improvements in motor function than Conventional therapy.	1	Chouhan et al. (2012)
1b	Rhythmic auditory cueing may not have a difference in efficacy when compared to Visual cueing for improving motor function.	1	Chouhan et al. (2012)
1b	Bilateral Isometric Handgrip Force Training with Visual Feedback may produce greater improvements in motor function than Therapy.	1	Lin et al. (2015)
1b	Pointing exercise with feedback at end may produce greater improvements in motor function than Conventional care.	1	Cirstea et al. (2006)
1b	Robot Assisted Arm Training with high inertia (RAT-WAM) may not have a difference in efficacy when compared to Robot Assisted Arm Training with low-inertia Proficio (RAT-P) for improving motor function.	1	Cho & Song (2020)
1b	Robot therapy with assistance as needed may produce greater improvements in motor function than Robot therapy with guidance forces all times.	1	Cho et al. (2019)
2	AMES robot with torque biofeedback and muscle vibration may not have a difference in efficacy when compared to AMES robot with electromyography biofeedback and muscle vibration for improving motor function.	1	Cordo et al. (2013)
1b	Virtual reality training (ArmeoSenso with monetary feedback rewards) and conventional care may not have a difference in efficacy when compared to virtual reality training (without rewards) with conventional care for improving motor function.	1	Widmer et al. (2022)
1b	Teacher-supervised Virtual reality with conventional rehab may not have a difference in efficacy when compared to Non-supervised virtual reality with conventional rehab for improving motor function.	1	Salvalaggio et al. (2022)
1b	Virtual reality games with Audio feedback and conventional therapy may not have a difference in efficacy when compared to Conventional Rehab for improving motor function.	1	Kuo et al. (2023b)
1b	Autonomy support (training with more-affected arm and could actively adjust task difficulty) with Verbal feedback may not have a difference in efficacy when compared to Training with more-affected arm with no opportunity to adjust difficulty with General verbal feedback for improving motor function.	1	Kim et al. (2023c)
1b	Cycling exercise with feedback and Conventional therapy may not have a difference in efficacy when compared to Conventional therapy for improving motor function.	1	Simic-Panic et al. (2024)
1b	Visual feedback therapy may produce greater improvements in motor function than conventional therapy.	1	Zhu et al. (2020)

2	There is conflicting evidence about the effect of Augmented feedback training combined with other interventions when compared to conventional therapy for improving motor function.	1	Feingold-Polak et al. (2024)
2	Reach-To-Grasp with robot feedback with Conventional therapy may not have a difference in efficacy when compared to Reach-To-Grasp with computer feedback with Conventional therapy for improving motor function.	1	Feingold-Polak et al. (2024)
2	Trunk Restraint Training with auditory feedback may not have a difference in efficacy when compared to Trunk Restraint Training with tactile feedback for improving motor function.	1	Thielman et al. (2010)
1b	MCIMT with auditory feedback may produce greater improvements in motor function than mCIMT alone.	1	Bang et al. (2016)
1b	Spatial target reaching training based on visual biofeedback with Routine therapy may produce greater improvements in motor function than Routine Therapy.	1	Kim et al. (2015b)

STROKE SEVERITY			
LoE	**Conclusion Statement**	**RCTs**	**References**
1b	Virtual reality training (ArmeoSenso with monetary feedback rewards) and conventional care may not have a difference in efficacy when compared to virtual reality training (without rewards) with conventional care for improving stroke severity.	1	Widmer et al. (2022)
1b	There is conflicting evidence about the effect of Cycling exercise with feedback and Conventional therapy when compared to Conventional therapy for improving stroke severity.	1	Simic-Panic et al. (2024)

MUSCLE STRENGTH			
LoE	**Conclusion Statement**	**RCTs**	**References**
2	There is conflicting evidence about the effect of Upper limb control of less-affected side with real-time feedback when compared to Upper limb control of affected side with real-time feedback for improving muscle strength.	1	Kim et al. (2024b)
1b	Virtual reality games with Audio feedback and conventional therapy may not have a difference in efficacy when compared to Conventional Rehab for improving muscle strength.	1	Kuo et al. (2023b)
2	Trunk Restraint Training with auditory feedback may not have a difference in efficacy when compared to Trunk Restraint Training with tactile feedback for improving muscle strength.	1	Thielman et al. (2010)

SPASTICITY			
LoE	**Conclusion Statement**	**RCTs**	**References**
1b	Pointing movement practice with feedback may not have a difference in efficacy when compared to Pointing movement practice without feedback for improving spasticity.	1	Cirstea et al. (2007)
2	Reinforced feedback in Virtual Reality environment with traditional neuromotor rehabilitation may not have a difference in efficacy when compared to traditional neuromotor rehabilitation for improving spasticity.	1	Kiper et al. (2011)
1b	There is conflicting evidence about the effect of Pointing exercise with feedback at end when compared to Conventional care for improving spasticity.	1	Cirstea et al. (2006)

1b	Teacher-supervised Virtual reality with conventional rehab may not have a difference in efficacy when compared to Non-supervised virtual reality with conventional rehab for improving spasticity.	1	Salvalaggio et al. (2022)
1b	Cycling exercise with feedback and Conventional therapy may produce greater improvements in spasticity than Conventional therapy.	1	Simic-Panic et al. (2024)
1b	MCIMT with auditory feedback may not have a difference in efficacy when compared to mCIMT alone for improving spasticity.	1	Bang et al. (2016)

RANGE OF MOTION			
LoE	**Conclusion Statement**	**RCTs**	**References**
1b	Repetitive motor task under vibratory feedback may not have a difference in efficacy when compared to Repetitive motor task for improving range of motion.	1	Cruz et al. (2014)
1b	There is conflicting evidence about the effect of Wearable movement monitoring device (providing visual and audio feedback) when compared to rehabilitation treatment for improving range of motion.	1	Lin et al. (2018b)
2	There is conflicting evidence about the effect of Upper limb control of less-affected side with real-time feedback when compared to Upper limb control of affected side with real-time feedback for improving range of motion.	1	Kim et al. (2024b)
1b	Virtual reality games with Audio feedback and conventional therapy may not have a difference in efficacy when compared to Conventional Rehab for improving range of motion.	1	Kuo et al. (2023b)
1b	Virtual reality training (ArmeoSenso with monetary feedback rewards) and conventional care may not have a difference in efficacy when compared to virtual reality training (without rewards) with conventional care for improving range of motion.	1	Widmer et al. (2022)
2	Trunk Restraint Training with auditory feedback may not have a difference in efficacy when compared to Trunk Restraint Training with tactile feedback for improving range of motion.	1	Thielman et al. (2010)

2. Activities

ACTIVITIES OF DAILY LIVING			
LoE	**Conclusion Statement**	**RCTs**	**References**
2	Reinforced feedback in Virtual Reality environment with traditional neuromotor rehabilitation may produce greater improvements in performance of activities of daily living than traditional neuromotor rehabilitation.	1	Kiper et al. (2011)
1b	Bilateral Isometric Handgrip Force Training with Visual Feedback may produce greater improvements in performance of activities of daily living than Therapy.	1	Lin et al. (2015)
1b	Virtual reality training (ArmeoSenso with monetary feedback rewards) and conventional care may not have a difference in efficacy when compared to virtual reality training (without rewards) with conventional care for improving performance of activities of daily living.	1	Widmer et al. (2022)
1b	Teacher-supervised Virtual reality with conventional rehab may not have a difference in efficacy when compared to Non-supervised virtual reality with conventional rehab for improving performance of activities of daily living.	1	Salvalaggio et al. (2022)

1b	Autonomy support (training with more-affected arm and could actively adjust task difficulty) with Verbal feedback may not have a difference in efficacy when compared to Training with more-affected arm with no opportunity to adjust difficulty with General verbal feedback for improving performance of activities of daily living.	1	Kim et al. (2023c)
1b	Cycling exercise with feedback and Conventional therapy may not have a difference in efficacy when compared to Conventional therapy for improving performance of activities of daily living.	1	Simic-Panic et al. (2024)
2	Upper limb control of less-affected side with real-time feedback may produce greater improvements in performance of activities of daily living than Upper limb control of affected side with real-time feedback.	1	Kim et al. (2024b)
1b	Visual feedback therapy may produce greater improvements in performance of activities of daily living than conventional therapy.	1	Zhu et al. (2020)
2	Augmented feedback training combined with other interventions may not have a difference in efficacy when compared to conventional therapy for improving performance of activities of daily living.	1	Feingold-Polak et al. (2024)
2	Trunk Restraint Training with auditory feedback may not have a difference in efficacy when compared to Trunk Restraint Training with tactile feedback for improving performance of activities of daily living.	1	Thielman et al. (2010)
1b	MCIMT with auditory feedback may produce greater improvements in performance of activities of daily living than mCIMT alone.	1	Bang et al. (2016)
1b	SMART Arm with outcome-triggered (OT) electrical stimulation may produce greater improvements in performance of activities of daily living than SMART arm alone.	1	Hayward et al. (2013)

DEXTERITY			
LoE	**Conclusion Statement**	**RCTs**	**References**
1b	Robot Assisted Arm Training with high inertia (RAT-WAM) may not have a difference in efficacy when compared to Robot Assisted Arm Training with low-inertia Proficio (RAT-P) for improving dexterity.	1	Cho & Song (2020)
1b	Robot therapy with assistance as needed may not have a difference in efficacy when compared to Robot therapy with guidance forces all times for improving dexterity.	1	Cho et al. (2019)
2	AMES robot with torque biofeedback and muscle vibration may not have a difference in efficacy when compared to AMES robot with electromyography biofeedback and muscle vibration for improving dexterity.	1	Cordo et al. (2013)
1b	Virtual Relaity Game (Vision Based Tracking) may result in lesser improvements in dexterity when compared to Virtual Reality (Haptic Feedback).	1	Cameirao et al. (2012)
1b	Virtual Reality (Haptic Feedback) may produce greater improvements in dexterity than Virtual Reality (Exoskelton).	1	Cameirao et al. (2012)
1b	Virtual Relaity Game (Vision Based Tracking) may not have a difference in efficacy when compared to Virtual Reality (Exoskelton) for improving dexterity.	1	Cameirao et al. (2012)
1b	Virtual reality training (ArmeoSenso with monetary feedback rewards) and conventional care may produce greater improvements in dexterity than virtual reality training (without rewards) with conventional care.	1	Widmer et al. (2022)
1b	Teacher-supervised Virtual reality with conventional rehab may not have a difference in efficacy when compared to Non-supervised virtual reality with conventional rehab for improving dexterity.	1	Salvalaggio et al. (2022)

1b	Virtual reality games with Audio feedback and conventional therapy may produce greater improvements in dexterity than Conventional Rehab.	1	Kuo et al. (2023b)
1b	Visual feedback correction with conventional therapy may not have a difference in efficacy when compared to Placebo video treatment with conventional therapy for improving dexterity.	1	Ojardias et al. (2024)

Key Points

- Repetitive motor task under vibratory feedback may be beneficial for improving motor function, but not range of motion, after stroke when compared to Repetitive motor task.
- The literature is mixed regarding the effect of Motion tracking device with virtual reality game on improvement of motor function after stroke when compared to Conventional therapy.
- Motion tracking device with virtual reality game may be less beneficial than Motion tracking device with braincomputer interface attention monitoring electroencephalogram device and virtual reality game for improving motor function after stroke.
- Wearable movement monitoring device (providing visual and audio feedback) may not be beneficial for improving motor function after stroke when compared to rehabilitation treatment; the literature is mixed regarding range of motion.
- Pointing movement practice with feedback may be beneficial for improving motor function, but not spasticity, after stroke when compared to Pointing movement practice without feedback.
- Upper limb control of less-affected side with real-time feedback may be beneficial for improving performance of activities of daily living, but not motor function, after stroke when compared to Upper limb control of affected side with real-time feedback; the literature is mixed regarding range of motion and muscle strength.
- Reinforced feedback in Virtual Reality environment with traditional neuromotor rehabilitation may be beneficial for improving motor function and performance of activities of daily living, but not spasticity, after stroke when compared to traditional neuromotor rehabilitation.
- The literature is mixed regarding the effect of Arm ability training with knowledge of results (feedback on their performance presented as charts to them) on improvement of motor function after stroke when compared to Rehab.
- Arm ability training with knowledge of results (feedback on their performance presented as charts to them) may not be beneficial for improving motor function after stroke when compared to arm ability training without knowledge of results.
- Rhythmic auditory cueing may be beneficial for improving motor function after stroke when compared to Conventional therapy.
- Rhythmic auditory cueing may not be beneficial for improving motor function after stroke when compared to Visual cueing.
- Bilateral Isometric Handgrip Force Training with Visual Feedback may be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Therapy.
- Pointing exercise with feedback at end may be beneficial for improving motor function after stroke when compared to Conventional care; the literature is mixed regarding spasticity.
- Robot Assisted Arm Training with high inertia (RAT-WAM) may not be beneficial for improving motor function and dexterity after stroke when compared to Robot Assisted Arm Training with low-inertia Proficio (RAT-P).
- Robot therapy with assistance as needed may be beneficial for improving motor function, but not dexterity, after stroke when compared to Robot therapy with guidance forces all times.
- AMES robot with torque biofeedback and muscle vibration may not be beneficial for improving motor function and dexterity after stroke when compared to AMES robot with electromyography biofeedback and muscle vibration.
- Virtual reality training (ArmeoSenso with monetary feedback rewards) and conventional care may be beneficial for improving dexterity, but not motor function, performance of activities of daily living, range of

motion, and stroke severity, after stroke when compared to virtual reality training (without rewards) with conventional care.

- Teacher-supervised Virtual reality with conventional rehab may not be beneficial for improving motor function, dexterity, performance of activities of daily living, and spasticity after stroke when compared to Non-supervised virtual reality with conventional rehab.
- Virtual reality games with Audio feedback and conventional therapy may be beneficial for improving dexterity, but not motor function, range of motion, and muscle strength, after stroke when compared to Conventional Rehab.
- Autonomy support (training with more-affected arm and could actively adjust task difficulty) with Verbal feedback may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Training with more-affected arm with no opportunity to adjust difficulty with General verbal feedback.
- Cycling exercise with feedback and Conventional therapy may be beneficial for improving spasticity, but not motor function and performance of activities of daily living, after stroke when compared to Conventional therapy; the literature is mixed regarding stroke severity.
- Visual feedback therapy may be beneficial for improving motor function and performance of activities of daily living after stroke when compared to conventional therapy.
- Virtual Relaity Game (Vision Based Tracking) may be less beneficial than Virtual Reality (Haptic Feedback) for improving dexterity after stroke.
- Virtual Reality (Haptic Feedback) may be beneficial for improving dexterity after stroke when compared to Virtual Reality (Exoskelton).
- Virtual Relaity Game (Vision Based Tracking) may not be beneficial for improving dexterity after stroke when compared to Virtual Reality (Exoskelton).
- Reach-To-Grasp with robot feedback with Conventional therapy may not be beneficial for improving motor function after stroke when compared to Reach-To-Grasp with computer feedback with Conventional therapy.
- Visual feedback correction with conventional therapy may not be beneficial for improving dexterity after stroke when compared to Placebo video treatment with conventional therapy.
- Trunk Restraint Training with auditory feedback may not be beneficial for improving motor function, muscle strength, range of motion, and performance of activities of daily living after stroke when compared to Trunk Restraint Training with tactile feedback.
- Augmented feedback training combined with other interventions may not be beneficial for improving performance of activities of daily living after stroke when compared to conventional therapy; the literature is mixed regarding motor function.
- MCIMT with auditory feedback may be beneficial for improving motor function and performance of activities of daily living, but not spasticity, after stroke when compared to mCIMT alone.
- Spatial target reaching training based on visual biofeedback with Routine therapy may be beneficial for improving motor function after stroke when compared to Routine Therapy.
- SMART Arm with outcome-triggered (OT) electrical stimulation may be beneficial for improving performance of activities of daily living after stroke when compared to SMART arm alone.

Summary of Key Points: Feedback-Based Training

Intervention	Control(s)	Function domain(s)	Effect
Repetitive motor task under vibratory feedback	Repetitive motor task	Motor function	+
Repetitive motor task under vibratory feedback	Repetitive motor task	Range of motion	–
Motion tracking device with virtual reality game	Conventional therapy	Motor function	=
Motion tracking device with virtual reality game	Motion tracking device with braincomputer interface attention	Motor function	–

	monitoring electroencephalogram device and virtual reality game		
Wearable movement monitoring device (providing visual and audio feedback)	rehabilitation treatment	Motor function	–
Wearable movement monitoring device (providing visual and audio feedback)	rehabilitation treatment	Range of motion	=
Pointing movement practice with feedback	Pointing movement practice without feedback	Motor function	+
Pointing movement practice with feedback	Pointing movement practice without feedback	Spasticity	–
Upper limb control of less-affected side with real-time feedback	Upper limb control of affected side with real-time feedback	Performance of activities of daily living	+
Upper limb control of less-affected side with real-time feedback	Upper limb control of affected side with real-time feedback	Motor function	–
Upper limb control of less-affected side with real-time feedback	Upper limb control of affected side with real-time feedback	Range of motion, muscle strength	=
Reinforced feedback in Virtual Reality environment with traditional neuromotor rehabilitation	traditional neuromotor rehabilitation	Motor function, performance of activities of daily living	+
Reinforced feedback in Virtual Reality environment with traditional neuromotor rehabilitation	traditional neuromotor rehabilitation	Spasticity	–
Arm ability training with knowledge of results (feedback on their performance presented as charts to them)	Rehab	Motor function	=
Arm ability training with knowledge of results (feedback on their performance presented as charts to them)	arm ability training without knowledge of results	Motor function	–
Rhythmic auditory cueing	Conventional therapy	Motor function	+
Rhythmic auditory cueing	Visual cueing	Motor function	–
Bilateral Isometric Handgrip Force Training with Visual Feedback	Therapy	Motor function, performance of activities of daily living	+
Pointing exercise with feedback at end	Conventional care	Motor function	+
Pointing exercise with feedback at end	Conventional care	Spasticity	=
Robot Assisted Arm Training with high inertia (RAT-WAM)	Robot Assisted Arm Training with low-inertia Proficio (RAT-P)	Motor function, dexterity	–
Robot therapy with assistance as needed	Robot therapy with guidance forces all times	Motor function	+
Robot therapy with assistance as needed	Robot therapy with guidance forces all times	Dexterity	–
AMES robot with torque biofeedback and muscle vibration	AMES robot with electromyography biofeedback and muscle vibration	Motor function, dexterity	–
Virtual reality training (ArmeoSenso with monetary feedback rewards) and conventional care	virtual reality training (without rewards) with conventional care	Dexterity	+

Virtual reality training (ArmeoSenso with monetary feedback rewards) and conventional care	virtual reality training (without rewards) with conventional care	Motor function, performance of activities of daily living, range of motion, stroke severity	–
Teacher-supervised Virtual reality with conventional rehab	Non-supervised virtual reality with conventional rehab	Motor function, dexterity, performance of activities of daily living, spasticity	–
Virtual reality games with Audio feedback and conventional therapy	Conventional Rehab	Dexterity	+
Virtual reality games with Audio feedback and conventional therapy	Conventional Rehab	Motor function, range of motion, muscle strength	–
Autonomy support (training with more-affected arm and could actively adjust task difficulty) with Verbal feedback	Training with more-affected arm with no opportunity to adjust difficulty with General verbal feedback	Motor function, performance of activities of daily living	–
Cycling exercise with feedback and Conventional therapy	Conventional therapy	Spasticity	+
Cycling exercise with feedback and Conventional therapy	Conventional therapy	Motor function, performance of activities of daily living	–
Cycling exercise with feedback and Conventional therapy	Conventional therapy	Stroke severity	=
Visual feedback therapy	conventional therapy	Motor function, performance of activities of daily living	+
Virtual Relaity Game (Vision Based Tracking)	Virtual Reality (Haptic Feedback)	Dexterity	–
Virtual Reality (Haptic Feedback)	Virtual Reality (Exoskelton)	Dexterity	+
Virtual Relaity Game (Vision Based Tracking)	Virtual Reality (Exoskelton)	Dexterity	–
Reach-To-Grasp with robot feedback with Conventional therapy	Reach-To-Grasp with computer feedback with Conventional therapy	Motor function	–
Visual feedback correction with conventional therapy	Placebo video treatment with conventional therapy	Dexterity	–
Trunk Restraint Training with auditory feedback	Trunk Restraint Training with tactile feedback	Motor function, muscle strength, range of motion, performance of activities of daily living	–
Augmented feedback training combined with other interventions	conventional therapy	Performance of activities of daily living	–
Augmented feedback training combined with other interventions	conventional therapy	Motor function	=
MCIMT with auditory feedback	mCIMT alone	Motor function, performance of activities of daily living	+
MCIMT with auditory feedback	mCIMT alone	Spasticity	–
Spatial target reaching training based on visual biofeedback with Routine therapy	Routine Therapy	Motor function	+
SMART Arm with outcome-triggered (OT) electrical stimulation	SMART arm alone	Performance of activities of daily living	+

Wearable Cueing and Reminder Devices



Adapted from: https://unsplash.com/photos/a-man-holding-a-smart-watch-in-his-hand-gcenoFmEdbQ

Wearable cueing devices provide vibratory, auditory or visual reminders that prompt stroke survivors to use or move the affected upper limb during daily activities.

A total of four RCTs were found that evaluated wearable cueing and reminder devices for upper extremity motor rehabilitation. One RCT compared wearable cueing and reminder devices with conventional therapy (Wei et al. (2019b)). One RCT compared wearable cueing and reminder devices combined with other interventions with sham or exercise and custom physiotherapy protocols (Schwerz de Lucena et al. (2022)). One RCT compared wearable cueing and reminder devices with no treatment (Proffitt et al. (2021)). One RCT compared wearable cueing and reminder devices with sham (Da-Silva et al. (2019)).

In addition, 4 RCTs in which wearable cueing and reminder devices formed part of a combined or comparative intervention are cross-referenced at the end of Table 21; their primary listings appear in other tables.

The methodological details and results of all four RCTs are presented in Table 21.

Table 21. RCTs Evaluating Wearable Cueing and Reminder Devices for Upper Extremity Motor Rehabilitation

Authors (Year) **Study Design (PEDro Score)** **Sample Size start** **Sample Size end** **Time post stroke category** **Study design**	**Interventions** **Duration: Session length, frequency per week for total number of weeks**	**Outcome Measures** **Result (direction of effect)**
Wearable cueing and reminder devices compared to conventional therapy		
Wei et al. (2019b) RCT (6) NStart=84 NEnd=69 TPS=Subacute A vs 0	E1: Remind to Move group (using cueing wristwatch device) E2: Sham device C: usual care Duration: 3hr/d, 4wk using devices	E1/E2 vs C: Action research arm test (+exp1) Motor activity log AUO (-) AOM (-) Fugl-Meyer Assessment (-) Box and Block Test (-) Functional independence measure (-) E1 vs E2: Action research arm test (+exp1) average movement amount (+exp1) Motor activity log AUO (-) AOM (-) Fugl-Meyer Assessment (-) Box and Block Test (-) Functional independence measure (-)

Wearable cueing and reminder devices combined with other interventions compared to sham or exercise and custom physiotherapy protocols		
Schwerz de Lucena et al. (2022) RCT (7) NStart=22 NEnd=20 TPS=Chronic A + B vs A/B *Also in Table 3 (Exercise and Strength Training)*	E: Cueing/remind to move + exercise/custom physiotherapy protocols C: Sham + exercise/custom physiotherapy protocols Duration: 135min/wk, 7 days/wk, 3wks	E vs C: BBT (-) FMA-UE (-) ARAT (-) NIHSS (-) grip strength/force (-) pinch strength/force (-) MAL (-)
Wearable cueing and reminder devices compared to no treatment		
Proffitt et al. (2021) Pilot RCT (5) NStart=5 NEnd=5 TPS=Chronic A vs 0	E: Lee Silverman Voice Treatment-BIG C: No Therapy (Waitlist) Duration: 1h/d, 4d/wk, 4wks	E vs C: Wolf Motor Function Test Task Time (No stats/data) Average Functional Ability Score (No stats/data) Participant Ratings on Canadian Occupational Performance Measure of Satisfaction and Performance (No stats/data) Self-Reported Mobility (No stats/data) Performance assessment of self-care skills PROMIS-43 AROM MaS (no stats)
Wearable cueing and reminder devices compared to sham		
Da-Silva et al. (2019) Pilot RCT (3) NStart=33 NEnd=27 TPS=Acute A vs 0	E: Prompting wristband C: Sham wristband Duration: 12hr/d, 4wk	E vs C: Action Research Arm Test (no stats) Motricity Index Arm (no stats) Motor Activity Log (no stats) National Institutes of Health Stroke Scale (no stats) Barthel Index (no stats) Modified Rankin Scale (no stats) Pain Visual Analogue Scale (no stats) Fatigue Visual Analogue Scale (no stats) Star Cancellation Test (no stats)
Cross-Referenced RCTs: Combined or Comparative Interventions Involving Wearable Cueing and Reminder Devices (results included in this table's levels of evidence)		
Mayrhuber et al. (2024) RCT (5) NStart=42 NEnd=23 TPS=Not Reported A + B vs A/B *Primary listing: Table 3 (Exercise and Strength Training)*	E: Home-based custom exercise program + Visual feedback + Vibrotactile Reminders C: Home-based custom exercise program Duration: 6 Weeks	E vs C: MAL AOU (-) QOM (-) FMA-UE (-) ARAT (-) MRS (-) EQ-5D-5L index value (-) VAS (-) global rating of Perceived Changes (-) Affected arm use (+exp)

		Arm use ratio (-) Percentage of Time active (-)
Stuerner et al. (2023) RCT (7) NStart=60 NEnd=60 TPS=Subacute A + B + C vs A/A + B vs 0 *Primary listing: Table 11 (Mental Practice)*	E1: Motor Imagery + Audio Feedback + Task Specific Training E2: Motor imagery + TST C: Task-specific Training Duration: 30min/1 session	E1 vs C: Mental chronometry MC (motor execution time- motor imagery time / motor execution time while doing BBT) (+exp1) BBT (-) E2 vs C: Mental chronometry MC (-) BBT (-) E1 vs E2: Mental chronometry MC (+exp1) BBT (-)
Kim et al. (2023b) RCT (6) NStart=38 NEnd=38 TPS=Chronic A + B vs A/B *Primary listing: Table 16 (Robotics)*	E: Neuro-X (Robotic exoskeleton) + Visual and Audio feedback C: Neuro-X (Robotic exoskeleton) Duration: 35 mins/d, 5d/wk, for 4 wks	E vs C: FMA-UE (+exp) BBT (+exp) FIM (+exp) MMST (-) Modified Ashworth Scale (-) BRS (-)
Gomes et al. (2021) Pilot RCT (5) NStart=12 NEnd=12 TPS=Chronic A + B1 vs A + B2 *Primary listing: Table 4 (Task-Specific Training)*	E1: Reach-Pointing + Internal Focus E2: Reach-Pointing + External Focus E3: Reach-Hold-Fit + Internal Focus E4: Reach-Hold-Fit + External Focus Duration: 10min/d, 1d/wk, 1 wk wash out period	E1 vs E2: Motor Behaviour ; - Movement Time (+exp1) ; - Velocity (+exp 1) ; - Peak Velocity (-) E3 vs E4: Motor Behaviour Movement Time (+exp3) Velocity (+exp3) Peak Velocity (-)

Abbreviations and table notes: C=control group; D=days; E=experimental group; H=hours; Min=minutes; RCT=randomized controlled trial; TPS=time post stroke category (Acute: less than 30 days, Subacute: more than 1 month but less than 6 months, Chronic: over 6 months); Wk=weeks.

+exp indicates a statistically significant between groups difference at α=0.05 in favour of the experimental group

+exp1/+exp2/+exp3 indicates a statistically significant between groups difference at α=0.05 in favour of the first, second or third experimental group

+con indicates a statistically significant between groups difference at α=0.05 in favour of the control group

- indicates no statistically significant between groups differences at α=0.05

1. Body Functions and Structures

MOTOR FUNCTION			
LoE	**Conclusion Statement**	**RCTs**	**References**
1b	There is conflicting evidence about the effect of Remind to Move group (using cueing wristwatch device) when compared to usual care for improving motor function.	1	Wei et al. (2019b)
1b	There is conflicting evidence about the effect of Remind to Move group (using cueing wristwatch device) when compared to Sham device for improving motor function.	1	Wei et al. (2019b)
1b	Cueing or remind to move with exercise or custom physiotherapy protocols may not have a difference in efficacy when compared to Sham with exercise or custom physiotherapy protocols for improving motor function.	1	Schwerz de Lucena et al. (2022)

1b	Neuro-X (Robotic exoskeleton) with Visual and Audio feedback may produce greater improvements in motor function than Neuro-X (Robotic exoskeleton).	1	Kim et al. (2023b)
2	Home-based custom exercise program with Visual feedback and Vibrotactile Reminders may not have a difference in efficacy when compared to Home-based custom exercise program for improving motor function.	1	Mayrhuber et al. (2024)

STROKE SEVERITY			
LoE	**Conclusion Statement**	**RCTs**	**References**
1b	Cueing or remind to move with exercise or custom physiotherapy protocols may not have a difference in efficacy when compared to Sham with exercise or custom physiotherapy protocols for improving stroke severity.	1	Schwerz de Lucena et al. (2022)
1b	Neuro-X (Robotic exoskeleton) with Visual and Audio feedback may not have a difference in efficacy when compared to Neuro-X (Robotic exoskeleton) for improving stroke severity.	1	Kim et al. (2023b)
2	Home-based custom exercise program with Visual feedback and Vibrotactile Reminders may not have a difference in efficacy when compared to Home-based custom exercise program for improving stroke severity.	1	Mayrhuber et al. (2024)

MUSCLE STRENGTH			
LoE	**Conclusion Statement**	**RCTs**	**References**
1b	Cueing or remind to move with exercise or custom physiotherapy protocols may not have a difference in efficacy when compared to Sham with exercise or custom physiotherapy protocols for improving muscle strength.	1	Schwerz de Lucena et al. (2022)
1b	Neuro-X (Robotic exoskeleton) with Visual and Audio feedback may not have a difference in efficacy when compared to Neuro-X (Robotic exoskeleton) for improving muscle strength.	1	Kim et al. (2023b)

SPASTICITY			
LoE	**Conclusion Statement**	**RCTs**	**References**
1b	Neuro-X (Robotic exoskeleton) with Visual and Audio feedback may not have a difference in efficacy when compared to Neuro-X (Robotic exoskeleton) for improving spasticity.	1	Kim et al. (2023b)

2. Activities

ACTIVITIES OF DAILY LIVING			
LoE	**Conclusion Statement**	**RCTs**	**References**
1b	Remind to Move group (using cueing wristwatch device) may not have a difference in efficacy when compared to usual care for improving performance of activities of daily living.	1	Wei et al. (2019b)
1b	Remind to Move group (using cueing wristwatch device) may not have a difference in efficacy when compared to Sham device for improving performance of activities of daily living.	1	Wei et al. (2019b)
1b	Cueing or remind to move with exercise or custom physiotherapy protocols may not have a difference in efficacy when compared to Sham with exercise or custom physiotherapy protocols for improving performance of activities of daily living.	1	Schwerz de Lucena et al. (2022)

1b	Neuro-X (Robotic exoskeleton) with Visual and Audio feedback may produce greater improvements in performance of activities of daily living than Neuro-X (Robotic exoskeleton).	1	Kim et al. (2023b)
2	Home-based custom exercise program with Visual feedback and Vibrotactile Reminders may not have a difference in efficacy when compared to Home-based custom exercise program for improving performance of activities of daily living.	1	Mayrhuber et al. (2024)

DEXTERITY			
LoE	**Conclusion Statement**	**RCTs**	**References**
1b	Remind to Move group (using cueing wristwatch device) may not have a difference in efficacy when compared to usual care for improving dexterity.	1	Wei et al. (2019b)
1b	Remind to Move group (using cueing wristwatch device) may not have a difference in efficacy when compared to Sham device for improving dexterity.	1	Wei et al. (2019b)
1b	Cueing or remind to move with exercise or custom physiotherapy protocols may not have a difference in efficacy when compared to Sham with exercise or custom physiotherapy protocols for improving dexterity.	1	Schwerz de Lucena et al. (2022)
1b	Motor Imagery with Audio Feedback and Task Specific Training may not have a difference in efficacy when compared to Task-specific Training for improving dexterity.	1	Stuerner et al. (2023)
1b	Motor Imagery with Audio Feedback and Task Specific Training may not have a difference in efficacy when compared to Motor imagery with TST for improving dexterity.	1	Stuerner et al. (2023)
1b	Neuro-X (Robotic exoskeleton) with Visual and Audio feedback may produce greater improvements in dexterity than Neuro-X (Robotic exoskeleton).	1	Kim et al. (2023b)

Key Points

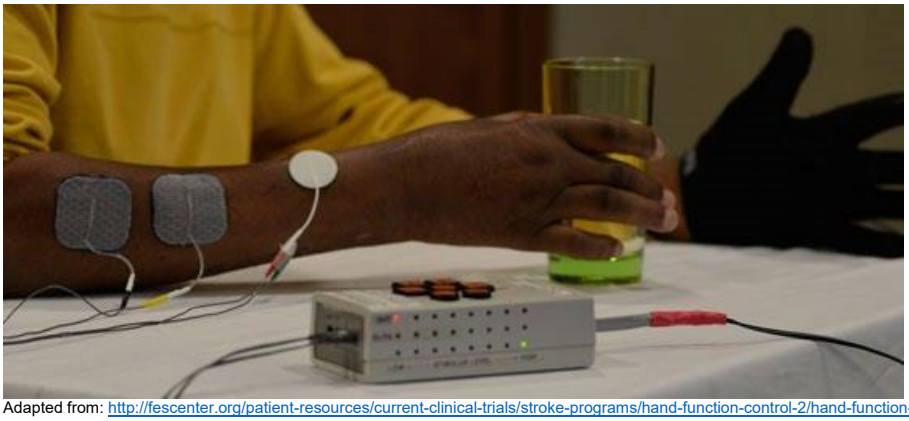
- Remind to Move group (using cueing wristwatch device) may not be beneficial for improving dexterity and performance of activities of daily living after stroke when compared to usual care; the literature is mixed regarding motor function.
- Remind to Move group (using cueing wristwatch device) may not be beneficial for improving dexterity and performance of activities of daily living after stroke when compared to Sham device; the literature is mixed regarding motor function.
- Cueing or remind to move with exercise or custom physiotherapy protocols may not be beneficial for improving motor function, dexterity, performance of activities of daily living, stroke severity, and muscle strength after stroke when compared to Sham with exercise or custom physiotherapy protocols.
- Neuro-X (Robotic exoskeleton) with Visual and Audio feedback may be beneficial for improving motor function, dexterity, and performance of activities of daily living, but not spasticity, stroke severity, and muscle strength, after stroke when compared to Neuro-X (Robotic exoskeleton).
- Home-based custom exercise program with Visual feedback and Vibrotactile Reminders may not be beneficial for improving motor function, performance of activities of daily living, and stroke severity after stroke when compared to Home-based custom exercise program.
- Motor Imagery with Audio Feedback and Task Specific Training may not be beneficial for improving dexterity after stroke when compared to Task-specific Training.
- Motor Imagery with Audio Feedback and Task Specific Training may not be beneficial for improving dexterity after stroke when compared to Motor imagery with TST.

Summary of Key Points: Wearable Cueing and Reminder Devices

Intervention	Control(s)	Function domain(s)	Effect
Remind to Move group (using cueing wristwatch device)	usual care	Dexterity, performance of activities of daily living	–
Remind to Move group (using cueing wristwatch device)	usual care	Motor function	=
Remind to Move group (using cueing wristwatch device)	Sham device	Dexterity, performance of activities of daily living	–
Remind to Move group (using cueing wristwatch device)	Sham device	Motor function	=
Cueing or remind to move with exercise or custom physiotherapy protocols	Sham with exercise or custom physiotherapy protocols	Motor function, dexterity, performance of activities of daily living, stroke severity, muscle strength	–
Neuro-X (Robotic exoskeleton) with Visual and Audio feedback	Neuro-X (Robotic exoskeleton)	Motor function, dexterity, performance of activities of daily living	+
Neuro-X (Robotic exoskeleton) with Visual and Audio feedback	Neuro-X (Robotic exoskeleton)	Spasticity, stroke severity, muscle strength	–
Home-based custom exercise program with Visual feedback and Vibrotactile Reminders	Home-based custom exercise program	Motor function, performance of activities of daily living, stroke severity	–
Motor Imagery with Audio Feedback and Task Specific Training	Task-specific Training	Dexterity	–
Motor Imagery with Audio Feedback and Task Specific Training	Motor imagery with TST	Dexterity	–

Sensorimotor Stimulation

Neuromuscular Electrical Stimulation (NMES)



Adapted from: http://fescenter.org/patient-resources/current-clinical-trials/stroke-programs/hand-function-control-2/hand-function-control/

Neuromuscular electrical stimulation (NMES) is a technique used to generate muscle contractions in regions affected by hemiparesis by stimulating lower motor neurons involved in muscle movement through transcutaneous application of electrical currents (Monte-Silva et al. 2019; Allen & Goodman 2014). Three forms of NMES are available: 1. Cyclic NMES in which a muscle is repetitively stimulated at near maximum contraction on a pre-set schedule and patient participation is passive (Nascimento et al. 2014); 2. Electromyography (EMG) triggered NMES, a target muscle is directly controlled or triggered by volitional EMG activity from the target or a different muscle to elicit a desired stimulation (Monte-Silva at al. 2019); 3. Functional electrical stimulation (FES), which refers to the application of NMES to assist voluntary during a functional task (Eraifej et al. 2017).

A total of 105 RCTs were found that evaluated neuromuscular electrical stimulation (NMES) for upper extremity motor rehabilitation. Six RCTs compared different approaches to FES (Jeon et al. (2017); Manigandan et al. (2014); Page et al. (2012); Popovic et al. (2004); Wang et al. (2000); Packman-Braun et al. (1988)). Two RCTs evaluated FES combined with other interventions (Knutson et al. (2016); Kowalczewski et al. (2007)). One RCT compared FES combined with other interventions with sham or bilateral arm training (Chan et al. (2009)). Two RCTs compared neuromuscular electrical stimulation combined with other interventions with sham (Boyaci et al. (2013); Hesse et al. (1998)). Fourteen RCTs compared FES with conventional therapy (Fletcher-Smith et al. (2019); Karaahmet et al. (2019); Demir et al. (2018); NakipoğluYuzer et al. (2017); Sehndkar et al. (2016); Karakus et al. (2013); Fil et al. (2011); Tarkka et al. (2011); Koyuncu et al. (2010); Mangold et al. (2009); Hara et al. (2008); Thrasher et al. (2008); Popovic et al. (2003); Faghri et al. (1994)). Four RCTs compared FES combined with other interventions with fes (Knutson et al. (2024); Kumari et al. (2022); Halakoo et al. (2020); Li et al. (2014)). Three RCTs compared neuromuscular electrical stimulation with sham (Lavi et al. (2022); Church et al. (2006); Chae et al. (1998)). Thirteen RCTs compared neuromuscular electrical stimulation with conventional therapy (Kara et al. (2021); Sentandreu-Mañó et al. (2021); Tilkici et al. (2017); Turkkan et al. (2017); Cui et al. (2015); Mohamed Faisal et al. (2012); Prabhu et al. (2012); Rosewilliam et al. (2012); Lin et al. (2011); Hsu et al. (2010); Linn et al. (1999); Powell et al. (1999); Baker & Parker (1986)). Four RCTs compared FES combined with other interventions with neuromuscular electrical stimulation (Huang et al. (2021a); Knutson et al. (2020); Zheng et al. (2019); Shen et al. (2015)). Three RCTs evaluated neuromuscular electrical stimulation combined with other interventions (Chen et al. (2019a); Etoh et al. (2019); Wilson et al. (2016)). One RCT compared EMG-triggered NMES combined with other interventions with exercise and custom physiotherapy protocols (Gabr et al. (2005)). One RCT compared EMG-triggered NMES combined with other interventions with emg-triggered nmes or sham (Theilig et al. (2011)). Three RCTs compared neuromuscular electrical stimulation combined with other interventions with stretching and positioning programs (Mann et al. (2005); Cauraugh et al. (2003a); King et al. (1996)). Four RCTs compared FES combined with other interventions with task-specific training (Jonsdottir et al. (2017); Alon et al. (2008); Alon et al. (2007); Popovic et al. (2002)). Two RCTs compared neuromuscular electrical stimulation combined with other interventions with orthotics (Leung et al. (2012); Yu et al. (2004)). One RCT compared EMG-triggered NMES with sham (Kimberley et al. (2004)). One RCT compared FES combined with other interventions with neuromuscular electrical stimulation or task-specific training (Knutson et al. (2012)). Four RCTs compared different approaches to neuromuscular electrical stimulation (Maeda et al. (2024); Doucet & Griffin (2013); deKroon et al. (2008); deKroon et al. (2004)). One RCT compared neuromuscular electrical stimulation combined with other interventions with peripheral nerve stimulation (Chae et al. (2009)). One RCT compared FES combined with other interventions with fes or sham (Kim et al. (2014a)). Two RCTs compared EMG-triggered NMES combined with other interventions with emg-triggered nmes (Schick et al. (2017); Kim et al. (2016d)). One RCT compared different approaches to EMG-triggered NMES (Zhou et al. (2017)). Six RCTs compared neuromuscular electrical stimulation combined with other interventions with conventional therapy (Alazab I.M. et al. (2022); Ohnishi et al. (2022); Choudhury et al. (2020); Zhou et al. (2018); Baygutalp & Senel (2014); ShimodozoNo et al. (2014)). Three RCTs compared FES combined with other interventions with conventional therapy (Zhang et al. (2024b); Akter et al. (2023); Carda et al. (2017)). Three RCTs compared EMG-triggered NMES with conventional therapy (Dorsch et al. (2014); Shin et al. (2008); Cauraugh et al. (2000)). Five RCTs evaluated EMG-triggered NMES combined with other interventions (Chuang et al. (2017); Kojima et al. (2014); Cauraugh et al. (2011); Bhatt et al. (2007); Cauraugh & Kim (2002)). One RCT compared EMG-FES with conventional therapy (Hara et al. (2006)). One RCT compared neuromuscular electrical stimulation combined with other interventions with fes (Cunningham et al. (2019)). One RCT compared EMG-triggered NMES combined with other interventions with sham or bilateral arm training (Cauraugh & Kim (2003)). One RCT compared neuromuscular electrical stimulation combined with other interventions with transcutaneous electrical stimulation (tens) (Yurdakul et al. (2020)). One RCT compared neuromuscular electrical stimulation combined with other interventions with emg-triggered nmes or task-specific training (Schick et al. (2022)). One RCT compared FES with no treatment (Hohler et al. (2024)). One RCT compared EMG-triggered NMES combined with other interventions with neuromuscular electrical stimulation (Hong et al. (2021)). One RCT compared neuromuscular electrical stimulation combined with other interventions with neuromuscular electrical stimulation or mirror therapy (Yun et al. (2011)). One RCT compared fES with sham (Niu C.M. et al. (2022)). One RCT compared eMG-FES combined with other interventions with conventional therapy (Perini et al. (2020)). One RCT compared eMG-triggered NMES combined with other interventions with conventional therapy (Qian et al. (2017)). One RCT compared fES combined with other interventions with task-specific training or sham (Thorsen et al. (2013)). One RCT compared fES combined with other interventions with botulinum toxin (botox) or task-specific training (Weber et al. (2010)). One RCT compared eMG-triggered NMES combined with other interventions with strength training (Francisco et al. (1998)).

In addition, 63 RCTs in which neuromuscular electrical stimulation (NMES) formed part of a combined or comparative intervention are cross-referenced at the end of Table 22; their primary listings appear in other tables.

The methodological details and results of all 105 RCTs are presented in Table 22.

Table 22. RCTs Evaluating Neuromuscular Electrical Stimulation (NMES) for Upper Extremity Motor Rehabilitation

Authors (Year) **Study Design (PEDro Score)** **Sample Size start** **Sample Size end** **Time post stroke category** **Study design**	**Interventions** **Duration: Session length, frequency per week for total number of weeks**	**Outcome Measures** **Result (direction of effect)**
Different approaches to FES compared against one another		
Jeon et al. (2017) Pilot RCT (5) NStart=20 NEnd=20 TPS=Subacute A1 vs A2	E: EMG-Triggered FES C: Cyclic FES Duration: 30min/d, 5d/wk, 4wk task-oriented EMG stimulation or FES & 30min/d, 5d/wk, 4wks conventional therapy	E vs C: FMA (-) Shoulder subluxation (+exp) EMG muscle activation supraspinatus & posterior deltoid (+exp) VAS Pain (+exp)
Manigandan et al. (2014) RCT (5) NStart=24 NEnd=24 TPS=Subacute A1 vs A2	E: Electrical stimulation to supraspinatus, posterior deltoid and long head of biceps C: Electrical stimulation to supraspinatus and posterior deltoid Duration: 2x/d, 5d/wk for 5wk	E vs C: Shoulder subluxation (+con) Range of Motion (+exp2)
Page et al. (2012) RCT (6) NStart=32 NEnd=32 TPS=Chronic A + B1 vs A + B2 vs 0 *Also in Table 4 (Task-Specific Training)*	E1: 30min electrical stimulation therapy + repetitive task specific practice E2: 60min electrical stimulation therapy + repetitive task specific practice E3: 120min electrical stimulation + repetitive task specific practice C: Home Exercise (part of their standard of care) Duration: E1: 30 min; E2: 60 min; E3: 120 min, 5d/wk for 8wk; C: 30min, 5d/wk for 8wk	E3 vs E2/E1: Fugl-Meyer Assessment (+exp3) Arm Motor Ability Test Functional Ability (+exp3) Movement Quality (+exp3) Action Research Arm Test (+exp3)
Popovic et al. (2004) RCT Crossover (5) NStart=41 NEnd=32 TPS=Subacute A1 vs A2	E: Functional Electrical Therapy (FET) in acute post stroke phase C: Functional Electrical Therapy (FET) in chronic post stroke phase Duration: 30min/d, 7d/wk for 3wk	E vs C: UEFT(+exp) Drawing test(+exp) mAS(-) reduced MAL(-) AROM
Wang et al. (2000) RCT Crossover (4) NStart=32 NEnd=32 TPS=Acute A1 vs A2 vs 0	E1: Long duration FES; E2: Short duration FES C: Routine therapy Duration: 45min/d, 5d/wk for 6wk	E1 vs E2 vs C: Subluxation reduction, short-duration (+exp) Subluxation reduction, long-duration (-) Passive Range of Motion (-) Fugl-Meyer Assessment (-)
Packman-Braun et al. (1988) RCT (4) NStart=18 NEnd=18 TPS=Not Reported A1 vs A2	E1: Functional Electrical Stimulation with 1:1 On/Off Ratio E2: Functional Electrical Stimulation with 1:3 On/Off Ratio E3: Functional Electrical Stimulation with 1:5 On/Off Ratio	E3 vs E2 vs E1: Muscle Fatigue (+exp3)

	Duration: 1 session/condition, 48hr washout	
FES combined with other interventions compared to control		
Knutson et al. (2016) RCT (6) NStart=80 NEnd=72 TPS=Chronic A vs B	E1: Contralateral controlled FES E2: Cyclic NMES Duration: 20 sessions FTP, 2d/wk, 12 wks & 10 sessions/wk CCFES or cNMES	E1 vs E2: BBT (+exp) FMA (-) Arm motor abilities test (-)
Kowalczewski et al. (2007) RCT (6) NStart=20 NEnd=18 TPS=Subacute A + B1 vs A + B2 *Also in Table 3 (Exercise and Strength Training)*	E1: High intensity FES assisted exercise therapy E2: Low FES assisted exercise therapy Duration: 15/60 min, 5d/wk for 3 wk	E1 vs E2: Wolf Motor Fuction Test (+exp1) Fugl-Meyer Assessment (-) Motor activity log (-) Combined kinematic Score (+exp1)
FES combined with other interventions compared to sham or bilateral arm training		
Chan et al. (2009) RCT (8) NStart=20 NEnd=20 TPS=Chronic A + B vs A/B *Also in Table 2 (Bilateral Arm Training)*	E: Bilateral arm training + FES + conventional OT C: Bilateral arm training + sham FES + conventional OT Duration: 90min/d, 3d/wk, 5wks	E vs C: Functional Test for the Hemiplegic Upper Extremity (+exp) FMA-UE (+exp) grip power (-) forward reaching distance (-) active range of motion of wrist (+exp) FIM (-) MAS (-)
Neuromuscular electrical stimulation combined with other interventions compared to sham		
Boyaci et al. (2013) RCT (7) NStart=31 NEnd=31 TPS=Chronic A vs B vs 0	E1: EMG-triggered NMES E2: Passive NMES C: sham Control Duration: 45min/d, 5d/wk, 3wk	E1/E2 vs C: Fugl-Meyer Assessment (+exp1, +exp2) Motor Activity Log (+exp1) Spasticity in wrist flexor (+exp2) Spasticity in finger flexor (-) Range of Motion in active wrist extension (+exp1, +exp2) ROM active finger joint extension (+exp1) Grip strength (+exp1) Functional Independence Measure FIM (+exp1) modified Ashworth Scale (-) surface EMG potentials (+exp1) E1 vs E2: all outcome measures (-)
Hesse et al. (1998) RCT (5) NStart=24 NEnd=24 TPS=Chronic A + B vs A vs B vs 0 *Also in Table 33 (Botulinum Toxin)*	E1: Botox 1000u + cyclic NMES E2: Botox 1000u E3: Placebo + cyclic NMES C: Placebo Duration: 1 injection ; 30min/d, 3d/wk, 12 wks stimulation	E1 vs E2 vs E3 vs C: modified Ashworth scale (-) Global Pain Assessment Score (no stats) ADL (+exp1) Limb position (-)

FES compared to conventional therapy		
Fletcher-Smith et al. (2019) Pilot RCT (4) NStart=40 NEnd=35 TPS=Acute A vs 0	E: Functional electrical stimulation + usual care C: Usual care Duration: 2x30min/d, 5d/wk, for 3mo	E vs C: ARAT (No stats) NIHSS (No stats) BI (No stats) Modified Rankin Scale (No stats) SS QOL (failed) EQ-5D (No stats) Spasticity (no stats) Scale of Pain intensity (no stats) Caregiver strain index (no stats)
Karaahmet et al. (2019) Pilot RCT (5) NStart=30 NEnd=21 TPS=Subacute A vs 0	E: Cycling Functional electrical stimulation C: Conventional care Duration: 30min, 5x/wk for 4wks	E vs C: Acromiohumeral Distance (-exp) Numeric Rating Scale (+exp) Brunnstrom (-exp) Fugl Meyers Assessment Upper Extremity (-exp1) Frenchay Arm Test (-exp) Functional Independence Measure (-exp)
Demir et al. (2018) RCT (4) NStart=29 NEnd=17 TPS=Acute A vs 0	E: FES + conventional physiotherapy C: Conventional physiotherapy Duration: 15-45min (2xwk), 5d/wk for 8wk	E vs C: FMA (-) mAS (-) MAL (-) JTHFT (-)
NakipoğluYuzer et al. (2017) RCT (5) NStart=30 NEnd=30 TPS=Subacute A vs 0	E: Functional Electrical Stimulation (300microseconds, 30Hz) C: Conventional therapy Duration: 30min/d, 5x/wk for 4wk	E vs C: Modified Ashworth Scale (no between group stats) Rivermead Motor Assessment (+exp) Barthel Index (+exp) Upper Extremity Function Test (no between group stats) Brunnstorm Hand Neurophysiological Staging (no between group stats) Active Wrist Range of Motion (+exp) Passive Wrist Range of Motion (+exp)
Sehndkar et al. (2016) RCT (6) NStart=28 NEnd=28 TPS=Not Reported A vs 0	E: FES + Conventional Physiotherapy C: Conventional Physiotherapy Duration: 30min FES + 30min conventional therapy in EG, 60min conventional therapy in CG, 5d/wk, 12wks	E vs C: Grip Force (+exp) sEMG temporal (+exp) spectral (+exp)
Karakus et al. (2013) RCT (7) NStart=30 NEnd=28 TPS=Subacute A vs 0	E: FES + standard rehabilitation C: Standard rehabilitation Duration: 30min/d, 5d/wk for 2wk	E vs C: Brunnstrom Recovery Stages (+exp) Motoricity Index (+exp) Modified Ashworth Scale (+exp) Flexion peak torque of wrist (-) Extension peak torque of wrist (-)
Fil et al. (2011) RCT (4) NStart=62 NEnd=48	E: FES + Conventional therapy C: Conventional therapy Duration: 10mins, 2x/d, 5d/wk, avg timein hospital 12d	E vs C: xray of shoulder joints for subluxation (+exp) Motor assessment scale (-)

TPS=Acute A vs 0		Shoulder joint displacement values (+con)
Tarkka et al. (2011) RCT (5) NStart=20 NEnd=20 TPS=Chronic A vs 0	E: FES C: Conventional care Duration: 60min, 2x/d, 5d/wk, 2wk	E vs C: Wolf Motor Function Test (-) MEP Latency and amplitude (-) Duration of silent periods (-)
Koyuncu et al. (2010) RCT (5) NStart=50 NEnd=50 TPS=Subacute A vs 0	E: FES + Conventional therapy C: Conventional Therapy Duration: 60min 5d/wk, 4wk	E vs C: Visual Analogue Scale (-) Active RoM (-) Passive RoM (-) X-ray shoulder subluxation (+exp)
Mangold et al. (2009) Pilot RCT (6) NStart=23 NEnd=23 TPS=Subacute A vs 0	E: FES C: Conventional therapy Duration: 1hr/d, 3d/wk for 4wk	E vs C: BI (-) CMSA (-) MAS
Hara et al. (2008) RCT (5) NStart=20 NEnd=19 TPS=Chronic A vs 0	E: FES C: Conventional therapy Duration: 45min/d, 6d/wk for 4wk	E vs C: AROM (+exp) mAS (+exp)
Thrasher et al. (2008) RCT (6) NStart=21 NEnd=21 TPS=Subacute A vs 0	E: FES + Conventional Therapy C: Conventional Therapy Duration: E1 (FES): 45min/d, 5d/wk, 12-16wks; E2 (FES + conventional rehab):45min/d, 3d/wk, 12-16wks;C: 45min/d, 5d/w, 12-16wks	E vs C: Rehabilitation Engineering Laboratory Hand Function Test Object manipulation (+exp) Grip torque (+exp) Pinch force (+exp) Eccentric load (-) Blocks (-) Barthel Index Chedoke Mcmaster Stages Mootr recovery FIM
Popovic et al. (2003) RCT (5) NStart=28 NEnd=28 TPS=Subacute A vs 0	E: Functional Electrical Therapy C: Conventional therapy Duration: 30 min/d, 7d/wk for 3 wks	E vs C: Upper extremity performance test (+exp) Reduced Upper Extremity Motor Activity Log (+exp) Drawing Test (-) modified Ashworth Scale (+exp)
Faghri et al. (1994) RCT (4) NStart=26 NEnd=26 TPS=Acute A vs 0	E: FES + conventional therapy C: Conventional therapy Duration: 1.5 to 6hr/d, 7d/wk, 6wks	E vs C: EMG posterior deltoid (+exp) Arm function (+exp) Arm tone (+exp) Shoulder lateral range of motion (SLROM) (+exp) Subluxation xray (+exp) upper arm girth (-)

FES combined with other interventions compared to fes		
Knutson et al. (2024) RCT (5) NStart=52 NEnd=39 TPS=Chronic A + B vs X *Also in Table 17 (Virtual Reality)*	E: Contralaterally controlled FES (CCFES) + Hand therapy video games C: CCFES Duration: 51min/d, 10sessions/wk for 12wks at home & 80min/d, 2d/wk, 12wks lab sessions	E vs C: BBT (-) FMA-UE (-) ARAT (-) Stroke Upper Limb Capacity Scale (-) Arm Motor Abilities Test (-) Delis-Kaplan Executive Functions Systems-Tower Test (-) SIS (-) perceived UE and LE strength (-) perceived memory and thinking ability (-) perceived mood and control of emotions (-) perceived ability to communicate and understand (-) perceived ability to perform ADLs (-) perceived ability to be mobile at home and in the community (-) perceived ability to use the affected hand (-) perceived ability to participate in meaningful activities (-) perceived percentage of recovery from stroke (-)
Kumari et al. (2022) RCT (2) NStart=20 NEnd=20 TPS=Not Reported A + B vs A/B *Also in Table 9 (Orthotics and Taping)*	E: "Saebo-flex" hand training + Extensor FES + conventional treatment C: Extensor FES + conventional Duration: 45min/d, 5d/wk, 6wks	E vs C: FMA-UE (no stat) Chedoke Hand and Arm scale (no stat) 9HPT (no stat) Power Grip strength (no stat) Lateral grip (no stat) Chuck Pinch strength (no stat) Tip to Tip Pinchstrength (no stat) Pulp pinch strength (no stat)
Halakoo et al. (2020) RCT (7) NStart=35 NEnd=32 TPS=Subacute A + B vs A/B *Also in Table 31 (Transcranial Direct Current Stimulation (tDCS))*	E1: Anodal tDCS + FES E2: Sham tDCS + FES C: FES Alone Duration: E1/2: 20min, 5x/wk, 2wks a-tDCS, C: 10 min/d, 5d/wk, 2wks FES	E1 vs E2/C: EMG Activity of flexor carpi radialis during passive extention of the wrist into the rest position (+exp1) Modified Ashworth Scale (+exp1) EMG Activity of Flexor carpi radialis during active wrist flexion and extension (+exp1)
Li et al. (2014) RCT (5) NStart=15 NEnd=14 TPS=Subacute A + B + C vs A/A + B *Also in Table 18 (Brain Computer Interfaces); Table 11 (Mental Practice)*	E: Motor Imagery-based Brain-computer Interface (BCI) + FES C: FES Duration: 1-1.5hr/d, 3d/wk BCI + FES & 20min/d, 3d/wk FES only & 5d/wk conventional therapy, 8wks	E vs C: ARAT (+exp) FMA UE (-), Event related desynchronization of sensorimotor cortex EEG
Neuromuscular electrical stimulation compared to sham		
Lavi et al. (2022) RCT (5) NStart=28	E: NMES + regular rehab C: sham + regular rehab Duration: 3x30-60min/d, 5d/wk, 6wks	E vs C: shoulder subluxation (+exp) FMA (+exp)

NEnd=23 TPS=Acute A vs 0		hand (+exp) finger extension (+exp) NPRS (-) FIM (-)
Church et al. (2006) RCT (8) NStart=176 NEnd=165 TPS=Acute A vs 0	E: cyclic NMES + standard care C: Sham stimulation + standard care Duration: 30min/d, 3d/wk, for 4wk	E vs C: Numerical pain rating scale (-) ARAT (-) MI (+con) FAT (+con) star cancellation test
Chae et al. (1998) RCT (6) NStart=46 NEnd=28 TPS=Acute A vs 0	E: Cyclic NMES + Conventional therapy C: Sham + Conventional therapy Duration: 1 hr/d, 5d/wk for 3 wk	E vs C: Fugl-Meyer Assessment (+exp) Functional Independence Measure (-)
Neuromuscular electrical stimulation compared to conventional therapy		
Kara et al. (2021) RCT (6) NStart=30 NEnd=30 TPS=Not Reported A vs 0	E: Passive NMES + conventional rehab C: Conventional rehab Duration: 20min/d, 5d/wk, 4wks	E vs C: Brunnstrom scale (-) FMA-UE (-) MAS (-)
Sentandreu-Mañó et al. (2021) RCT (7) NStart=69 NEnd=61 TPS=Subacute A1 vs A2 vs 0	E1: High-Frequency NMES (50 Hz) E2: Low-Frequency NMES (35 Hz) C: Conventional Rehab Duration: 20-30min/d, 3d/wk, 8wks	E1/E2 vs C: ROM wrist resting angle (+exp) wrist active extension (+exp) wrist passive extension (+exp) metacarpophalangeal active extension (-) grip and pinch strength (+exp) MAS wrist flexors (+exp) metacarpophalangeal flexors (+exp) BI (+exp2) BBT (-) Muscle electrical activity peak EMG amplitude extensors (+exp) ARC extensors (+exp)
Turkkan et al. (2017) RCT (6) NStart=24 NEnd=24 TPS=Subacute A vs 0	E: NMES + conventional physiotherapy C: conventional physiotherapy Duration: 60 min/d, 5d/wk, 4wks	E vs C: Visual Analog Scale for Pain (-) Shoulder Disability Questionnaire (-) Acromion-greater tuberosity distance (+exp) Muscle thickness (-)
Tilkici et al. (2017) RCT (6) NStart=40 NEnd=40 TPS=Chronic A vs 0	E: Neuromuscular Electrical Stimulation + Conventional Therapy C: Conventional Therapy only Duration: 30min/d, 5d/wk, 3wk	E vs C: Modified Ashworth Scale upper extrimity (-) elbow (-) Wrist (+exp) Brunnstrom's Recovery Stages hand (-)

		upper extrimity (-) Fugl-Meyer Assessment (-) motor (-) cognitive (-) Duruoz Hand Index (-) Functional Independence Measure (-) Nothingam Health Profile pain (-) emotion (-) sleep (+exp) social isolation physical activity (+exp) energy (-) wrist extension angle degree (+exp)
Cui et al. (2015) Pilot RCT (6) NStart=45 NEnd=44 TPS=Subacute A1 vs A2 vs 0	E1: Long NMES (12Hr) E2: Short NMES (30min) C: Conventional Therapy Duration: 30min or 12 hour NMES, 6d/wk, 4wks	E1 vs C: Fugl-Meyer Assessment ; -Proximal (+exp1) ; -Distal (+exp1) Action Research Arm Test (+exp1) Modified Ashworth -Elbow (-) Wrsit (-) E1 vs E2: Fugl-Meyer Assessment ; -Proximal (-) ; -Distal (+exp1) Action Research Arm Test (+exp1) Modified Ashworth -Elbow (-) Wrsit (-) E1/E2 vs C: Fugl-Meyer Assessment ; -Proximal (+exp1) ; -Distal (+exp1) Action Research Arm Test (+exp1) Modified Ashworth -Elbow (-) Wrsit (-)
Mohamed Faisal et al. (2012) RCT (5) NStart=30 NEnd=30 TPS=Acute A vs 0	E: Functional Neuromuscular Electrical Stimulation + Conventional Physical Therapy C: Conventional Physical Therapy Duration: 1hr/d (20min NMES + 40min conventional PT), 6d/wk, 4wks	E vs C: Action Research Arm Test (+exp) Box and Block Test (+exp)
Prabhu et al. (2012) RCT (2) NStart=50 NEnd=50 TPS=Chronic A vs 0	E: Electrical Stimulation of Triceps + Conventional Motor Training C: Conventional Motor Training Duration: 15min stimulation, 45min therapy, 5x/wk, 3wks	E vs C: Modified Tardieu Scale (+exp) Active of Range of Motion - Extension (+exp) Forward Reach Distance (-)
Rosewilliam et al. (2012) RCT (7) NStart=90 NEnd=67 TPS=Acute A vs 0	E: NMES + Standard Therapy C: Standard Therapy Duration: 30min, 2x/d, 6wk	E vs C: Action Research Arm Test (-) Barthel Index (-) Active ROM wrist flexion (-) wrist extension (+exp) Grip strength (+exp) Isometric muscle strength Wrist muscle strength

		extensor (+exp) flexor (-)
Lin et al. (2011) RCT (4) NStart=46 NEnd=37 TPS=Subacute A vs 0	E: Neuromuscular Electrical Stimulation + conventional therapy C: Conventional therapy Duration: 30 min/day, 5d/wk for 3 wk	E vs C: Fugl-Meyer Assessment: (+exp) Modified Ashworth Scale: (+exp) Modified Barthel Index (-)
Hsu et al. (2010) RCT (5) NStart=66 NEnd=66 TPS=Acute A1 vs A2 vs 0	E1: High NMES E2: Low NMES C: Conventional therapy Duration: low NMES - 30min/d, 5d/wk, 4wks high NMES - 60 mins, 5d/wk, 4wks	E1 vs E2: Fugl-Meyer Assessment (-) Action Research Arm Test (-) Motor activity log (-) E1 vs C: Fugl-Meyer Assessment (+exp1) Action Research Arm Test (+exp1) Motor activity log (-) E2 vs C: Fugl-Meyer Assessment (+exp2) Action Research Arm Test (+exp2) Motor activity log (-)
Linn et al. (1999) RCT (5) NStart=40 NEnd=40 TPS=Acute A vs 0	E: Cyclic NMES C: conventional therapy Duration: 45min/d, 3d/wk for 4wk	E vs C: Pain reduction (+exp) subluxation (+exp) motor assessment scale + pain-free passive lateral rotation + upper arm girth loss + humeral displacement
Powell et al. (1999) RCT (7) NStart=60 NEnd=48 TPS=Acute A vs 0	E: Cyclical neuromuscular electrical stimulation + conventional therapy C: Conventional therapy Duration: 3x30min/d, 8wks	E vs C: ARAT (+exp) Passive range of motion Active range of motion Grip strength, Star cancellation, Ashworth Scale Barthel Index Rankin Scale 9Hole-Peg-Test Pain VAS for wrist discomfort
Baker & Parker (1986) RCT (4) NStart=63 NEnd=63 TPS=Subacute A vs 0	E: Cyclical NMES + conventional sling/wheelchair support C: Conventional slings/wheelchair arm supports Duration: 6-7h, 5d/wk, 6wks	E vs C: Shoulder subluxation xray (+exp) Perceived Pain (-)
FES combined with other interventions compared to neuromuscular electrical stimulation		
Huang et al. (2021a) RCT (8) NStart=50 NEnd=50 TPS=Subacute A vs B	E: contralaterally controlled functional electrical stimulation + routine rehabilitation C: neuromuscular electrical stimulation (NMES) + routine rehabilitation Duration: 20min/d, 5d/wk, 3 wks stimulation on wrist extensors ; 1hr/d, 5d/wk, 3wks rehab	E vs C: FMA-UE (-) ARAT (-) BI (-) EMG parameter- RMS of paretic extensor carpi radialis (+exp) EMG parameter- CCR of paretic flexor carpi radialis (-)

Knutson et al. (2020) RCT (5) NStart=67 NEnd=53 TPS=Subacute A1 vs A2 vs B	E1: Arm + Hand Contralaterally Controlled Functional Electrical Stimulation (CCFES) E2: Hand CCFES E3: Arm + Hand Cyclic Neuromuscular Electrical Stimulation Duration: A + H cNMES: 60 mins/session for 10 sessions, CCFES groups: 46 mins/session for 10 sessions +70 mins FTP for 2 FTP sessions = 10 hrs/wk for 12wks. 36 wks total (12wk therapy, 24 wk post-intervention)	E1 vs E2: Box and Block Test (-) Fugl-Meyers Assessment Upper Extremity (+exp1) Stroke Upper Limb Capacity Scale (-) Arm Motors Abilities Test (-) Reachable Workspace (+exp1) E1 vs E3: Box and Block Test (-) Fugl-Meyers Assessment Upper Extremity (-) Stroke Upper Limb Capacity Scale (-) Arm Motors Abilities Test: (-) Reachable Workspace (+exp1) E3 vs C: Box and Block Test (-) Fugl-Meyers Assessment Upper Extremity (-) Stroke Upper Limb Capacity Scale (-) Arm Motors Abilities Test: (-) Reachable Workspace: (-) E1 vs E2 vs E3: Box and Block Test: (-) Fugl-Meyers Assessment Upper Extremity: (+exp1) Stroke Upper Limb Capacity Scale: (-) Arm Motors Abilities Test: (-) Reachable Workspace: (+exp1)
Zheng et al. (2019) RCT (5) NStart=50 NEnd=41 TPS=Acute A vs B	E: Functional Electrical Stimulation (FES) C: NMES Duration: 40 mins/d, 5ds/wk, 2wks	E vs C: Fugl Meyer Upper Extremity (+exp) Manual Muscle Testing of extensor carpi (+exp) Modified Barthel Index (+exp) Active wrist Range of Motion (+exp) Jebsen Hand Function Test (+exp) International classification of functioning score (+exp)
Shen et al. (2015) RCT (7) NStart=60 NEnd=60 TPS=Subacute A vs B	E: Contralaterally controlled functional electrical stimulation (CCFES) + Conventional therapy C: Neuromuscular electrical stimulation (NMES) + Conventional therapy Duration: 20min, 5x/wk, 3wk	E vs C: Fugl-Meyer Assessment (+exp) Motricity Index (-) Active Range of Motion (+exp) Hong Kong version of the Functional Test for the Hemiplegic Upper Extremity (FTHUE-HK) (+exp)
Neuromuscular electrical stimulation combined with other interventions compared to control		
Chen et al. (2019a) RCT (7) NStart=43 NEnd=40 TPS=Chronic A + B vs A vs B *Also in Table 24 (Thermal Stimulation)*	E1: Neuromuscular Electrical Stimulation + Conventional Rehabilitation E2: Noxious Thermal Stimulation + Conventional Rehabilitation E3: Thermal Stimulation + Neuromuscular Electrical stimulation + Conventional Rehabilitation Duration: 30min/d, 3d/wk, 8wk	E1 vs E2 vs E3: Fugl-Meyer Assessment upper extremity (-) modified Barthel Index (-) modified Ashworth scale (-) Motricity Index (-)
Etoh et al. (2019)	E1: NMES + rTMS (1HZ)	E1 vs E2:

RCT Crossover (8) NStart=20 NEnd=20 TPS=Chronic A + B vs A/B *Also in Table 29 (Repetitive Transcranial Magnetic Stimulation (rTMS))*	E2: Sham NMES + rTMS (1Hz) Duration: 5d/wk for 4wks NMES or sham + 60min/d Repetitive facilitative exercise	FMA (-) ARAT (-) BBT (+exp) MAS (+exp)
Wilson et al. (2016) RCT (6) NStart=122 NEnd=109 TPS=Subacute A vs B vs C *Also in Table 27 (Additional Afferent and Peripheral Stimulation Methods)*	E1: Cyclic Neuromuscular Electrical Stimulation E2: Electromyographically-triggered Neuromuscular Electrical Stimulatiom E3: Sensory Stimulation Duration: 40 min (2x/d), 5d/wk, 8 wk	E1 vs E2 vs E3: Fugl-Meyer Assessment (-) Modified Arm Motor Ability Task (-)
EMG-triggered NMES combined with other interventions compared to exercise and custom physiotherapy protocols		
Gabr et al. (2005) RCT Crossover (2) NStart=12 NEnd=12 TPS=Chronic A vs B *Also in Table 3 (Exercise and Strength Training)*	E: Home-based electromyography-triggered neuromascular stimulation (ETMS) C: Home exercise program Duration: 70min/d, 5d/wk, for 8wks ETMS/Home-exercise (17wks total)	E vs C: FMA (no stat) ARAT (no stat) Goniometry-PROM (no stat)
EMG-triggered NMES combined with other interventions compared to emg-triggered nmes or sham		
Theilig et al. (2011) RCT (6) NStart=24 NEnd=24 TPS=Subacute A + B vs A/B *Also in Table 29 (Repetitive Transcranial Magnetic Stimulation (rTMS))*	E: EMG-NMES + rTMS (1 Hz) C: EMG-NMES + Sham rTMS Duration: 45min (20min EMG-NMS + 15min rTMS/Sham), for 2wk	E vs C: Wolf Motor Function Test (-) Tardieu Scale (-) Passive wrist extension (-) Motor evoked potentials (-)
Neuromuscular electrical stimulation combined with other interventions compared to stretching and positioning programs		
Mann et al. (2005) Pilot RCT (6) NStart=22 NEnd=22 TPS=Subacute A vs B *Also in Table 8 (Stretching Programs)*	E: NMES C: Passive extension exercises Duration: 10-30min twice/d for 12wk	E vs C: ARAT (+exp): -grasp (+exp) grip (+exp) pinch (+exp) gross movement (-)
Cauraugh et al. (2003a) RCT (6) NStart=34 NEnd=34 TPS=Chronic A + B1 vs A + B2 vs A *Also in Table 8 (Stretching Programs)*	E1: Blocked NMES training (NMES+Hand ROM training) E2: Random NMES training (NMES+Hand ROM training) C: Hand ROM exercises (Passive movements, voluntary UE extensions/abduction) Duration: 90min/d, 2d/wk, for 2wks	E1/E2 vs C: BBT (+exp1, +exp2) Premotor and motor reaction times (+exp1, +exp2) variability in Sustained Muscle Contraction RMSE for force production (+exp1, +exp2) E1 vs E2: BBT (-) Premotor and motor reaction times (+exp1)
King et al. (1996) RCT (4)	E:NMES C: Passive stretch	E vs C: Tone reduction (+exp)

NStart=21 NEnd=21 TPS=Chronic A vs B	Duration: Not reported	
FES combined with other interventions compared to task-specific training		
Jonsdottir et al. (2017) RCT (6) NStart=82 NEnd=68 TPS=Subacute A + B vs A/B *Also in Table 4 (Task-Specific Training)*	E: Myoelectric Continuous Control of Functional Electrical Stimulation + Task Oriented Therapy C: Task Oriented Therapy Duration: 45min/d, 5d/wk for 5wk	E vs C: Action Research Arm Test (-) Fugl-Meyer Assessment-Upper Extremity (-) Disability of the Arm, Shoulder, and Hand Questionnaire (-)
Alon et al. (2008) RCT (4) NStart=26 NEnd=26 TPS=Acute A + B vs A/B *Also in Table 4 (Task-Specific Training)*	E: FES + Task-specific training C: Task-specific training Duration: Task Specific training: 30min/2x/d, 5d/wk, 12wk; FES: 1hr/session, 4x/d, 12wk	E vs C: Modified Fugl-Meyer Assessment (+exp) Box and Blocks Test (-) Jebsen-Taylor light object lift (-)
Alon et al. (2007) Pilot RCT (4) NStart=15 NEnd=15 TPS=Acute A + B vs A/B *Also in Table 4 (Task-Specific Training)*	E: FES + Standard task-specific training C: Standard task-specific training Duration: 30 min(2x/d), 5d/wk for 12 wk	E vs C: Box and Blocks Test (+exp) Jebsen Taylor Hand Function Test (+exp) Ful-Meyer Assessment (+exp)
Popovic et al. (2002) RCT (3) NStart=16 NEnd=16 TPS=Subacute A + B vs A/B *Also in Table 4 (Task-Specific Training)*	E: Functional Electrical Stimulation + Task Specific Training C: Task specific training Duration: 30min/d, 3wks	E vs C: Upper Extremity Function Test (No stats)
Neuromuscular electrical stimulation combined with other interventions compared to orthotics		
Leung et al. (2012) RCT (8) NStart=36 NEnd=32 TPS=Subacute A + B vs A/B *Also in Table 9 (Orthotics and Taping)*	E: Electrical Stimulation to Wrist and Finger Extensors with Splint C: Splint Duration: 1h/d, 5d/wk, 4wks stimulation & 12h/d, 5d/wk, 4wks splint	E vs C: Passive Wrist Extension at 2 Nm and 3Nm (-) Wrist and Finger Extensor Muscle Strength (-) Tardieu Scale (-) Motor Assessment Scale (-) Participants' Global Perceived Effect of Treatment (-) Physiotherapists' Perceived Effect of Treatment Rating for Treatment Effectiveness (+exp) Rating for Treatment Worth (+exp) Recommendation of Treatment (-)
Yu et al. (2004) RCT (6) NStart=61	E: Intramuscular NMES C: Sling	E vs C: Brief Pain Inventory (+exp) Fugl-Meyer Motor Assessment-UL (-)

NEnd=50 TPS=Chronic A vs B *Also in Table 9 (Orthotics and Taping)*	Duration: 6Hr, 1x/d, 6wk NMES & 6wk Sling	Ashworth Scale (-) FIM-selfcare (-) Arm Motor Ability Test (-)
EMG-triggered NMES compared to sham		
Kimberley et al. (2004) RCT (6) NStart=16 NEnd=16 TPS=Chronic A vs 0	E: EMG triggered NMES C: Sham Duration: 6hr/d, 10d total over 3wks	E vs C: BBT (no stats) Motor activity log (no stats) JTHFT (no stats) Isometric finger extension strength (no stats), fMRI Parameters
FES combined with other interventions compared to neuromuscular electrical stimulation or task-specific training		
Knutson et al. (2012) RCT (5) NStart=21 NEnd=17 TPS=Chronic A + B vs A + C *Also in Table 4 (Task-Specific Training)*	E: Contralaterally controlled FES + Task specific training C: Cyclic NMES+ Task specific training Duration: CCFES: 55 mins/d, 2ds/wk, 6wks; Cyclic NMES: 75 mins/d, 2ds/wl, 6wks; Task-specific training: 90 mins/d, 2ds/wk, 6wks	E vs C: Maximum voluntary finger extension angle (+exp) Finger tracking test (+exp) FMA-UE (+exp) BBT (+exp) Arm motor abilities test - functional abilities component (+exp)
Different approaches to neuromuscular electrical stimulation compared against one another		
Maeda et al. (2024) RCT (5) NStart=25 NEnd=20 TPS=Subacute A1 vs A2	E: WIVES (Wearable Integrated Volitional Control Electrical Stimulation) + Conventional therapy C: IVES (Integrated Volitional Control Electrical Stimulation) + Conventional therapy Duration: WIVES/IVES (worn 8h/d, 28ds); Conventional therapy (3h/d, 28ds)	E vs C: FMA-UE (-) ARAT (-) WMFT (-) MAL (-)
Doucet & Griffin (2013) Pilot RCT (5) NStart=16 NEnd=16 TPS=Chronic A1 vs A2	E1: High Frequency NMES (40Hz) E2: Low Frequency NMES (20Hz) Duration: E1: 20min, 4x/wk, for 4wk; E2: 40min, 4x/wk, for 4wk	E1 vs E2: Grip strength (+exp1) Lateral pinch strength (+exp1) Palmar pinch strength (-) Tip pinch strength (-) Minnesota Manual Dexterity Test (+exp2) Thumb adduction motor endurance (+exp2) root mean square (RMS) of EMG amplitude (+exp1) Maximal voluntary isometric contraction of thumb adduction (-)
deKroon et al. (2008) RCT (6) NStart=22 NEnd=21 TPS=Chronic A1 vs A2	E1: EMG-triggered NMES E2: cyclic NMES Duration: 30min/d, 3d/wk for 6wk	E1 vs E2: ARAT (-) Grip strength (-) FMA (-) MI (-)
deKroon et al. (2004) RCT (6) NStart=30 NEnd=28 TPS=Chronic A1 vs A2	E: Electrical stimulation of flexors and extensors C: Electrical stimulation of extensors only Duration: 20-60min (increased over time), 3x/d for 6wk	E vs C: ARAT (-) Hand grip strength ratio (-) MI (-) AS (-) AROM wrist (-)

Neuromuscular electrical stimulation combined with other interventions compared to peripheral nerve stimulation		
Chae et al. (2009) RCT (7) NStart=26 NEnd=20 TPS=Chronic A vs B *Also in Table 27 (Additional Afferent and Peripheral Stimulation Methods)*	E: Motor electrical stimulation involving cyclic (NMES) and EMG C: Percutaneous Sensory electrical stimulation Duration: 1 hr/d, 7d/wk for 6 wks	E vs C: Fugl-Meyer Motor Assessment (-) Arm Motor Ability Test (-) EMG activation (-)
FES combined with other interventions compared to fes or sham		
Kim et al. (2014a) RCT (7) NStart=27 NEnd=23 TPS=Subacute A + B vs A/B *Also in Table 10 (Mirror Therapy)*	E: Functional Electrical Stimulation + Mirror Therapy C: Functional Electrical Stimulation + Sham Mirror Therapy Duration: 30min/d stimulation/sham + 30min/d ,MT, 5d/wk, 4wks	E vs C: Box and Block Test (-) Fugl-Meyer Assessment Shoulder, Elbow, Forearm (-) Wrist (+exp) Hand (+exp) Coordination (-) Brunnstrom Recovery Stage Upper Extremity (-) Hand (+exp) Manual Function Test Shoulder (-) Hand (+exp)
EMG-triggered NMES combined with other interventions compared to emg-triggered nmes		
Schick et al. (2017) RCT (7) NStart=33 NEnd=32 TPS=Subacute A + B vs A/B *Also in Table 10 (Mirror Therapy)*	E: bilateral EMG-triggered multi-channel electrostimulation + mirror therapy C: bilateral EMG-triggered multi-channel electrostimulation Duration: 30min/d, 5d/wk, 3wk	E vs C: Outcomes for all patients Fugl-Meyer Assessment (-) Part A (-) Part B (-) Part C (-) Part D (-) Rivermead Assessment of Somatosensory Performance (-) Box and Block Test (-) Goal Attainment Scaling (-) Barthel Index (-) For patients with very severe paresis Fugl-Meyer Assessment (+exp) Part A (+exp) Part B (-) Part C (-) Part D (-)
Kim et al. (2016d) RCT (5) NStart=20 NEnd=20 TPS=Chronic A + B vs A/B *Also in Table 4 (Task-Specific Training)*	E: EMG-Triggered Neuromuscular Stimulation + Task-Oriented Training C: EMG-Triggered Neuromuscular Stimulation Duration: 30min/d, 5d/wk, 4wks (experimental) & 20min/d, 5d/wk, 4wks (control)	E vs C: Fugl-Meyer Assessment- Upper Extremity (+exp) Box and Block Test (+exp) Jebsen-Taylor Hand Function Test (-) muscle activation (%RVC)
Different approaches to EMG-triggered NMES compared against one another		
Zhou et al. (2017) RCT (6)	E: Electromyogrpahical bridge (emg triggered stimulation)	E vs C: Brunnstrom (+exp)

NStart=42 NEnd=36 TPS=Subacute A vs B	C: Cyclic NMES Duration: 2 sessions over 4wk	Fugl-Meyer Upper Extremity Assessment (+exp) Motor Status Scale (+exp) Active Range of Wrist/Finger Extension (-) EMG parameters
Neuromuscular electrical stimulation combined with other interventions compared to conventional therapy		
Alazab I.M. et al. (2022) RCT (2) NStart=60 NEnd=60 TPS=Subacute A vs B vs 0 *Also in Table 27 (Additional Afferent and Peripheral Stimulation Methods)*	E1: Neuromuscular electrical stimulation (NMES) + Conventional therapy E2: Peripheral Pulse Electromagnetic Waves (rPMS) + Conventional therapy C: Conventional therapy Duration: 20min/d, 2d/wk, 8wks	E1 vs E2: Supraspinatus EMG amplitude (+exp2) Deltoid EMG amplitude (+exp2) FMA-UE (-) E1 vs C: Supraspinatus EMG amplitude (+exp) Deltoid EMG amplitude (-) FMA-UE (-) E2 vs C: Supraspinatus EMG amplitude (+exp2) Deltoid EMG amplitude (+exp2) FMA-UE (+exp2)
Ohnishi et al. (2022) RCT (4) NStart=101 NEnd=99 TPS=Acute A + B vs A vs B vs 0 *Also in Table 1 (Neurodevelopmental Techniques)*	E1: NMES + conventional exercise E2: RFE + conventional exercise E3: RFE under NMES + conventional exercise C: conventional training Duration: 1hr/d, 7d/wk, 4wks	E1/E2/E3 vs C: MAS (no stat), SIAS; knee-mouth (-) finger-function (-) FMA-UE total (+exp3) wrist (+exp3) finger (+exp3) FIM; motor (no stat); cognitive (no stat)
Choudhury et al. (2020) RCT (6) NStart=95 NEnd=61 TPS=Chronic A + B1 vs A + B2 vs 0 *Also in Table 20 (Feedback-Based Training)*	E1: NMES with Paired Auditory Stimuli E2: NMES with Random Auditory Stimuli C: Conventional Therapy Duration: 4hr/d, 4wks device	E1 vs E2 vs C: No between group comparisons: Action Research Arm Test (no stat) Modified Ashworth Scale (no stat) Grip/Pinch Strength (no stat) Range of Motion (no stat) Maximum Contraction Force (no stat)
Zhou et al. (2018) RCT (6) NStart=90 NEnd=81 TPS=Subacute A vs B vs 0 *Also in Table 23 (Transcutaneous Electrical Nerve Stimulation (TENS))*	E1: NMES + conventional rehabilitation E2: TENS + conventional rehabilitation C: Conventional rehabilitation Duration: 1hr/d, 5d/wk for 4wks	E1/E2 vs C: NRS-shoulder pain (+exp1/2) mAS-adductors (-) AROM (-) PROM (-) FMA (-) BI (-) Stroke Specific QoL (-) E1 vs E2: NRS-shoulder pain (+exp1) mAS-adductors (-) AROM (-) PROM (-) FMA (-) BI (-) Stroke Specific QoL (-)
Baygutalp & Senel (2014) RCT (4) NStart=30	E: NMES+conventional therapy C: Conventional therapy Duration: 60min/d, 5d/wk, 3wk	E vs C: BI(-) Brunnstroms recovery stages(-)

NEnd=30 TPS=Chronic A vs 0		Mod Ashworth scale(-) VAS-Pain (+exp)
ShimodozoNo et al. (2014) Pilot RCT (7) NStart=27 NEnd=24 TPS=Subacute A + B vs A/B vs 0 *Also in Table 4 (Task-Specific Training)*	E1: NMES + repetitive facilitative exercise; E2 Repetitive facilitative exercise C: Conventional Therapy Duration: 40min/d, 5d/wk,4wk	E1/E2 vs C: Fugl-Meyer Assessment (+exp2) AROM; shoulder flexion (-); - elbow extension (+exp2); - wrist dorsiflexion (-) Modified Ashworth scale elbow flexor (-) wrist flexors (-)
FES combined with other interventions compared to conventional therapy		
Zhang et al. (2024b) RCT (7) NStart=60 NEnd=51 TPS=Subacute A + B vs A vs B vs 0 *Also in Table 10 (Mirror Therapy)*	E1: Contralaterally controlled FES (CCFES) + CT E2: Mirror therapy +CT E3: CCFES + Mirror therapy + CT C: Conventional therapy Duration: MT: 20min/d, 5d/wk, 3wks; CCFES: 20min/d, 5d/wk, 3wks; CT: 3-4hr/d, 5d/wk, 3wks	E1 vs E2 vs E3 vs C: FMA - UE Total (-) Wrist (+exp3) ARAT (-) MRCS (-) BI (-) RMT (-)
Akter et al. (2023) RCT (9) NStart=25 NEnd=25 TPS=Chronic A + B vs 0 *Also in Table 1 (Neurodevelopmental Techniques)*	E: FES + Brunnstrom Hand rehab + conventional rehab C: Conventional Rehab Duration: 60min/d(20min hand rehab, 15min FES, 25min conventional rehab), 5d/wk, 4wks	E vs C: FMA-UE (+exp) wrist (+exp) hand (+exp) MAS (+exp) JTHF (+exp) Grip strength (+exp)
Carda et al. (2017) RCT Crossover (7) NStart=11 NEnd=10 TPS=Chronic A + B vs 0 *Also in Table 4 (Task-Specific Training)*	E: Electrically assisted movement therapy (FES + task specific) C: Standard care Duration: 90min/d, 5d/wk for 2wk	E vs C: Fugl-Meyer Assessment (+exp) Motor Activity Log (+exp) Wolf Motor Function Test (-) Resistance to Passive Movement Scale (-)
EMG-triggered NMES compared to conventional therapy		
Dorsch et al. (2014) Pilot RCT (8) NStart=33 NEnd=33 TPS=Acute A vs 0	E: EMG-triggered electrical stimulation + usual therapy C: Usual therapy Duration: 60min/d, 5d/wk, for 4wks electrical stimulation + 5h/wk Usual therapy	E vs C: Manual muscle testing (-) Motor assessment scale (-)
Shin et al. (2008) RCT (4) NStart=14 NEnd=14 TPS=Chronic A vs 0	E: EMG triggered-NMES C: Conventional control Duration: 30min, 2x/d, 5d/wk, 10wks	E vs C: Box and Block Test (+exp) Strength (+exp) Accuracy Index (+exp) Delay in onset (+exp) Delay in offset (+exp) fmri SMC Laterality Index PMC; SMA

Cauraugh et al. (2000) RCT Crossover (3) NStart=11 NEnd=11 TPS=Chronic A vs 0	E: EMG-triggered NMES + Standard therapy C: Standard therapy Duration: 30 min/session, 4d/wk, for 3 wk , 12 sessions in total	E vs C: BBT (+exp) MAS (-) FMA ue (-) sustained muscle contraction task reaction time task
EMG-triggered NMES combined with other interventions compared to control		
Chuang et al. (2017) RCT (6) NStart=38 NEnd=38 TPS=Chronic A + B vs A + C *Also in Table 23 (Transcutaneous Electrical Nerve Stimulation (TENS)); Table 2 (Bilateral Arm Training)*	E1: EMG-NMES + BAT E2: TENS +BAT Duration: 40min/d, 3d/wk for 4wk	E1 vs E2: FMA (-) Pain-NRS + Brief pain inventory
Kojima et al. (2014) RCT Crossover (5) NStart=13 NEnd=13 TPS=Subacute A + B1 vs A + B2 *Also in Table 10 (Mirror Therapy)*	E1: Immediate Mirror therapy + EMG-triggered NMES + Physical and Occupational therapy E2: delayed Mirror therapy + EMG-triggered NMES + Physical and Occupational therapy Duration: 30 min/d, 4d/wk for 8 wk	E1 vs E2: FMA (+exp) active range of motion (+exp) hand ratio BBT WMFT MAL
Cauraugh et al. (2011) RCT (6) NStart=18 NEnd=18 TPS=Chronic A + B1 vs A + B2 *Also in Table 2 (Bilateral Arm Training)*	E1: Short-term bilateral arm training + EMG triggered NMES E2: Long-term bilateral arm training + EMG triggered NMES Duration: E1: 90 min, 1x/wk for 4 wks; E2: 90 min/session, 10 sessions over 16mo	E1 vs E2: BBT (+exp2) Reaction time (+exp2) Force produced (+exp2)
Bhatt et al. (2007) RCT (4) NStart=20 NEnd=20 TPS=Chronic A + B vs A/B *Also in Table 1 (Neurodevelopmental Techniques)*	E1: EMG-triggered NMES E2: Tracking training (a structured motor learning program) E3: EMG-triggered NMES + tracking training Duration: 1 hr/d, 5d/wk, for 2 wks (each group)	E1 vs E2 vs E3: Jebsen hand test (-) BBT (-) fMRI with finger tracking test
Cauraugh & Kim (2002) RCT (4) NStart=25 NEnd=25 TPS=Chronic A + B vs A + C vs 0	E1: EMG NMES + bilateral training; E2: EMG NMES + unilateral training C: ROM Control exercise Duration: 90min, 4d/wk for 2wk	E vs C: E1 vs E2/C: BBT(+exp1, +EXP2), movement reaction time (+exp1)
EMG-FES compared to conventional therapy		
Hara et al. (2006) RCT (5) NStart=14 NEnd=14 TPS=Chronic A vs 0	E: EMG-trigerred FES C: Conventional therapy Duration: 1hr/d, 2d/wk for 4mon	E vs C: AROM (+exp) mAS (-) 10 cup moving test nine hole peg test EMG measures

Neuromuscular electrical stimulation combined with other interventions compared to fes		
Cunningham et al. (2019) RCT Crossover (4) NStart=15 NEnd=15 TPS=Chronic A vs B	E: Cyclic Neuromuscular Electrical Stimulation cNMES C: Controlled Functional Electrical stimulation CCFES (bilateral controlled) Duration: 1hr, 1x/condition, over 1 week washout	E vs C: Improved interhemispheric inhibition (+con) MEP amplitudes recruitment curve AUC iMEPs from contralesional hemisphere maximum voluntary contraction
EMG-triggered NMES combined with other interventions compared to sham or bilateral arm training		
Cauraugh & Kim (2003) RCT (3) NStart=26 NEnd=26 TPS=Chronic A + B1 vs A + B2 vs 0 *Also in Table 2 (Bilateral Arm Training)*	E1: EMG-Triggered NMES (10s duration) with Bilateral Arm Training E2: EMG-Triggered NMES (5s duration) with Bilateral Arm Training C: Sham Stimulation with Bilateral Arm Training Duration: 90min, 2x/wk, 2wks	E1 vs E2: Box and Block Test (+exp1) Reaction Time (-) Sustained Muscle Contraction (-) E1/E2 vs C: Box and Block Test (+exp1, +exp2) Reaction Time (+exp1, exp2) Sustained Muscle Contraction (+exp1,+exp2)
Neuromuscular electrical stimulation combined with other interventions compared to transcutaneous electrical stimulation (tens)		
Yurdakul et al. (2020) RCT (6) NStart=33 NEnd=30 TPS=Subacute A + B vs A/B *Also in Table 23 (Transcutaneous Electrical Nerve Stimulation (TENS))*	E: Electromuscular Stimulation C: Transcutaneous Electrical Nerve Stimulation Duration: 70min/sessions, 5sessions/wk, 6wks	E vs C: Fugl-Meyer Assessment (-) Functional Independence Measure (-) Brunnstrom Recovery Stages (-) Muscle Power- Arm Maximal Flexion (+exp) Mean Flexion (+exp) Maximal Extension (-) Mean Extension (-)
Neuromuscular electrical stimulation combined with other interventions compared to emg-triggered nmes or task-specific training		
Schick et al. (2022) RCT (8) NStart=12 NEnd=12 TPS=Subacute A + B vs A + C *Also in Table 4 (Task-Specific Training)*	E: cNMES + task oriented training + conventional rehab C: EMG-NMES + task oriented training + conventional rehab Duration: 1hr/d(30min TST, 30 min nMES), 5d/wk, 3wks	E vs C: FMA-UE (-) BBT (-) SIS (-)
FES compared to no treatment		
Hohler et al. (2024) RCT Crossover (5) NStart=20 NEnd=17 TPS=Subacute A vs 0	E: FES C: No treatment Duration: single session	E vs C: ARAT (-) mBBT (+exp) IMI (No stat)
EMG-triggered NMES combined with other interventions compared to neuromuscular electrical stimulation		
Hong et al. (2021) RCT (4) NStart=50 NEnd=42 TPS=Acute A vs B	E: Position triggered ES + conventional rehabilitation C: Passive ES + conventional rehabilitation	E vs C: FMA-UE (-) MI (-) MFT (-) Peak torque (-)

	Duration: ES: 30min/d, 5d/wk, 3wks; Conventional rehab: 30min/d, 5d/wk, 3wks	
Neuromuscular electrical stimulation combined with other interventions compared to neuromuscular electrical stimulation or mirror therapy		
Yun et al. (2011) RCT (4) NStart=60 NEnd=60 TPS=Chronic A + B vs A vs B	E1: Cyclic NMES + mirror therapy; E2: NMES; E3: Mirror therapy Duration: 30min/d, 5d/wk for 3wk	E1 vs E2/E3: Modified Ashworth Scale (+exp1) Wrist flexion (-) Wrist extension (-) Hand flexion (-) Hand extension (+exp1) Fugl-Meyer (+exp1) Wrist (+exp1) Hand (+exp1) Coordination (+exp1)
FES compared to sham		
Niu C.M. et al. (2022) Pilot RCT (4) NStart=20 NEnd=16 TPS=Subacute A vs 0	E: FES + Conventional rehab C: Sham FES + Conventional rehab Duration: 4hrs/d(1hr FES, 3hr Conventional rehab), 5d/wk, 1wk	E vs C: FMA-UE (+exp) Peak Velocity (+exp) Movement Duration (+exp)
EMG-FES combined with other interventions compared to conventional therapy		
Perini et al. (2020) Pilot RCT (7) NStart=18 NEnd=18 TPS=Chronic A + B vs 0 *Also in Table 16 (Robotics)*	E: EMG-Controlled FES during task oriented training + Robotic training C: Conventional rehab (TST) Duration: 45min, 5x/wk, 4wks conventional, 45min FEs + 45min robot, 3x/wk experimental	E vs C: Fugl-Meyer Assessment (+exp) Proximal (+exp) Distal (-) Reaching Performance Scale (+exp) Box and Block Test (-)
EMG-triggered NMES combined with other interventions compared to conventional therapy		
Qian et al. (2017) Pilot RCT (6) NStart=24 NEnd=24 TPS=Subacute A + B vs 0 *Also in Table 16 (Robotics)*	E: EMG driven NMES Robot arm C: Conventional Therapy Duration: 40min, 5d/wk for 4wk	E vs C: FIM (-) ARAT (-) Modified Ashworth Scale (+exp) FMA (+exp)
FES combined with other interventions compared to task-specific training or sham		
Thorsen et al. (2013) Pilot RCT (8) NStart=11 NEnd=11 TPS=Chronic A + B vs A/B *Also in Table 4 (Task-Specific Training)*	E: FES + Task specific training C: Sham + Task specific training Duration: 45min/session, 3-5d/wk, 25 sessions	E vs C: Action Research Arm Test (+exp) Individually Prioritized Problem Assessment (+exp)
FES combined with other interventions compared to botulinum toxin (botox) or task-specific training		
Weber et al. (2010) Pilot RCT (6) NStart=23	E: FES + botulinum toxin-A + home based task-oriented exercise C: Botulinum toxin-A + home-based exercise program	E vs C: Motor Activity Log observation (-)

NEnd=18 TPS=Chronic A + B + C vs A/A + B *Also in Table 33 (Botulinum Toxin); Table 4 (Task-Specific Training)*	Duration: 1hr/d, 5d/wk, 4 wk	self-reported (-) Action Research Arm Test (-)
EMG-triggered NMES combined with other interventions compared to strength training		
Francisco et al. (1998) Pilot RCT (3) NStart=9 NEnd=9 TPS=Acute A + B vs A/B *Also in Table 3 (Exercise and Strength Training)*	E: EMG triggered NMS (EMG-Stim) + Wrist Strengthening Exercises C: Wrist Exercises Duration: 30min/d, 5x/wk, during rehabilitation stay	E vs C: Fugl-Meyer Assessment Upper Extremity (+exp) Functional Independence Measure (+exp)
Cross-Referenced RCTs: Combined or Comparative Interventions Involving Neuromuscular Electrical Stimulation (NMES) (results included in this table's levels of evidence)		
Yang et al. (2024) RCT (5) NStart=69 NEnd=61 TPS=Subacute A + B vs A/B *Primary listing: Table 16 (Robotics)*	E1: Robot therapy + Electroymography-triggered neuromuscular electrical stimulation (ENMES) E2: Robot therapy E3: ENMES Duration: 40min/d 5d/wk, 8wks	E1 vs E2 vs E3: FMA - UE (+exp1) WMFT (+exp1) ARAT (+exp1)
Panahi et al. (2024) RCT (8) NStart=24 NEnd=24 TPS=Chronic A vs 0 *Primary listing: Table 44 (Acupuncture)*	E: Dry Needling + FES + conventional exercise C: Sham-Needling + FES + Conventional exercise Duration: Dry Needling (1d/wk, 4wks); FES (10 min/d but goes up to 30 min/d by increases of 5 minutes each week, 3d/wk, 4wks); Exercise training (30min, but is gradually increased with patient progress, 3d/wk, 4wks)	E vs C: Muscle Thickness (+exp) Modified Ashworth Scale (-) FMA-UE (+exp) BBT (+exp) Reflex torque (+exp)
Kim et al. (2023a) RCT (5) NStart=26 NEnd=24 TPS=Chronic A + B + C vs A/A + B *Primary listing: Table 19 (EMG Biofeedback)*	E: FES-Biofeedback mirror therapy + conventional C: Mirror therapy + conventional rehab Duration: 30min/d, 5d/wk, 4wk	E vs C: Brunnstrom Motor Recovery Stage UE (-) hand (-) FMA-UE (+exp) MFT (+exp) AROM flexion (+exp) extension (+exp) pronation (+exp) supination (+exp) ulnar deviation (+exp) radial deviation (+exp) MBI (-)
Liu et al. (2023) RCT (8) NStart=60 NEnd=57 TPS=Acute A + B vs C	E: Motor imagery BCI + conventional rehab C: FES + conventional rehab Duration: 20min/d, 5d/wk, 3wks	E vs C: FMA-UE (+exp) WMFT (+exp) MBI (+exp) Attention Network test ANT (+exp) Shulte grid test (+exp) Symbol digit modalities test (+exp)

Primary listing: Table 18 (Brain Computer Interfaces)		
Fu J. et al. (2023) RCT (7) NStart=66 NEnd=61 TPS=Subacute A + B + C vs A + D *Primary listing: Table 18 (Brain Computer Interfaces)*	E: Portable BCI-based hand robot system + Conventional therapy + neuromuscular electrical stimulation C: Task-specific training + Conventional therapy + neuromuscular electrical stimulation Duration: 90mins/d (30 mins of BCI/task-specific training, 20 mins of physical therapy, 20 mins of occupational therapy + 20 mins of neuromuscular electrical stimulation), 5ds/wk, 4 wks	E vs C: FMA-UE (+exp) EEG-derived Laterality Index (no stat) BCI accuracy (no stat)
Paolillo et al. (2023) RCT (7) NStart=18 NEnd=18 TPS=Chronic A + B vs A/B *Primary listing: Table 32 (Other Non-Invasive Brain Stimulation Methods)*	E: Transcranial laser photobiomodulation + NMES C: Sham transcranial laser photobiomodulation + NMES Duration: 30min/d, 1d/wk for 3mo	E vs C: grip strength (no-between group result) Box and Block Test (no-between group result) TUG (no-between group result) modified Ashworth scale (no-between group result) VAS-pain (+exp) MMSE (+exp) FIM (no-between group result) WHOQoL-BREF (no-between group result) Subjective Well-Being Scale (no-between group result)
Zhang et al. (2023a) RCT (8) NStart=33 NEnd=28 TPS=Subacute A + B vs A/B *Primary listing: Table 18 (Brain Computer Interfaces)*	E: BCI with FES C: Sham BCI with FES Duration: 40min/d, 5d/wk for 4wks	E vs C: FMA-UE (+exp) MMT (-) ROM (-) EEG signals (no stat)
Sethi et al. (2023) Pilot RCT (7) NStart=14 NEnd=14 TPS=Chronic A + B vs A/B *Primary listing: Table 32 (Other Non-Invasive Brain Stimulation Methods)*	E: Transcranial Random Noise stimulation (tRNS) + FES C: Sham-tRNS + active FES Duration: 30min/d, 3d/wk, 6wks	E vs C: FMA-UE (+exp) SIS-H (+exp) Grip strength/force (-) WMFT (-)
Wei et al. (2022) RCT (8) NStart=26 NEnd=25 TPS=Chronic A + B vs A/B vs 0 *Primary listing: Table 31 (Transcranial Direct Current Stimulation (tDCS))*	E1: Bilateral tDCS + NMES + coventional care E2: tDCS + sham NMES + conventional care C: Sham tDCS and sham NMES + conventional care Duration: 30 min/d, 5d/wk, 3 wks stimulation + 2-3d/wk conventional rehabilitation	E1/E2 vs C: FMA-UE (-) ARAT (-) Modified ashworth scale (-) Barthel Index (-)
Yang et al. (2022b) RCT (6) NStart=60 NEnd=60	E1: Low-frequency rTMS + FES + conventional rehab E2: Low-frequency rTMS + conventional rehab C: FES + conventional rehab	E1/E2 vs C: FMA (+exp1) TAM (+exp1) TMS-MEP

TPS=Subacute A + B vs A vs B *Primary listing: Table 29 (Repetitive Transcranial Magnetic Stimulation (rTMS))*	Duration: E1: 60min routine + 20min FES + 30min rTMS, E2: 60min routine + 30min rTMS, C: 60min routine + 20min FES, 6d/wk for 4wks	incubation/latent period (-) amplitude (+exp1) E1 vs E2: TMS-MEP (no stat) FMA (+exp1) TAM (+exp1)
Zhao Q. et al. (2022) RCT (6) NStart=24 NEnd=16 TPS=Subacute A vs B *Primary listing: Table 19 (EMG Biofeedback)*	E: EMG bridge therapy + conventional therapy C: NMES + conventional rehab Duration: 20min/d, 5d/wk, 4wks	E vs C: AROM (-) FMA-UE (-) MMT (-) BI (-)
Zhan et al. (2022) RCT (4) NStart=24 NEnd=24 TPS=Chronic A + B vs A/B *Primary listing: Table 18 (Brain Computer Interfaces)*	E: BCI-FES + Conventional rehab C: FES + Conventional Rehab Duration: E: 40min/d, 3d/wk, 4wks C: 30min/d, 3d/wk, 3wks	E vs C: FMA (-) EEG connectivity (+exp)
Ambrosini et al. (2021) RCT (6) NStart=72 NEnd=64 TPS=Subacute A + B vs 0 *Primary listing: Table 16 (Robotics)*	E: Robot Exoskeleton + EMG-Triggered FES (RETRAINER) C: Conventional Therapy Duration: 90min, 3x/wk, 9wks	E vs C: Action Research Arm Test (+exp) Gross Movements (+exp) Hand Function (+exp) Motricity Index (-) Motor Activity Log (-) Box and Block Test (+exp) Stroke Specific Quality of Life Scale (-) Muscle Research Council (-) system usability
Chen et al. (2021e) RCT (6) NStart=32 NEnd=32 TPS=Chronic A + B vs C *Primary listing: Table 18 (Brain Computer Interfaces)*	E: FES + BCI C: NMES Duration: E:40min/d, 4d/wk, 3wks;	E vs C: FMA-UE (+exp) manual muscle testing (+exp) Modified Barthel Index (-)
Conforto et al. (2021) RCT (6) NStart=38 NEnd=25 TPS=Chronic A + B + C vs A/A + B *Primary listing: Table 27 (Additional Afferent and Peripheral Stimulation Methods)*	E: Repetitive peripheral sensory stimulation + functional electrical stimulation + task specific training C: Sham RPSS + FES + TST Duration: 3hrs(RPSS:1.5hrs FES:0.5hrs TST:0.75hrs), 3d/wk, 6wks	E vs C: WMFT (-) Pinch Strength (-) Grasp Strength (-) FMA (-) BI (-) BDI (-) MAI (-) mAS (-) SIS (-) ROM - wrist (-)

Minami et al. (2021) RCT Crossover (5) NStart=9 NEnd=8 TPS=Chronic A + B vs 0 *Primary listing: Table 4 (Task-Specific Training)*	E: purposeful activity + electrical stimulation therapy (FES) + occupational therapy C: occupational therapy Duration: 40min/d,4d/wk,3mo, (1mo washout)	E vs C: E: FMA-UE (+exp) MAL (+exp) quality of movement (+exp) Goal attainment scale (+exp) muscle thickness of upper limb (-)
Lindsay et al. (2020) RCT (9) NStart=97 NEnd=93 TPS=Acute A + B vs A/B *Primary listing: Table 33 (Botulinum Toxin)*	E: Botulinum Toxin A injection + NMES C: Placebo + NMES Duration: 1x injection, NMES 7d/wk for 90d	E vs C: ARAT (+exp) EMG at slow stretch for spasticity elbow (+exp) wrist (-) Stiffness at slow stretch elbow (-) wrist (-) PROM slow stretch elbow (+exp) wrist (-)
Straudi et al. (2020) RCT (6) NStart=40 NEnd=39 TPS=Subacute A + B vs 0 *Primary listing: Table 16 (Robotics)*	E: Robot-assisted arm therapy + hand functional electrical stimulation (RAT+FES) C: Conventional Therapy Duration: 1hr40min, 5x/wk, 6wks	E vs C: Fugl-Meyers Upper Extremity (-) proximal (-) distal (-) Box and Block Test- affected arm (-) Wolf Motor Function Test functional ability (-) task rate (-) Barthel Index (-) Modified Ashworth Scale (-)
Kim et al. (2020b) RCT (6) NStart=22 NEnd=22 TPS=Not Reported A + B vs A/B *Primary listing: Table 12 (Action Observation)*	E: Action observation training with intrinsic muscle stimulation + conventional therapy C: Action observation training + conventional therapy Duration: 40min/d, 3d/wk, 4wks action observation training + 30min/d, 5d/wk, 4wks conventional therapy	E vs C: Manual Function Test: (no stats) 2-point Discrimination: (no stats) Proprioception: (no stats) stereognosis
Lee et al. (2020b) RCT (6) NStart=28 NEnd=26 TPS=Chronic A + B + C vs A/A + B *Primary listing: Table 12 (Action Observation)*	E: Action Observation with EEG-Mediated Functional Electrical Stimulation Brain-Computer Interface C: Functional Electrical Stimulation Duration: 30min, 5x/wk, 4wks	E vs C: Fugl-Meyer Assessment (+exp) Wolf Motor Function Test (+exp) Motor Acitivty Log (+exp) Modified Barthel Index (+exp) EEG brain waves - Alpha prefrontal area left side (-) prefrontal area on the right side (-) frontal lobe left side (-) frontal lobe right side (-) central lobe left side (+exp) central lobe right side (no stat) EEG brain waves - beta prefrontal area left side (-) prefrontal area on the right side (-) frontal lobe left side (-)

		frontal lobe right side (-) central lobe left side (+exp) central lobe right side (no stat) EEG brain waves - concentration prefrontal area left side (-) prefrontal area on the right side (-) frontal lobe left side (+exp) frontal lobe right side (+exp) central lobe left side (no stat) central lobe right side (no stat) EEG brain waves - activation prefrontal area left side (-) prefrontal area on the right side (-) frontal lobe left side (-) frontal lobe right side (-) central lobe left side (-) central lobe right side (+exp)
Huang et al. (2020) RCT (7) NStart=30 NEnd=30 TPS=Chronic A + B vs A + C *Primary listing: Table 16 (Robotics)*	E: NMES EMG robotic hand C: EMG robotic hand Duration: 3-5d/wk, 7wk (20session in total)	E vs C: FMA (-) ARAT (-) FIM (-) Modified Ashworth scale (+exp) EMG activity level (-) Co-contraction index (-)
Salazar et al. (2020) RCT (9) NStart=30 NEnd=30 TPS=Chronic A + B vs A/B *Primary listing: Table 31 (Transcranial Direct Current Stimulation (tDCS))*	E: Dual tDCS + FES C: Sham tDCS + FES Duration: Not Reported	E vs C: Kinematics Task Movement Time (Reaching) (+exp) Mean Reaching Velocity (+exp) Mean Return Velocity (-) Peak Velocity (-) Smoothness (-) Elbow Range of Motion (-) Trunk forward inclination (-) Grip Strength (+exp) Fugl-Meyers Upper Limb (-)
Park et al. (2020a) RCT (8) NStart=68 NEnd=68 TPS=Chronic A + B vs A/B *Primary listing: Table 11 (Mental Practice)*	E: EMG NMES + mental imagery training C: EMG NMES Duration: 30min/d, 5d/wk, 6wk	E vs C: Action Research Arm Test (-) Fugl Meyer Assessment (-) modified Barthel Index (-)
Qian et al. (2019) RCT (7) NStart=30 NEnd=30 TPS=Chronic A + B1 vs A + B2 *Primary listing: Table 16 (Robotics)*	E1: NMES robotic to distal fingers E2: NMES robotic to proximal wrist-elbow joints Duration: 1hr/d, 3-5d/wk, 7wk (20 session in total)	E1 vs E2: FMA hand/wrist (+exp1) ARAT (-) Mod Ashworth Scale (+exp1) EMG activation (+exp1)
Daly et al. (2019) RCT (5) NStart=36	E1: Distal (wrist/hand Functional Electrical Stimulation)	E1 vs C: Fugl Meyer Assessment Upper Extremity (-)

NEnd=31 TPS=Chronic A + B1 vs A + B2 *Primary listing: Table 16 (Robotics)*	E2: Proximal (Shoulder/elbow) (Functional Electrical Stimulation + inMotion robot) C: FES + Robot assisted Whole arm Duration: 1.5hrs, 5x/wk, 12wks	Arm Motor Assessment Test (-) E2 vs C: Fugl Meyer Assessment Upper Extremity (-) Arm Motor Assessment Test (-) E1 vs E2: Fugl Meyer Assessment Upper Extremity (-) Arm Motor Assessment Test (-) SIS (+exp)
Cruz et al. (2019) RCT (5) NStart=40 NEnd=40 TPS=Chronic A + B vs C *Primary listing: Table 24 (Thermal Stimulation)*	E: Cryotherapy on spastic wrist flexors + Kinesiotherapy C: NMES on wrist extensors Duration: 25min/d, 2d/wk, 8wks	E1 vs E2 vs C: Palmar Grip Strength (-)
Khan et al. (2019) RCT (8) NStart=60 NEnd=60 TPS=Chronic A + B vs A + C vs A *Primary listing: Table 30 (Theta Burst Stimulation (TBS))*	E1: iTBS + Physical therapy E2: FES + Physical therapy C: Physical Therapy Duration: 4wks, 3x stimulation plus 5x physical therapy for 30min	E1 vs C: Fugl-Meyer Assessment: (+exp1) Modified Rankin Scale: (+exp1) Barthel Index: (+exp1) National Institute of Health Stroke Scale: (+exp1) E2 vs C: Fugl-Meyer Assessment: (+exp2) Modified Rankin Scale: (+exp2) Barthel Index: (+exp2) National Institute of Health Stroke Scale: (+exp2) E1 vs E2: Fugl-Meyer Assessment: (-) Modified Rankin Scale: (-) Barthel Index: (-) National Institute of Health Stroke Scale: (-) RMT resting motor threshold
Kirac-Unal et al. (2019) Pilot RCT (6) NStart=27 NEnd=23 TPS=Acute A + B vs 0 *Primary listing: Table 4 (Task-Specific Training)*	E: Task Specific EMG triggered ES therapy + Conventional PT C: Conventional PT Duration: 15 min/d, 5d/wk, for 4wks EMG-triggered ES training, 60min/d, 5d/wk, for 4wks Conventional PT	E vs C: ARAT: Grasp (+exp) Grip (+exp) Pinch (+exp) Gross movement (-) FIM self-care (-) Grip strength (+exp) Brunnstrom recover stages: UE (-), hand (+exp) SIS: strength (-), ADL (-), Hand function (-)
Mathieson et al. (2018) RCT (8) NStart=50 NEnd=47 TPS=Acute A + B vs A/B *Primary listing: Table 10 (Mirror Therapy)*	E1: Functional Electrical Stimulation E2: Mirror Therapy E3: Functional Electrical Stimulation + Mirror Therapy Duration: 30min, 2x/d, 5d/wk for 3wk	E1 vs E2: Action Research Arm Test (+exp) Fugl-Meyer Assessment Upper Extremity component (+exp) Nottingham Extended Activities of Daily Living Test (-) Functional Independence Measure (-) Mini Mental Status Examination (-)

		Attention Processing Tests Level one and two (-) Shape Tests and Star Cancellation Test (-) E1 vs E3: Action Research Arm Test (-) Fugl-Meyer Assessment Upper Extremity component (-) Nottingham Extended Activities of Daily Living Test (-) Functional Independence Measure (-) Mini Mental Status Examination (-) Attention Processing Tests Level one and two (-) Shape Tests and Star Cancellation Test (-) E2 vs E3: Action Research Arm Test (-) Fugl-Meyer Assessment Upper Extremity component (-) Nottingham Extended Activities of Daily Living Test (-) Functional Independence Measure (-) Mini Mental Status Examination (-) Attention Processing Tests Level one and two (-) Shape Tests and Star Cancellation Test (-)
Mohanty et al. (2018) RCT Crossover (3) NStart=20 NEnd=20 TPS=Chronic A + B vs 0 *Primary listing: Table 18 (Brain Computer Interfaces)*	E: EEG Brain-Computer Interface Feedback with Functional Electrical Stimulation C: No Treatment Duration: 2hrs, 3x/wk, 6wks	E vs C: Action Research Arm Test (no stat) Nine-Hole Peg Test (no stat) Barthel Index (no stat) Stroke Impact Scale (no stat)
Shaheiwola et al. (2018) RCT (7) NStart=30 NEnd=30 TPS=Chronic A + B vs A/B *Primary listing: Table 31 (Transcranial Direct Current Stimulation (tDCS))*	E: Bilateral active tDCS+FES C: sham tDCS+FES Duration: 20min tDCS + 1hr FES, 5d/wk, 4wk	E vs C: Fugl-Meyer scale (+exp) Wolf motor function test functional ability score (+exp) task time (+exp) Modified Ashworth scale (-) Surface electromyography evaluation (-) and the transcranial magnetic stimulation (+exp)
Lee et al. (2018c) Pilot RCT (7) NStart=48 NEnd=41 TPS=Chronic A + B vs A/B *Primary listing: Table 17 (Virtual Reality)*	E: Virtual Reality + Functional Electrical Stimulation C: Functional Electrical Stimulation Duration: 30min/d, 5d/wk for 4wk	E vs C: Fugl-Meyer Assessment; Proximal (-) Distal (+exp) Wolf Motor Function Test (-) Box and Block Test (-) Jebsen Taylor Hand Function Test (-) Stroke Impact Scale (-)
Park et al. (2017b) RCT (3) NStart=40 NEnd=32 TPS=Not Reported	E: Mental Practice + EMG NMES + Conventional Rehab C: Conventional Rehab Duration: 30min/d, 5d/wk for 4wk	E vs C: Fugl-Meyer Assessment (+exp) Motor Activity Log (+exp)

A + B vs 0 *Primary listing: Table 11 (Mental Practice)*		
Barker et al. (2017) RCT (7) NStart=50 NEnd=50 TPS=Subacute A + B vs A/B vs 0 *Primary listing: Table 16 (Robotics)*	E1: SMART arm + outcome triggered electrical stim + usual therapy E2: SMART arm + usual therapy C: Usual therapy Duration: 60min/d, 5d/wk, 4wk	E1/E2 vs C: Motor assessment scale (-) Modified Ashworth Scale (-) Triceps strength measured using Medical Research Council manual muscle testing (-) Ritchie Articular Index (-) SIS (-) MAL (-)
Tosun et al. (2017) RCT (6) NStart=25 NEnd=25 TPS=Subacute A + B vs A/B vs 0 *Primary listing: Table 29 (Repetitive Transcranial Magnetic Stimulation (rTMS))*	E1: low frequency rTMS E2: low frequency rTMS + NMES C: Standard Physical therapy Duration: 5d/wk, 4wk PT and NMES; 20 mins/d, 5d/wk, 2wk rTMS	E1/E2 vs C: Brunnstrom Recovery Stages (-) Fugl-Meyer Assessment-UE (-) Motricity Index-UE (-) Modified Ashworth Scale (-) Barthel Index (-) fMRI parameters (-)
Hochsprung et al. (2017) Pilot RCT (4) NStart=31 NEnd=21 TPS=Acute A vs B vs 0 *Primary listing: Table 9 (Orthotics and Taping)*	E1: Kinesiotaping + Conventional Treatment E2: Neuromuscular electrical stimulation + Conventional Treatment C: Conventional treatment Duration: 7d/wk, 25-30mins/d conventional treatment, 6d/wk KT 4wks, 30mins per session 7d/wk NMES	E1/E2 vs C: pain Visual Analogue Scale (no stat) Barthel Index (no stat) Berg balance Scale (no stat) Arm Research Arm Test (no stat)
Takebayashi et al. (2017) Pilot RCT (6) NStart=20 NEnd=19 TPS=Chronic A + B + C vs A/A + B *Primary listing: Table 31 (Transcranial Direct Current Stimulation (tDCS))*	E: dual-tDCS combined with PNMES + CIMT C: CIMT Duration: 2hr CIMT & 20min tDCS & 10min PNMES , 2x/d, 5d/wk, 2wk	E vs C: Fugl-Meyer Assessment-UE (+exp) Motor Activity Log AOU (+exp) QOM (-)
Jang et al. (2016b) RCT (6) NStart=23 NEnd=20 TPS=Subacute A + B vs A/B *Primary listing: Table 18 (Brain Computer Interfaces)*	E: Brain-computer interface (BCI) + functional electrical stimulation (FES) C: Functional Electrical Stimulation Duration: 30min/d, 5d/wk, 6wks	E vs C: Vertical Shoulder Subluxation (+exp) Horizontal Shoulder Subluxation (-) Visual Analogue Scale Pain (-) Modified Ashworth Scale (-) Manual Function Test (-) Shoulder Flexion (+exp) Shoulder Abduction (+exp) Touching the occiput with palm (-) Touching the back with palm (-) Grasping (-) Pinching (-) Carrying cubes (-) Pegboard Manipulation (-)
Kwakkel et al. (2016) RCT (7) NStart=159	E1: mCIMT E2: EMG-NMES C: Usual care	E1 vs C: ARAT (+exp1) FMA-UE (-)

NEnd=159 TPS=Subacute A vs B vs 0 *Primary listing: Table 6 (Constraint-Induced Movement Therapy (CIMT))*	Duration: E1: 60min/session, 3hrs/d, 5wks; E2: 60min/session for 3wks; C: 30min/d for 2months	MI-UE (-) Erasmus modified Nottingham Sensory Assessment (-) SIS-hand (+exp) WMFT (-) Frenchay Arm Test (-) MAL (-) NHPT (-) E2 vs C: ARAT (-) FMA-UE (-) MI-UE (-) Erasmus modified Nottingham Sensory Assessment (-) SIS-hand (-) WMFT (-) Frenchay Arm Test (-) MAL (-) NHPT (-)
Kim et al. (2016b) RCT (7) NStart=34 NEnd=30 TPS=Chronic A + B + C vs 0 *Primary listing: Table 12 (Action Observation)*	E: FES with Action observation training and brain computer interface C: Conventional therapy Duration: E: 30min/session, 3sessions/wk, 4wks; C: 30min/session, 1session/d, 4wks;	E vs C: FMA (+exp) Motor activity log (+exp) mod BI (+exp) wrist flexion (+exp)
Amasyali et al. (2016) Pilot RCT (5) NStart=24 NEnd=21 TPS=Subacute A vs B vs 0 *Primary listing: Table 10 (Mirror Therapy)*	E1: Mirror therapy E2: EMG-triggered neuromuscular stimulation C: Conventional care Duration: E1/E2: 30min/d, 5d/wk, 3wks; C: 2h/d, 5d/wk, 3wks	E vs C: E1/2 v C: Wrist Extension (-) Grip Force (-) Box and Blocks Test (-) Fugl-Meyer Upper Extremity (+exp1) E1 vs E2: Wrist Extension (-) Grip Force (-) Box and Blocks Test (-) Fugl-Meyer Upper Extremity (-)
Hu et al. (2015) RCT (6) NStart=26 NEnd=26 TPS=Chronic A + B vs A + C *Primary listing: Table 16 (Robotics)*	E1: EMG NMES robot E2: EMG robot Duration: 3-5 sessions/wk, 20 sessions total/7wks	E1 vs E2: FMA Shoulder/elbow (+exp1) Wrist/hand (-) Mod Ashworth score (-) ARAT (exp1+) EMG parameters
Lee et al. (2015b) RCT (7) NStart=39 NEnd=39 TPS=Chronic A + B vs A/B *Primary listing: Table 16 (Robotics)*	E: NMES+robot therapy C: Robot therapy+Sham Duration: 90-100min/d, 5d/wk for 4wks	E vs C: Modified Ashworth scale (-) WMFT quality of movement (-) SIS hand function (-) UE-FMA (-) Motor activity log (-)

McCabe et al. (2015) RCT (7) NStart=39 NEnd=35 TPS=Chronic A + B vs A + C vs A *Primary listing: Table 16 (Robotics)*	E1: Robotic training (InMotion ARM) + motor learning E2: Motor learning + functional electrical stimulation C: Motor learning Duration: 5hr/d, 5d/wk for 12wk	E1 vs E2 vs C: Arm Motor Ability Test: Function (-) Shoulder elbow (-) Wrist Hand (-) Fugl-Meyer Assessment: Shoulders and Elbows (-) Wrists/Hands (-)
Gharib et al. (2015) RCT (8) NStart=40 NEnd=40 TPS=Chronic A + B vs A/B *Primary listing: Table 4 (Task-Specific Training)*	E: Electrical stim+repetitive task practice C: Sham electrical +repetitive task practice Duration: 3x/wk; 2mo	E vs C: Motor assess Scale (+exp) JTHFT (+exp)
Kim et al. (2015c) Pilot RCT (5) NStart=33 NEnd=29 TPS=Chronic A + B1 vs A + B2 vs 0 *Primary listing: Table 10 (Mirror Therapy)*	E1: Functional electrical stimulation with biofeedback + mirror therapy E2: FES + mirror therapy C: Conventional rehabilitation Duration: 30 min/d, 5d/wk for 4 wk	E1 vs C: Functional Independence Measure (+exp) Jebsen Taylor Hand test (+exp) Manual Muscle Test wrist extension (+exp) wrist flexion (-) elbow extension (-) elbow flexion (-) Box and Block Test (+exp) ROM wrist extension (-) wrist flexion (-) elbow extension () elbow flexion (-) Grip strength (-) Modified Ashworth Scale (-) SSQOL (+exp) E1 vs E2: Functional Independence Measure (-) Jebsen Taylor Hand test (+exp) Manual Muscle Test (+exp) Box and Block Test (+exp) ROM wrist extension (-) wrist flexion (-) elbow extension () elbow flexion (-) Grip strength (+exp) SSQOL (+exp)
Lin et al. (2014a) RCT (7) NStart=43 NEnd=42 TPS=Chronic A + B vs A/B vs 0 *Primary listing: Table 10 (Mirror Therapy)*	E1: Mirror therapy + Mesh glove (afferent stimulation, primarily NMES) E2: Mirror therapy C: task oriented exercise Duration: 90min/d, 5d/wk for 4wk	E1 vs C: FMA (+exp1) BBT (-) 10MWT (-) MAL (-) ABILHAND (-) E2 vs C: FMA (+exp2) BBT (+con)

		10MWT (+con) MAL (-) ABILHAND (-) E1 vs E2: FMA (-) BBT (+exp1) 10MWT (+exp1) MAL (-) ABILHAND (-)
Santamato et al. (2013) RCT (6) NStart=32 NEnd=32 TPS=Chronic A + B vs A + C *Primary listing: Table 26 (Extracorporeal Shockwave Therapy)*	E: Botolinum Toxin-A + Extracorporeal shock wave therapy (ESWT) C: BTX-A + electrical stimulation (ES) Duration: E: single dose BTX-A + 1x/d, 5d ESWT; C: single dose BTX-A + 30min, 2x/d, 5d ES	E vs C: modified Ashworth scale (+exp) spasm frequency scale (+exp) visual analogue scale (+exp) PAIN vas (+EXP)
deJong et al. (2013) RCT (8) NStart=48 NEnd=46 TPS=Subacute A + B vs 0 *Primary listing: Table 8 (Stretching Programs)*	E: Static arm positioning + NMES C: Sham positioning and sham NMES Duration: 45min/session; 2x/d, 5x/wk, 8wk	E vs C: Passive range of motion Shoulder external rotation (-) Flexion and abduction (-) Elbow extension (-) Forearm supination (-) Wrist extension with extended fingers (-) Flexed fingers (-) Tardieu Scale (-) Leeds Adult/Arm Spasticity Impact Scale (-) Fugl-Meyer Assessment Upper Extremity (-) ShoulderQ which was used to assess shoulder pain
Su-jeonYOU et al. (2013) Pilot RCT (6) NStart=18 NEnd=16 TPS=Chronic A + B vs C *Primary listing: Table 11 (Mental Practice)*	E: Mental training linked with EMG triggered stimulation C: FES Duration: 40 min/d, 2d/wk, 4wk	E vs C: Range of Motion- wrist joint (-) Modified Ashworth Scale (-) Fugl-Meyer Assessment-UE (+exp) shoulder (+exp) wrist (+exp) hand (-) coordination (-) Motor Activity Log AOU (-) QOM (-) Modified Barthel Index (-) Root mean square of extensor muscles of forearm (-)
Hong et al. (2012) RCT (8) NStart=14 NEnd=14 TPS=Chronic A + B vs C *Primary listing: Table 11 (Mental Practice)*	E: Mental Imagery Training + EMG-Triggered Electrical Stimulation C: Generalized Functional Electric Stimulation Duration: 20min/d, 2x/d, 5d/wk, 4wks	E vs C: Fugl-Meyer Assessment- Upper Extremity (+exp) MAL Amount of Use (-) Modified Ashworth Scale (-) MAL Quality of Movement (-) Modified Barthel Index (-)

El-Bahrawy et al. (2012) RCT (8) NStart=40 NEnd=40 TPS=Chronic A + B vs A + C *Primary listing: Table 1 (Neurodevelopmental Techniques)*	E: Motor relearning+electrical stim C: Bobath treatment+electrical stim Duration: 2hr session/d, 3d/wk, 6wk + 30min electrical stim/session	E vs C: Jamar hand dynamometer (+con) Purdue pegboard test (-) modifed Ashworth scale (-) resting angle of the wrist ulnar deviation was measured by electro-geniometer
Sahin et al. (2012) RCT (6) NStart=44 NEnd=42 TPS=Chronic A + B vs A/B *Primary listing: Table 1 (Neurodevelopmental Techniques)*	E: PNF + NMES C: PNF Duration: 15min, 5d/wk for 4wk	E vs C: modified Ashworth scale (+exp) PROM (+exp) BRS (+exp) FIM (+exp) Fmax/Mmax ratio (-)
Shindo et al. (2011) Pilot RCT (4) NStart=24 NEnd=20 TPS=Subacute A + B vs A/B *Primary listing: Table 9 (Orthotics and Taping)*	E: integrated volitional electrical stimulator (IVES) + wrist splint C: wrist splint Duration: 45 min IVES & 8hr splint/d, 3d/wk, 3 wk	E vs C: Fugl-Meyer Assessment (+exp) distal (+exp) proximal (-) Motor Activity Log AOU (-) QOM (-) Action Research Arm Test (-) improvement ratio (+exp)
Alon et al. (2009) RCT (4) NStart=46 NEnd=46 TPS=Acute A + B vs A/B *Primary listing: Table 4 (Task-Specific Training)*	E: FES + Task-specific training C: Task-specific training Duration: 30min, 2x/d, for 12wk	E vs C: Fast recovery profile Fugl-Meyer Assessment Upper Extremity (+exp) Box and Blocks Test (+exp) Jebsen-Taylor Light Object Lift (+exp) Slow recovery profile Fugl-Meyer Assessment Upper Extremity (+exp) Box and Blocks Test (+exp) Jebsen-Taylor Light Object Lift (-)
Cauraugh et al. (2009) RCT (5) NStart=30 NEnd=29 TPS=Chronic A + B1 vs A + B2 vs C *Primary listing: Table 2 (Bilateral Arm Training)*	E1: Coupled bilateral training with load + EMG-triggered NMES E2: Coupled bilateral training with no load + EMG-triggered NMES C: unilateral arm training Duration: 90min/d, 4d/2wk	E1 vs C: BBT (+exp1) Motor reaction time (+exp1) E2 vs C: BBT (+exp1) Motor reaction time (-) E1 vs E2: BBT (-) Motor reaction time (+exp1) Sustained contraction task
Hesse et al. (2008a) RCT (8) NStart=54 NEnd=52 TPS=Subacute A vs B *Primary listing: Table 16 (Robotics)*	E1: Mechanical arm trainer E2: Electrical muscle stimulation of paretic wrist extensors Duration: 20-30min/d, 5d/wk for 6wk	E1 vs E2: FMA (-) BBT (+exp) Medical research council,(-) Mod Ashworth scale (-)

Barker et al. (2008) RCT (5) NStart=42 NEnd=33 TPS=Chronic A + B vs A/B vs 0 *Primary listing: Table 16 (Robotics)*	E1: SMART arm with electrical stim E2: SMART arm alone C: No Treatment Duration: 60min/d, 3/wk, 4wk	E1/E2 vs C: Motor assessment scale (+exp) Modified Ashworth Scale (+exp) Reaching Kinematics (-) EMG data (+exp1,exp2) E1 vs E2: Reaching Kinematics (-) EMG data (-)
Hemmen et al. (2007) RCT (5) NStart=27 NEnd=22 TPS=Subacute A + B vs C *Primary listing: Table 11 (Mental Practice)*	E: Arm hand function training (EMG triggered biofeedback + movement imagery)+usual therapy C: Electrical stimulation (without the EMG-triggered feedback function) + usual therapy Duration: 30min/d, 5d/wk, 3mo	E vs C: Fugl-Meyer Assessment (-) Action Research Arm test (-)
Hesse et al. (2005) RCT (7) NStart=44 NEnd=39 TPS=Subacute A vs B *Primary listing: Table 16 (Robotics)*	E: Robotic Assisted Therapy (Bi-Manu-track robot) C: EMG-initiated electrical stimulation Duration: 20min/d, 5d/wk, 6wks robot therapy	E vs C: Fugl-Meyer Assessment (+exp) Medical Research Council (+exp) Modified Ashworth Scale (-)
Daly et al. (2005) RCT (5) NStart=13 NEnd=12 TPS=Chronic A + B vs A + C *Primary listing: Table 16 (Robotics)*	E1: Robotics + motor learning E2: Functional Neuromuscular Stimulation + motor learning Duration: 5hr/d, 5d/wk, 12wk	E1 vs E2: Arm Motor Ability Test Shoulder/Elbow Wrist/hand Fugl-Meyer Upper Extremity Target Accuracy Smoothness of Movement
Cauraugh et al. (2005) RCT (4) NStart=21 NEnd=21 TPS=Chronic A + B vs A + C *Primary listing: Table 2 (Bilateral Arm Training)*	E1: Bilateral movements + active EMG-triggered neuromuscular stimulation E2: Unilateral + active EMG-triggered neuromuscular stimulation Duration: 90min/d, 4d/wk, 2wks	E1 vs E2: Reaction time (-) Movement time (+exp1) peak velocity (+exp1) deceleration time (+exp1)
Cauraugh et al. (2003b) RCT (3) NStart=20 NEnd=20 TPS=Chronic A + B vs A + C *Primary listing: Table 2 (Bilateral Arm Training)*	E1: Unilateral movement + EMG-NMES E2: Bilateral movement + EMG-NMES Duration: 6h over 2wks	E1 vs E2: EMG activation levels (+exp2)

Abbreviations and table notes: C=control group; D=days; E=experimental group; H=hours; Min=minutes; RCT=randomized controlled trial; TPS=time post stroke category (Acute: less than 30 days, Subacute: more than 1 month but less than 6 months, Chronic: over 6 months); Wk=weeks.

+exp indicates a statistically significant between groups difference at α=0.05 in favour of the experimental group

+exp1/+exp2/+exp3 indicates a statistically significant between groups difference at α=0.05 in favour of the first, second or third experimental group

+con indicates a statistically significant between groups difference at α=0.05 in favour of the control group

- indicates no statistically significant between groups differences at α=0.05

1. Body Functions and Structures

MOTOR FUNCTION			
LoE	**Conclusion Statement**	**RCTs**	**References**
1b	120min electrical stimulation with repetitive task specific practice may produce greater improvements in motor function than 60min electrical stimulation therapy with repetitive task specific practice or 30min electrical stimulation therapy and repetitive task specific practice.	1	Page et al. (2012)
1a	Different approaches to functional electrical stimulation combined with other interventions may not have a difference in efficacy when compared with one another for improving motor function.	2	Knutson et al. (2016); Kowalczewski et al. (2007)
1b	Bilateral arm training with functional electrical stimulation and conventional occupational therapy may produce greater improvements in motor function than Bilateral arm training with sham functional electrical stimulation and conventional occupational therapy.	1	Chan et al. (2009)
1b	Neuromuscular electrical stimulation combined with other interventions may produce greater improvements in motor function than sham.	1	Boyaci et al. (2013)
1b	Functional electrical stimulation may not have a difference in efficacy when compared to conventional therapy for improving motor function.	5	Demir et al. (2018); NakipoğluYuzer et al. (2017); Tarkka et al. (2011); Thrasher et al. (2008); Popovic et al. (2003)
2	Functional electrical stimulation combined with other interventions may not have a difference in efficacy when compared to fes for improving motor function.	2	Knutson et al. (2024); Li et al. (2014)
1a	Neuromuscular electrical stimulation may produce greater improvements in motor function than sham.	3	Lavi et al. (2022); Church et al. (2006); Chae et al. (1998)
1a	Neuromuscular electrical stimulation may produce greater improvements in motor function than conventional therapy.	8	Kara et al. (2021); Tilkici et al. (2017); Cui et al. (2015); Mohamed Faisal et al. (2012); Rosewilliam et al. (2012); Lin et al. (2011); Hsu et al. (2010); Powell et al. (1999)
2	High neuromuscular electrical stimulation may not have a difference in efficacy when compared to Low neuromuscular electrical stimulation for improving motor function.	1	Hsu et al. (2010)
1a	There is conflicting evidence about the effect of Functional electrical stimulation combined with other interventions when compared to neuromuscular electrical stimulation for improving motor function.	4	Huang et al. (2021a); Knutson et al. (2020); Zheng et al. (2019); Shen et al. (2015)
2	There is conflicting evidence about the effect of Arm with Hand Contralaterally Controlled Functional Electrical Stimulation when compared to Hand contralaterally controlled functional electrical stimulation or Arm with Hand Cyclic Neuromuscular Electrical Stimulation for improving motor function.	1	Knutson et al. (2020)
1b	Neuromuscular Electrical Stimulation with Conventional Rehabilitation may not have a difference in efficacy when compared to Noxious Thermal Stimulation with Conventional Rehabilitation or Thermal Stimulation, Neuromuscular Electrical stimulation and Conventional Rehabilitation for improving motor function.	1	Chen et al. (2019a)
1b	Neuromuscular electrical stimulation with repetitive transcranial magnetic stimulation may not have a difference in efficacy when compared to Sham neuromuscular electrical stimulation with	1	Etoh et al. (2019)

	repetitive transcranial magnetic stimulation for improving motor function.		
1b	Cyclic Neuromuscular Electrical Stimulation may not have a difference in efficacy when compared to Electromyographically-triggered Neuromuscular Electrical Stimulatiom or Sensory Stimulation for improving motor function.	1	Wilson et al. (2016)
1b	Electromyography-triggered neuromuscular electrical stimulation with repetitive transcranial magnetic stimulation may not have a difference in efficacy when compared to electromyography-triggered neuromuscular electrical stimulation with Sham repetitive transcranial magnetic stimulation for improving motor function.	1	Theilig et al. (2011)
1b	There is conflicting evidence about the effect of Functional electrical stimulation combined with other interventions when compared to task-specific training for improving motor function.	3	Jonsdottir et al. (2017); Alon et al. (2008); Alon et al. (2007)
1b	Neuromuscular electrical stimulation combined with other interventions may not have a difference in efficacy when compared to orthotics for improving motor function.	1	Yu et al. (2004)
2	Contralaterally controlled functional electrical stimulation with Task specific training may produce greater improvements in motor function than Cyclic neuromuscular electrical stimulation with Task specific training.	1	Knutson et al. (2012)
1b	Different approaches to neuromuscular electrical stimulation may not have a difference in efficacy when compared with one another for improving motor function.	2	Maeda et al. (2024); deKroon et al. (2004)
1b	Electromyography-triggered neuromuscular electrical stimulation may not have a difference in efficacy when compared to cyclic neuromuscular electrical stimulation for improving motor function.	1	deKroon et al. (2008)
1b	Motor electrical stimulation involving cyclic (neuromuscular electrical stimulation) and electromyography may not have a difference in efficacy when compared to Percutaneous Sensory electrical stimulation for improving motor function.	1	Chae et al. (2009)
1b	There is conflicting evidence about the effect of Functional Electrical Stimulation with Mirror Therapy when compared to Functional Electrical Stimulation with Sham Mirror Therapy for improving motor function.	1	Kim et al. (2014a)
1b	Electromyography-triggered neuromuscular electrical stimulation combined with other interventions may not have a difference in efficacy when compared to emg-triggered nmes for improving motor function.	2	Schick et al. (2017); Kim et al. (2016d)
1b	Electromyogrpahical bridge may produce greater improvements in motor function than Cyclic neuromuscular electrical stimulation.	1	Zhou et al. (2017)
1a	Neuromuscular electrical stimulation combined with other interventions may not have a difference in efficacy when compared to conventional therapy for improving motor function.	4	Alazab I.M. et al. (2022); Ohnishi et al. (2022); Zhou et al. (2018); ShimodozoNo et al. (2014)
2	Neuromuscular electrical stimulation with Conventional therapy may not have a difference in efficacy when compared to Peripheral Pulse Electromagnetic Waves (rPMS) with Conventional therapy for improving motor function.	1	Alazab I.M. et al. (2022)
1b	Neuromuscular electrical stimulation with conventional rehabilitation may not have a difference in efficacy when compared to transcutaneous electrical nerve stimulation with conventional rehabilitation for improving motor function.	1	Zhou et al. (2018)

1a	There is conflicting evidence about the effect of Functional electrical stimulation combined with other interventions when compared to conventional therapy for improving motor function.	3	Zhang et al. (2024b); Akter et al. (2023); Carda et al. (2017)
2	Electromyography-triggered neuromuscular electrical stimulation may not have a difference in efficacy when compared to conventional therapy for improving motor function.	1	Cauraugh et al. (2000)
1b	Different approaches to electromyography-triggered neuromuscular electrical stimulation combined with other interventions may not have a difference in efficacy when compared with one another for improving motor function.	3	Chuang et al. (2017); Kojima et al. (2014); Bhatt et al. (2007)
1b	Electromuscular Stimulation may not have a difference in efficacy when compared to Transcutaneous Electrical Nerve Stimulation for improving motor function.	1	Yurdakul et al. (2020)
1b	CNMES with task oriented training and conventional rehab may not have a difference in efficacy when compared to electromyography-triggered neuromuscular electrical stimulation with task oriented training and conventional rehab for improving motor function.	1	Schick et al. (2022)
2	Functional electrical stimulation may not have a difference in efficacy when compared to No treatment for improving motor function.	1	Hohler et al. (2024)
2	Position triggered ES with conventional rehabilitation may not have a difference in efficacy when compared to Passive ES with conventional rehabilitation for improving motor function.	1	Hong et al. (2021)
2	Arm hand function training (electromyography triggered biofeedback with movement imagery) and usual therapy may not have a difference in efficacy when compared to Electrical stimulation (without the electromyography-triggered feedback function) with usual therapy for improving motor function.	1	Hemmen et al. (2007)
2	Mental Practice with electromyography neuromuscular electrical stimulation and Conventional Rehab may produce greater improvements in motor function than Conventional Rehab.	1	Park et al. (2017b)
1b	Mirror therapy with Mesh glove (afferent stimulation, primarily neuromuscular electrical stimulation) may produce greater improvements in motor function than task oriented exercise.	1	Lin et al. (2014a)
1b	Mirror therapy with Mesh glove (afferent stimulation, primarily neuromuscular electrical stimulation) may not have a difference in efficacy when compared to Mirror therapy for improving motor function.	1	Lin et al. (2014a)
2	Functional electrical stimulation with Task-specific training may produce greater improvements in motor function than Task-specific training.	1	Alon et al. (2009)
1b	Functional Electrical Stimulation may produce greater improvements in motor function than Mirror Therapy.	1	Mathieson et al. (2018)
1b	Functional Electrical Stimulation may not have a difference in efficacy when compared to Functional Electrical Stimulation with Mirror Therapy for improving motor function.	1	Mathieson et al. (2018)
1b	Mirror Therapy may not have a difference in efficacy when compared to Functional Electrical Stimulation with Mirror Therapy for improving motor function.	1	Mathieson et al. (2018)
1b	Mechanical arm trainer may not have a difference in efficacy when compared to Electrical muscle stimulation of paretic wrist extensors for improving motor function.	1	Hesse et al. (2008a)
1b	Botulinum Toxin A injection with neuromuscular electrical stimulation may produce greater improvements in motor function than Placebo with neuromuscular electrical stimulation.	1	Lindsay et al. (2020)

1b	Brain-computer interface with functional electrical stimulation may not have a difference in efficacy when compared to Functional Electrical Stimulation for improving motor function.	1	Jang et al. (2016b)
1b	Low frequency repetitive transcranial magnetic stimulation may not have a difference in efficacy when compared to Physical therapy for improving motor function.	1	Tosun et al. (2017)
1b	Robot-assisted arm therapy with hand functional electrical stimulation (RAT and functional electrical stimulation) may not have a difference in efficacy when compared to Conventional Therapy for improving motor function.	1	Straudi et al. (2020)
1b	Robotic Assisted Therapy (Bi-Manu-track robot) may produce greater improvements in motor function than electromyography-initiated electrical stimulation.	1	Hesse et al. (2005)
1b	Robot Exoskeleton with electromyography-Triggered functional electrical stimulation (RETRAINER) may produce greater improvements in motor function than Conventional Therapy.	1	Ambrosini et al. (2021)
1b	Modified constraint-induced movement therapy may not have a difference in efficacy when compared to Usual care for improving motor function.	1	Kwakkel et al. (2016)
1b	Mental Imagery Training with electromyography-Triggered Electrical Stimulation may produce greater improvements in motor function than Generalized Functional Electric Stimulation.	1	Hong et al. (2012)
1b	There is conflicting evidence about the effect of Electromyography neuromuscular electrical stimulation robot when compared to electromyography robot for improving motor function.	1	Hu et al. (2015)
1b	Action Observation with EEG-Mediated Functional Electrical Stimulation Brain-Computer Interface may produce greater improvements in motor function than Functional Electrical Stimulation.	1	Lee et al. (2020b)
1b	Neuromuscular electrical stimulation electromyography robotic hand may not have a difference in efficacy when compared to electromyography robotic hand for improving motor function.	1	Huang et al. (2020)
1b	There is conflicting evidence about the effect of Neuromuscular electrical stimulation robotic to distal fingers when compared to neuromuscular electrical stimulation robotic to proximal wrist-elbow joints for improving motor function.	1	Qian et al. (2019)
1b	Dual transcranial direct current stimulation with functional electrical stimulation may not have a difference in efficacy when compared to Sham transcranial direct current stimulation with functional electrical stimulation for improving motor function.	1	Salazar et al. (2020)
1b	Bilateral active transcranial direct current stimulation with functional electrical stimulation may produce greater improvements in motor function than sham transcranial direct current stimulation with functional electrical stimulation.	1	Shaheiwola et al. (2018)
1b	Functional electrical stimulation with Action observation training and brain computer interface may produce greater improvements in motor function than Conventional therapy.	1	Kim et al. (2016b)
2	Distal (wrist or hand Functional Electrical Stimulation) may not have a difference in efficacy when compared to functional electrical stimulation with Robot assisted Whole arm for improving motor function.	1	Daly et al. (2019)
2	Distal (wrist or hand Functional Electrical Stimulation) may not have a difference in efficacy when compared to Proximal (Shoulder or elbow) (Functional Electrical Stimulation with inMotion robot) for improving motor function.	1	Daly et al. (2019)

1b	Neuromuscular electrical stimulation with robot therapy may not have a difference in efficacy when compared to Robot therapy with Sham for improving motor function.	1	Lee et al. (2015b)
1b	Robotic training (InMotion ARM) with motor learning may not have a difference in efficacy when compared to Motor learning for improving motor function.	1	McCabe et al. (2015)
1b	Electrical stim with repetitive task practice may produce greater improvements in motor function than Sham electrical with repetitive task practice.	1	Gharib et al. (2015)
1b	Static arm positioning with neuromuscular electrical stimulation may not have a difference in efficacy when compared to Sham positioning and sham neuromuscular electrical stimulation for improving motor function.	1	deJong et al. (2013)
1b	Intermittent theta burst stimulation with Physical therapy may produce greater improvements in motor function than Physical Therapy.	1	Khan et al. (2019)
1b	Intermittent theta burst stimulation with Physical therapy may not have a difference in efficacy when compared to functional electrical stimulation with Physical therapy for improving motor function.	1	Khan et al. (2019)
1b	Electromyography neuromuscular electrical stimulation with mental imagery training may not have a difference in efficacy when compared to electromyography neuromuscular electrical stimulation for improving motor function.	1	Park et al. (2020a)
1b	Functional electrical stimulation with brain-computer interface may produce greater improvements in motor function than neuromuscular electrical stimulation.	1	Chen et al. (2021e)
1b	Repetitive peripheral sensory stimulation with functional electrical stimulation and task specific training may not have a difference in efficacy when compared to Sham RPSS with functional electrical stimulation and TST for improving motor function.	1	Conforto et al. (2021)
2	Purposeful activity with electrical stimulation therapy (functional electrical stimulation) and occupational therapy may produce greater improvements in motor function than occupational therapy.	1	Minami et al. (2021)
1b	Bilateral transcranial direct current stimulation with neuromuscular electrical stimulation and coventional care may not have a difference in efficacy when compared to Sham transcranial direct current stimulation and neuromuscular electrical stimulation with conventional care for improving motor function.	1	Wei et al. (2022)
1b	Low-frequency repetitive transcranial magnetic stimulation with functional electrical stimulation and conventional rehab may produce greater improvements in motor function than functional electrical stimulation with conventional rehab.	1	Yang et al. (2022b)
1b	Low-frequency repetitive transcranial magnetic stimulation with functional electrical stimulation and conventional rehab may produce greater improvements in motor function than Low-frequency repetitive transcranial magnetic stimulation with conventional rehab.	1	Yang et al. (2022b)
1b	Electromyography bridge therapy with conventional therapy may not have a difference in efficacy when compared to neuromuscular electrical stimulation with conventional rehab for improving motor function.	1	Zhao Q. et al. (2022)
2	Brain-computer interface-functional electrical stimulation with Conventional rehab may not have a difference in efficacy when compared to functional electrical stimulation with Conventional Rehab for improving motor function.	1	Zhan et al. (2022)

2	Functional electrical stimulation-Biofeedback mirror therapy with conventional may produce greater improvements in motor function than Mirror therapy with conventional rehab.	1	Kim et al. (2023a)
1b	Motor imagery brain-computer interface with conventional rehab may produce greater improvements in motor function than functional electrical stimulation with conventional rehab.	1	Liu et al. (2023)
1b	Portable brain-computer interface-based hand robot system with Conventional therapy and neuromuscular electrical stimulation may produce greater improvements in motor function than Task-specific training with Conventional therapy and neuromuscular electrical stimulation.	1	Fu J. et al. (2023)
1b	Brain-computer interface with functional electrical stimulation may produce greater improvements in motor function than Sham brain-computer interface with functional electrical stimulation.	1	Zhang et al. (2023a)
2	Robot therapy with Electroymography-triggered neuromuscular electrical stimulation (ENMES) may produce greater improvements in motor function than Robot therapy or ENMES.	1	Yang et al. (2024)
2	Functional electrical stimulation may not have a difference in efficacy when compared to routine therapy for improving motor function.	1	Wang et al. (2000)
2	Functional electrical therapy applied in the acute phase may produce greater improvements in motor function than functional electrical therapy applied in the chronic phase.	1	Popovic et al. (2004)
2	Cyclic neuromuscular electrical stimulation with mirror therapy may produce greater improvements in motor function than neuromuscular electrical stimulation or mirror therapy alone.	1	Yun et al. (2011)
2	FES with Conventional rehab may produce greater improvements in motor function than Sham FES with Conventional rehab.	1	Niu C.M. et al. (2022)
1b	EMG-Controlled FES during task oriented training with Robotic training may produce greater improvements in motor function than Conventional rehab (TST).	1	Perini et al. (2020)
2	Different approaches to FES may not have a difference in efficacy when compared with one another for improving motor function.	1	Jeon et al. (2017)
1b	There is conflicting evidence about the effect of EMG driven NMES Robot arm when compared to Conventional Therapy for improving motor function.	1	Qian et al. (2017)
1b	Long NMES (12Hr) may produce greater improvements in motor function than Short NMES (30min).	1	Cui et al. (2015)
1b	FES with Task specific training may produce greater improvements in motor function than Sham with Task specific training.	1	Thorsen et al. (2013)
1b	FES with botulinum toxin-A and home based task-oriented exercise may not have a difference in efficacy when compared to Botulinum toxin-A with home-based exercise program for improving motor function.	1	Weber et al. (2010)
1b	Neuromuscular electrical stimulation combined with other interventions may produce greater improvements in motor function than stretching and positioning programs.	1	Mann et al. (2005)
2	EMG triggered NMS (EMG-Stim) with Wrist Strengthening Exercises may produce greater improvements in motor function than Wrist Exercises.	1	Francisco et al. (1998)
1b	There is conflicting evidence about the effect of Transcranial Random Noise stimulation (tRNS) with FES when compared to Sham-tRNS with active FES for improving motor function.	1	Sethi et al. (2023)

1b	Task Specific EMG triggered ES therapy with Conventional PT may produce greater improvements in motor function than Conventional PT.	1	Kirac-Unal et al. (2019)
1b	Virtual Reality with Functional Electrical Stimulation may not have a difference in efficacy when compared to Functional Electrical Stimulation for improving motor function.	1	Lee et al. (2018c)
1b	Dual-tDCS combined with PNMES with CIMT may produce greater improvements in motor function than CIMT.	1	Takebayashi et al. (2017)
2	Mirror therapy may not have a difference in efficacy when compared to EMG-triggered neuromuscular stimulation for improving motor function.	1	Amasyali et al. (2016)
2	Functional electrical stimulation with biofeedback with mirror therapy may produce greater improvements in motor function than Conventional rehabilitation.	1	Kim et al. (2015c)
2	Functional electrical stimulation with biofeedback with mirror therapy may produce greater improvements in motor function than FES with mirror therapy.	1	Kim et al. (2015c)
1b	Mental training linked with EMG triggered stimulation may produce greater improvements in motor function than FES.	1	Su-jeonYOU et al. (2013)
2	Integrated volitional electrical stimulator (IVES) with wrist splint may produce greater improvements in motor function than wrist splint.	1	Shindo et al. (2011)
1b	Dry Needling with FES and conventional exercise may produce greater improvements in motor function than Sham-Needling with FES and Conventional exercise.	1	Panahi et al. (2024)
2	EMG-triggered neuromuscular stimulation may not have a difference in efficacy when compared to Conventional care for improving motor function.	1	Amasyali et al. (2016)

STROKE SEVERITY			
LoE	**Conclusion Statement**	**RCTs**	**References**
1a	Functional electrical stimulation may produce greater improvements in stroke severity than conventional therapy.	4	NakipoğluYuzer et al. (2017); Karakus et al. (2013); Mangold et al. (2009); Thrasher et al. (2008)
1a	Neuromuscular electrical stimulation may not have a difference in efficacy when compared to conventional therapy for improving stroke severity.	3	Kara et al. (2021); Tilkici et al. (2017); Powell et al. (1999)
1b	There is conflicting evidence about the effect of Functional Electrical Stimulation with Mirror Therapy when compared to Functional Electrical Stimulation with Sham Mirror Therapy for improving stroke severity.	1	Kim et al. (2014a)
1b	Electromuscular Stimulation may not have a difference in efficacy when compared to Transcutaneous Electrical Nerve Stimulation for improving stroke severity.	1	Yurdakul et al. (2020)
1b	Low frequency repetitive transcranial magnetic stimulation may not have a difference in efficacy when compared to Physical therapy for improving stroke severity.	1	Tosun et al. (2017)
1b	Intermittent theta burst stimulation with Physical therapy may produce greater improvements in stroke severity than Physical Therapy.	1	Khan et al. (2019)
1b	Intermittent theta burst stimulation with Physical therapy may not have a difference in efficacy when compared to functional electrical stimulation with Physical therapy for improving stroke severity.	1	Khan et al. (2019)

1b	Electromyogrpahical bridge may produce greater improvements in stroke severity than Cyclic neuromuscular electrical stimulation.	1	Zhou et al. (2017)
2	Functional electrical stimulation-Biofeedback mirror therapy with conventional may not have a difference in efficacy when compared to Mirror therapy with conventional rehab for improving stroke severity.	1	Kim et al. (2023a)
2	Neuromuscular electrical stimulation combined with other interventions may not have a difference in efficacy when compared to conventional therapy for improving stroke severity.	1	Baygutalp & Senel (2014)
1b	Task Specific EMG triggered ES therapy with Conventional PT may produce greater improvements in stroke severity than Conventional PT.	1	Kirac-Unal et al. (2019)
1b	PNF with NMES may produce greater improvements in stroke severity than PNF.	1	Sahin et al. (2012)

MUSCLE STRENGTH			
LoE	**Conclusion Statement**	**RCTs**	**References**
2	Functional Electrical Stimulation with 1:1 On/Off Ratio may result in lesser improvements in muscle strength when compared to Functional Electrical Stimulation with 1:3 On/Off Ratio or Functional Electrical Stimulation with 1:5 On/Off Ratio.	1	Packman-Braun et al. (1988)
1b	Bilateral arm training with functional electrical stimulation and conventional occupational therapy may not have a difference in efficacy when compared to Bilateral arm training with sham functional electrical stimulation and conventional occupational therapy for improving muscle strength.	1	Chan et al. (2009)
1b	Neuromuscular electrical stimulation combined with other interventions may produce greater improvements in muscle strength than sham.	1	Boyaci et al. (2013)
1a	Functional electrical stimulation may produce greater improvements in muscle strength than conventional therapy.	4	Sehndkar et al. (2016); Karakus et al. (2013); Thrasher et al. (2008); Faghri et al. (1994)
1b	Neuromuscular electrical stimulation may result in lesser improvements in muscle strength when compared to sham.	1	Church et al. (2006)
1a	Neuromuscular electrical stimulation may produce greater improvements in muscle strength than conventional therapy.	4	Sentandreu-Mañó et al. (2021); Turkkan et al. (2017); Rosewilliam et al. (2012); Powell et al. (1999)
1b	There is conflicting evidence about the effect of Functional electrical stimulation combined with other interventions when compared to neuromuscular electrical stimulation for improving muscle strength.	2	Zheng et al. (2019); Shen et al. (2015)
1b	Neuromuscular Electrical Stimulation with Conventional Rehabilitation may not have a difference in efficacy when compared to Noxious Thermal Stimulation with Conventional Rehabilitation or Thermal Stimulation, Neuromuscular Electrical stimulation and Conventional Rehabilitation for improving muscle strength.	1	Chen et al. (2019a)
1b	Blocked neuromuscular electrical stimulation training (neuromuscular electrical stimulation with Hand range of motion training) may produce greater improvements in muscle strength than Hand range of motion exercises (Passive movements, voluntary UE extensions or abduction).	1	Cauraugh et al. (2003a)
1b	Neuromuscular electrical stimulation combined with other interventions may not have a difference in efficacy when compared to orthotics for improving muscle strength.	1	Leung et al. (2012)

1b	Different approaches to neuromuscular electrical stimulation may not have a difference in efficacy when compared with one another for improving muscle strength.	1	deKroon et al. (2004)
1b	Electromyography-triggered neuromuscular electrical stimulation may not have a difference in efficacy when compared to cyclic neuromuscular electrical stimulation for improving muscle strength.	1	deKroon et al. (2008)
1a	There is conflicting evidence about the effect of Functional electrical stimulation combined with other interventions when compared to conventional therapy for improving muscle strength.	2	Zhang et al. (2024b); Akter et al. (2023)
1b	There is conflicting evidence about the effect of Electromuscular Stimulation when compared to Transcutaneous Electrical Nerve Stimulation for improving muscle strength.	1	Yurdakul et al. (2020)
2	Position triggered ES with conventional rehabilitation may not have a difference in efficacy when compared to Passive ES with conventional rehabilitation for improving muscle strength.	1	Hong et al. (2021)
1b	SMART arm with outcome triggered electrical stim and usual therapy may not have a difference in efficacy when compared to Usual therapy for improving muscle strength.	1	Barker et al. (2017)
1b	Mechanical arm trainer may not have a difference in efficacy when compared to Electrical muscle stimulation of paretic wrist extensors for improving muscle strength.	1	Hesse et al. (2008a)
1b	Low frequency repetitive transcranial magnetic stimulation may not have a difference in efficacy when compared to Physical therapy for improving muscle strength.	1	Tosun et al. (2017)
1b	Robotic Assisted Therapy (Bi-Manu-track robot) may produce greater improvements in muscle strength than electromyography-initiated electrical stimulation.	1	Hesse et al. (2005)
1b	Robot Exoskeleton with electromyography-Triggered functional electrical stimulation (RETRAINER) may not have a difference in efficacy when compared to Conventional Therapy for improving muscle strength.	1	Ambrosini et al. (2021)
1b	Modified constraint-induced movement therapy may not have a difference in efficacy when compared to Usual care for improving muscle strength.	1	Kwakkel et al. (2016)
1b	Dual transcranial direct current stimulation with functional electrical stimulation may produce greater improvements in muscle strength than Sham transcranial direct current stimulation with functional electrical stimulation.	1	Salazar et al. (2020)
2	Cryotherapy on spastic wrist flexors with Kinesiotherapy may not have a difference in efficacy when compared to neuromuscular electrical stimulation on wrist extensors for improving muscle strength.	1	Cruz et al. (2019)
1b	Functional electrical stimulation with brain-computer interface may produce greater improvements in muscle strength than neuromuscular electrical stimulation.	1	Chen et al. (2021e)
1b	Repetitive peripheral sensory stimulation with functional electrical stimulation and task specific training may not have a difference in efficacy when compared to Sham RPSS with functional electrical stimulation and TST for improving muscle strength.	1	Conforto et al. (2021)
2	Purposeful activity with electrical stimulation therapy (functional electrical stimulation) and occupational therapy may not have a difference in efficacy when compared to occupational therapy for improving muscle strength.	1	Minami et al. (2021)
1b	Electromyography bridge therapy with conventional therapy may not have a difference in efficacy when compared to neuromuscular	1	Zhao Q. et al. (2022)

	electrical stimulation with conventional rehab for improving muscle strength.		
1b	Brain-computer interface with functional electrical stimulation may not have a difference in efficacy when compared to Sham brain-computer interface with functional electrical stimulation for improving muscle strength.	1	Zhang et al. (2023a)
1b	Motor relearning with electrical stim may result in lesser improvements in muscle strength when compared to Bobath treatment with electrical stim.	1	El-Bahrawy et al. (2012)
1b	Short-term bilateral arm training with electromyography triggered neuromuscular electrical stimulation may result in lesser improvements in muscle strength when compared to long-term bilateral arm training with electromyography triggered neuromuscular electrical stimulation.	1	Cauraugh et al. (2011)
2	EMG-triggered neuromuscular electrical stimulation may produce greater improvements in muscle strength than conventional therapy.	1	Shin et al. (2008)
1b	Electromyography-triggered neuromuscular electrical stimulation may not have a difference in efficacy when compared to conventional therapy for improving muscle strength.	1	Dorsch et al. (2014)
2	High Frequency NMES (40Hz) may not have a difference in efficacy when compared to Low Frequency NMES (20Hz) for improving muscle strength.	1	Doucet & Griffin (2013)
1b	Transcranial Random Noise stimulation (tRNS) with FES may not have a difference in efficacy when compared to Sham-tRNS with active FES for improving muscle strength.	1	Sethi et al. (2023)
1b	Task Specific EMG triggered ES therapy with Conventional PT may produce greater improvements in muscle strength than Conventional PT.	1	Kirac-Unal et al. (2019)
2	Mirror therapy may not have a difference in efficacy when compared to EMG-triggered neuromuscular stimulation for improving muscle strength.	1	Amasyali et al. (2016)
2	Functional electrical stimulation with biofeedback with mirror therapy may not have a difference in efficacy when compared to Conventional rehabilitation for improving muscle strength.	1	Kim et al. (2015c)
2	Functional electrical stimulation with biofeedback with mirror therapy may produce greater improvements in muscle strength than FES with mirror therapy.	1	Kim et al. (2015c)
1b	Dry Needling with FES and conventional exercise may produce greater improvements in muscle strength than Sham-Needling with FES and Conventional exercise.	1	Panahi et al. (2024)
2	EMG-triggered neuromuscular stimulation may not have a difference in efficacy when compared to Conventional care for improving muscle strength.	1	Amasyali et al. (2016)

SPASTICITY			
LoE	**Conclusion Statement**	**RCTs**	**References**
1b	Bilateral arm training with functional electrical stimulation and conventional occupational therapy may not have a difference in efficacy when compared to Bilateral arm training with sham functional electrical stimulation and conventional occupational therapy for improving spasticity.	1	Chan et al. (2009)
1b	Neuromuscular electrical stimulation combined with other interventions may not have a difference in efficacy when compared to sham for improving spasticity.	2	Boyaci et al. (2013); Hesse et al. (1998)

1b	Functional electrical stimulation may produce greater improvements in spasticity than conventional therapy.	5	Demir et al. (2018); NakipoğluYuzer et al. (2017); Karakus et al. (2013); Hara et al. (2008); Popovic et al. (2003)
1b	Anodal transcranial direct current stimulation with functional electrical stimulation may produce greater improvements in spasticity than Sham transcranial direct current stimulation with functional electrical stimulation.	1	Halakoo et al. (2020)
1a	Neuromuscular electrical stimulation may not have a difference in efficacy when compared to conventional therapy for improving spasticity.	7	Kara et al. (2021); Sentandreu-Mañó et al. (2021); Tilkici et al. (2017); Cui et al. (2015); Prabhu et al. (2012); Lin et al. (2011); Powell et al. (1999)
1b	Neuromuscular Electrical Stimulation with Conventional Rehabilitation may not have a difference in efficacy when compared to Noxious Thermal Stimulation with Conventional Rehabilitation or Thermal Stimulation, Neuromuscular Electrical stimulation and Conventional Rehabilitation for improving spasticity.	1	Chen et al. (2019a)
1b	Neuromuscular electrical stimulation with repetitive transcranial magnetic stimulation may produce greater improvements in spasticity than Sham neuromuscular electrical stimulation with repetitive transcranial magnetic stimulation.	1	Etoh et al. (2019)
1b	Electromyography-triggered neuromuscular electrical stimulation with repetitive transcranial magnetic stimulation may not have a difference in efficacy when compared to electromyography-triggered neuromuscular electrical stimulation with Sham repetitive transcranial magnetic stimulation for improving spasticity.	1	Theilig et al. (2011)
1a	Neuromuscular electrical stimulation combined with other interventions may not have a difference in efficacy when compared to orthotics for improving spasticity.	2	Leung et al. (2012); Yu et al. (2004)
1b	Different approaches to neuromuscular electrical stimulation may not have a difference in efficacy when compared with one another for improving spasticity.	1	deKroon et al. (2004)
1a	Neuromuscular electrical stimulation combined with other interventions may not have a difference in efficacy when compared to conventional therapy for improving spasticity.	4	Ohnishi et al. (2022); Zhou et al. (2018); Baygutalp & Senel (2014); ShimodozoNo et al. (2014)
1b	Neuromuscular electrical stimulation with conventional rehabilitation may not have a difference in efficacy when compared to transcutaneous electrical nerve stimulation with conventional rehabilitation for improving spasticity.	1	Zhou et al. (2018)
1a	There is conflicting evidence about the effect of Functional electrical stimulation combined with other interventions when compared to conventional therapy for improving spasticity.	2	Akter et al. (2023); Carda et al. (2017)
2	Electromyography-trigerred functional electrical stimulation may not have a difference in efficacy when compared to Conventional therapy for improving spasticity.	1	Hara et al. (2006)
1b	Botolinum Toxin-A with Extracorporeal shock wave therapy (extracorporeal shockwave therapy) may produce greater improvements in spasticity than botulinum toxin A with electrical stimulation (ES).	1	Santamato et al. (2013)
1b	SMART arm with outcome triggered electrical stim and usual therapy may not have a difference in efficacy when compared to Usual therapy for improving spasticity.	1	Barker et al. (2017)

1b	Mechanical arm trainer may not have a difference in efficacy when compared to Electrical muscle stimulation of paretic wrist extensors for improving spasticity.	1	Hesse et al. (2008a)
1b	There is conflicting evidence about the effect of Botulinum Toxin A injection with neuromuscular electrical stimulation when compared to Placebo with neuromuscular electrical stimulation for improving spasticity.	1	Lindsay et al. (2020)
1b	Brain-computer interface with functional electrical stimulation may not have a difference in efficacy when compared to Functional Electrical Stimulation for improving spasticity.	1	Jang et al. (2016b)
1b	Low frequency repetitive transcranial magnetic stimulation may not have a difference in efficacy when compared to Physical therapy for improving spasticity.	1	Tosun et al. (2017)
1b	Robot-assisted arm therapy with hand functional electrical stimulation (RAT and functional electrical stimulation) may not have a difference in efficacy when compared to Conventional Therapy for improving spasticity.	1	Straudi et al. (2020)
1b	Robotic Assisted Therapy (Bi-Manu-track robot) may not have a difference in efficacy when compared to electromyography-initiated electrical stimulation for improving spasticity.	1	Hesse et al. (2005)
1b	Mental Imagery Training with electromyography-Triggered Electrical Stimulation may not have a difference in efficacy when compared to Generalized Functional Electric Stimulation for improving spasticity.	1	Hong et al. (2012)
1b	Electromyography neuromuscular electrical stimulation robot may not have a difference in efficacy when compared to electromyography robot for improving spasticity.	1	Hu et al. (2015)
1b	Neuromuscular electrical stimulation electromyography robotic hand may produce greater improvements in spasticity than electromyography robotic hand.	1	Huang et al. (2020)
1b	Neuromuscular electrical stimulation robotic to distal fingers may produce greater improvements in spasticity than neuromuscular electrical stimulation robotic to proximal wrist-elbow joints.	1	Qian et al. (2019)
1b	Bilateral active transcranial direct current stimulation with functional electrical stimulation may not have a difference in efficacy when compared to sham transcranial direct current stimulation with functional electrical stimulation for improving spasticity.	1	Shaheiwola et al. (2018)
1b	Neuromuscular electrical stimulation with robot therapy may not have a difference in efficacy when compared to Robot therapy with Sham for improving spasticity.	1	Lee et al. (2015b)
1b	Motor relearning with electrical stim may not have a difference in efficacy when compared to Bobath treatment with electrical stim for improving spasticity.	1	El-Bahrawy et al. (2012)
2	SMART arm with electrical stim may produce greater improvements in spasticity than No Treatment.	1	Barker et al. (2008)
1b	Static arm positioning with neuromuscular electrical stimulation may not have a difference in efficacy when compared to Sham positioning and sham neuromuscular electrical stimulation for improving spasticity.	1	deJong et al. (2013)
1b	Repetitive peripheral sensory stimulation with functional electrical stimulation and task specific training may not have a difference in efficacy when compared to Sham RPSS with functional electrical stimulation and TST for improving spasticity.	1	Conforto et al. (2021)
1b	Bilateral transcranial direct current stimulation with neuromuscular electrical stimulation and coventional care may not have a difference in efficacy when compared to Sham transcranial direct current	1	Wei et al. (2022)

	stimulation and neuromuscular electrical stimulation with conventional care for improving spasticity.		
2	Functional electrical therapy applied in the acute phase may not have a difference in efficacy when compared to functional electrical therapy applied in the chronic phase for improving spasticity.	1	Popovic et al. (2004)
2	Cyclic neuromuscular electrical stimulation with mirror therapy may not have a difference in efficacy when compared to neuromuscular electrical stimulation or mirror therapy alone for improving spasticity.	1	Yun et al. (2011)
2	Neuromuscular electrical stimulation may produce greater improvements in spasticity than passive stretching.	1	King et al. (1996)
2	EMG-triggered neuromuscular electrical stimulation may not have a difference in efficacy when compared to conventional therapy for improving spasticity.	1	Cauraugh et al. (2000)
1b	EMG driven NMES Robot arm may produce greater improvements in spasticity than Conventional Therapy.	1	Qian et al. (2017)
1b	Long NMES (12Hr) may not have a difference in efficacy when compared to Short NMES (30min) for improving spasticity.	1	Cui et al. (2015)
2	Functional electrical stimulation with biofeedback with mirror therapy may not have a difference in efficacy when compared to Conventional rehabilitation for improving spasticity.	1	Kim et al. (2015c)
1b	Mental training linked with EMG triggered stimulation may not have a difference in efficacy when compared to FES for improving spasticity.	1	Su-jeonYOU et al. (2013)
1b	PNF with NMES may produce greater improvements in spasticity than PNF.	1	Sahin et al. (2012)
1b	Dry Needling with FES and conventional exercise may not have a difference in efficacy when compared to Sham-Needling with FES and Conventional exercise for improving spasticity.	1	Panahi et al. (2024)

RANGE OF MOTION			
LoE	**Conclusion Statement**	**RCTs**	**References**
2	Different approaches to functional electrical stimulation: some approaches may produce greater improvements in range of motion than others.	1	Manigandan et al. (2014)
1b	Bilateral arm training with functional electrical stimulation and conventional occupational therapy may produce greater improvements in range of motion than Bilateral arm training with sham functional electrical stimulation and conventional occupational therapy.	1	Chan et al. (2009)
1b	Neuromuscular electrical stimulation combined with other interventions may produce greater improvements in range of motion than sham.	1	Boyaci et al. (2013)
2	Functional electrical stimulation may produce greater improvements in range of motion than conventional therapy.	4	NakipoğluYuzer et al. (2017); Koyuncu et al. (2010); Hara et al. (2008); Faghri et al. (1994)
1a	Neuromuscular electrical stimulation may produce greater improvements in range of motion than conventional therapy.	5	Sentandreu-Mañó et al. (2021); Tilkici et al. (2017); Prabhu et al. (2012); Rosewilliam et al. (2012); Powell et al. (1999)
1b	Functional electrical stimulation combined with other interventions may produce greater improvements in range of motion than neuromuscular electrical stimulation.	2	Zheng et al. (2019); Shen et al. (2015)

1b	Different approaches to neuromuscular electrical stimulation may not have a difference in efficacy when compared with one another for improving range of motion.	1	deKroon et al. (2004)
1b	Electromyogrpahical bridge may not have a difference in efficacy when compared to Cyclic neuromuscular electrical stimulation for improving range of motion.	1	Zhou et al. (2017)
1a	Neuromuscular electrical stimulation combined with other interventions may not have a difference in efficacy when compared to conventional therapy for improving range of motion.	2	Zhou et al. (2018); ShimodozoNo et al. (2014)
1b	Neuromuscular electrical stimulation with conventional rehabilitation may not have a difference in efficacy when compared to transcutaneous electrical nerve stimulation with conventional rehabilitation for improving range of motion.	1	Zhou et al. (2018)
2	Electromyography-triggered neuromuscular electrical stimulation combined with other interventions: some approaches may produce greater improvements in range of motion than others.	1	Kojima et al. (2014)
2	Electromyography-trigerred functional electrical stimulation may produce greater improvements in range of motion than Conventional therapy.	1	Hara et al. (2006)
1b	There is conflicting evidence about the effect of Botulinum Toxin A injection with neuromuscular electrical stimulation when compared to Placebo with neuromuscular electrical stimulation for improving range of motion.	1	Lindsay et al. (2020)
1b	Dual transcranial direct current stimulation with functional electrical stimulation may not have a difference in efficacy when compared to Sham transcranial direct current stimulation with functional electrical stimulation for improving range of motion.	1	Salazar et al. (2020)
1b	Static arm positioning with neuromuscular electrical stimulation may not have a difference in efficacy when compared to Sham positioning and sham neuromuscular electrical stimulation for improving range of motion.	1	deJong et al. (2013)
1b	Repetitive peripheral sensory stimulation with functional electrical stimulation and task specific training may not have a difference in efficacy when compared to Sham RPSS with functional electrical stimulation and TST for improving range of motion.	1	Conforto et al. (2021)
1b	Electromyography bridge therapy with conventional therapy may not have a difference in efficacy when compared to neuromuscular electrical stimulation with conventional rehab for improving range of motion.	1	Zhao Q. et al. (2022)
2	Functional electrical stimulation-Biofeedback mirror therapy with conventional may produce greater improvements in range of motion than Mirror therapy with conventional rehab.	1	Kim et al. (2023a)
1b	Brain-computer interface with functional electrical stimulation may not have a difference in efficacy when compared to Sham brain-computer interface with functional electrical stimulation for improving range of motion.	1	Zhang et al. (2023a)
1b	Electromyography-triggered neuromuscular electrical stimulation with repetitive transcranial magnetic stimulation may not have a difference in efficacy when compared to electromyography-triggered neuromuscular electrical stimulation with Sham repetitive transcranial magnetic stimulation for improving range of motion.	1	Theilig et al. (2011)
2	Contralaterally controlled functional electrical stimulation with Task specific training may produce greater improvements in range of motion than Cyclic neuromuscular electrical stimulation with Task specific training.	1	Knutson et al. (2012)

2	Functional electrical stimulation may not have a difference in efficacy when compared to routine therapy for improving range of motion.	1	Wang et al. (2000)
1b	Electrical Stimulation to Wrist and Finger Extensors with Splint may not have a difference in efficacy when compared to Splint for improving range of motion.	1	Leung et al. (2012)
2	Functional electrical stimulation with biofeedback with mirror therapy may not have a difference in efficacy when compared to Conventional rehabilitation for improving range of motion.	1	Kim et al. (2015c)
2	Functional electrical stimulation with biofeedback with mirror therapy may not have a difference in efficacy when compared to FES with mirror therapy for improving range of motion.	1	Kim et al. (2015c)
1b	Mental training linked with EMG triggered stimulation may not have a difference in efficacy when compared to FES for improving range of motion.	1	Su-jeonYOU et al. (2013)
1b	PNF with NMES may produce greater improvements in range of motion than PNF.	1	Sahin et al. (2012)

PROPRIOCEPTION			
LoE	**Conclusion Statement**	**RCTs**	**References**
1b	Modified constraint-induced movement therapy may not have a difference in efficacy when compared to Usual care for improving proprioception.	1	Kwakkel et al. (2016)
2	Botox 1000u with cyclic neuromuscular electrical stimulation may not have a difference in efficacy when compared to Placebo for improving proprioception.	1	Hesse et al. (1998)
1b	Bilateral electromyography-triggered multi-channel electrostimulation with mirror therapy may not have a difference in efficacy when compared to bilateral electromyography-triggered multi-channel electrostimulation for improving proprioception.	1	Schick et al. (2017)

2. Activities

ACTIVITIES OF DAILY LIVING			
LoE	**Conclusion Statement**	**RCTs**	**References**
1b	120min electrical stimulation with repetitive task specific practice may produce greater improvements in performance of activities of daily living than 60min electrical stimulation therapy with repetitive task specific practice or 30min electrical stimulation therapy and repetitive task specific practice.	1	Page et al. (2012)
1a	Different approaches to functional electrical stimulation combined with other interventions may not have a difference in efficacy when compared with one another for improving performance of activities of daily living.	2	Knutson et al. (2016); Kowalczewski et al. (2007)
1b	Bilateral arm training with functional electrical stimulation and conventional occupational therapy may not have a difference in efficacy when compared to Bilateral arm training with sham functional electrical stimulation and conventional occupational therapy for improving performance of activities of daily living.	1	Chan et al. (2009)
1a	Neuromuscular electrical stimulation combined with other interventions may produce greater improvements in performance of activities of daily living than conventional therapy.	5	Ohnishi et al. (2022); Zhou et al. (2018); Baygutalp & Senel (2014); Boyaci et al. (2013); Hesse et al. (1998)

1a	Functional electrical stimulation may not have a difference in efficacy when compared to conventional therapy for improving performance of activities of daily living.	6	Demir et al. (2018); NakipoğluYuzer et al. (2017); Fil et al. (2011); Mangold et al. (2009); Thrasher et al. (2008); Popovic et al. (2003)
2	Functional electrical stimulation combined with other interventions may not have a difference in efficacy when compared to fes for improving performance of activities of daily living.	1	Knutson et al. (2024)
1a	Neuromuscular electrical stimulation may not have a difference in efficacy when compared to sham for improving performance of activities of daily living.	3	Lavi et al. (2022); Church et al. (2006); Chae et al. (1998)
1a	Neuromuscular electrical stimulation may not have a difference in efficacy when compared to conventional therapy for improving performance of activities of daily living.	7	Sentandreu-Mañó et al. (2021); Turkkan et al. (2017); Tilkici et al. (2017); Rosewilliam et al. (2012); Lin et al. (2011); Hsu et al. (2010); Powell et al. (1999)
2	High neuromuscular electrical stimulation may not have a difference in efficacy when compared to Low neuromuscular electrical stimulation for improving performance of activities of daily living.	1	Hsu et al. (2010)
1b	Functional electrical stimulation combined with other interventions may not have a difference in efficacy when compared to neuromuscular electrical stimulation for improving performance of activities of daily living.	3	Huang et al. (2021a); Knutson et al. (2020); Zheng et al. (2019)
2	Arm with Hand Contralaterally Controlled Functional Electrical Stimulation may not have a difference in efficacy when compared to Hand contralaterally controlled functional electrical stimulation or Arm with Hand Cyclic Neuromuscular Electrical Stimulation for improving performance of activities of daily living.	1	Knutson et al. (2020)
1b	Neuromuscular Electrical Stimulation with Conventional Rehabilitation may not have a difference in efficacy when compared to Noxious Thermal Stimulation with Conventional Rehabilitation or Thermal Stimulation, Neuromuscular Electrical stimulation and Conventional Rehabilitation for improving performance of activities of daily living.	1	Chen et al. (2019a)
1b	Cyclic Neuromuscular Electrical Stimulation may not have a difference in efficacy when compared to Electromyographically-triggered Neuromuscular Electrical Stimulatiom or Sensory Stimulation for improving performance of activities of daily living.	1	Wilson et al. (2016)
1a	Neuromuscular electrical stimulation combined with other interventions may not have a difference in efficacy when compared to orthotics for improving performance of activities of daily living.	2	Leung et al. (2012); Yu et al. (2004)
2	Contralaterally controlled functional electrical stimulation with Task specific training may produce greater improvements in performance of activities of daily living than Cyclic neuromuscular electrical stimulation with Task specific training.	1	Knutson et al. (2012)
2	Different approaches to neuromuscular electrical stimulation may not have a difference in efficacy when compared with one another for improving performance of activities of daily living.	1	Maeda et al. (2024)
1b	Motor electrical stimulation involving cyclic (neuromuscular electrical stimulation) and electromyography may not have a difference in efficacy when compared to Percutaneous Sensory electrical stimulation for improving performance of activities of daily living.	1	Chae et al. (2009)
1b	Electromyography-triggered neuromuscular electrical stimulation combined with other interventions may not have a difference in efficacy when compared to emg-triggered nmes for improving performance of activities of daily living.	1	Schick et al. (2017)

1b	Neuromuscular electrical stimulation with conventional rehabilitation may not have a difference in efficacy when compared to transcutaneous electrical nerve stimulation with conventional rehabilitation for improving performance of activities of daily living.	1	Zhou et al. (2018)
1a	There is conflicting evidence about the effect of Functional electrical stimulation combined with other interventions when compared to conventional therapy for improving performance of activities of daily living.	2	Zhang et al. (2024b); Carda et al. (2017)
1b	Electromyography-triggered neuromuscular electrical stimulation may not have a difference in efficacy when compared to conventional therapy for improving performance of activities of daily living.	2	Dorsch et al. (2014); Cauraugh et al. (2000)
1b	Electromuscular Stimulation may not have a difference in efficacy when compared to Transcutaneous Electrical Nerve Stimulation for improving performance of activities of daily living.	1	Yurdakul et al. (2020)
2	Mental Practice with electromyography neuromuscular electrical stimulation and Conventional Rehab may produce greater improvements in performance of activities of daily living than Conventional Rehab.	1	Park et al. (2017b)
1b	Mirror therapy with Mesh glove (afferent stimulation, primarily neuromuscular electrical stimulation) may not have a difference in efficacy when compared to task oriented exercise for improving performance of activities of daily living.	1	Lin et al. (2014a)
1b	Mirror therapy with Mesh glove (afferent stimulation, primarily neuromuscular electrical stimulation) may not have a difference in efficacy when compared to Mirror therapy for improving performance of activities of daily living.	1	Lin et al. (2014a)
1b	SMART arm with outcome triggered electrical stim and usual therapy may not have a difference in efficacy when compared to Usual therapy for improving performance of activities of daily living.	1	Barker et al. (2017)
1b	Functional Electrical Stimulation may not have a difference in efficacy when compared to Mirror Therapy for improving performance of activities of daily living.	1	Mathieson et al. (2018)
1b	Functional Electrical Stimulation may not have a difference in efficacy when compared to Functional Electrical Stimulation with Mirror Therapy for improving performance of activities of daily living.	1	Mathieson et al. (2018)
1b	Mirror Therapy may not have a difference in efficacy when compared to Functional Electrical Stimulation with Mirror Therapy for improving performance of activities of daily living.	1	Mathieson et al. (2018)
1b	Low frequency repetitive transcranial magnetic stimulation may not have a difference in efficacy when compared to Physical therapy for improving performance of activities of daily living.	1	Tosun et al. (2017)
1b	Robot-assisted arm therapy with hand functional electrical stimulation (RAT and functional electrical stimulation) may not have a difference in efficacy when compared to Conventional Therapy for improving performance of activities of daily living.	1	Straudi et al. (2020)
1b	Robot Exoskeleton with electromyography-Triggered functional electrical stimulation (RETRAINER) may not have a difference in efficacy when compared to Conventional Therapy for improving performance of activities of daily living.	1	Ambrosini et al. (2021)
1b	Modified constraint-induced movement therapy may not have a difference in efficacy when compared to Usual care for improving performance of activities of daily living.	1	Kwakkel et al. (2016)
1b	Mental Imagery Training with electromyography-Triggered Electrical Stimulation may not have a difference in efficacy when compared to	1	Hong et al. (2012)

	Generalized Functional Electric Stimulation for improving performance of activities of daily living.		
1b	Action Observation with EEG-Mediated Functional Electrical Stimulation Brain-Computer Interface may produce greater improvements in performance of activities of daily living than Functional Electrical Stimulation.	1	Lee et al. (2020b)
1b	Neuromuscular electrical stimulation electromyography robotic hand may not have a difference in efficacy when compared to electromyography robotic hand for improving performance of activities of daily living.	1	Huang et al. (2020)
1b	Functional electrical stimulation with Action observation training and brain computer interface may produce greater improvements in performance of activities of daily living than Conventional therapy.	1	Kim et al. (2016b)
2	Distal (wrist or hand Functional Electrical Stimulation) may not have a difference in efficacy when compared to functional electrical stimulation with Robot assisted Whole arm for improving performance of activities of daily living.	1	Daly et al. (2019)
2	Distal (wrist or hand Functional Electrical Stimulation) may not have a difference in efficacy when compared to Proximal (Shoulder or elbow) (Functional Electrical Stimulation with inMotion robot) for improving performance of activities of daily living.	1	Daly et al. (2019)
1b	Neuromuscular electrical stimulation with robot therapy may not have a difference in efficacy when compared to Robot therapy with Sham for improving performance of activities of daily living.	1	Lee et al. (2015b)
1b	Robotic training (InMotion ARM) with motor learning may not have a difference in efficacy when compared to Motor learning for improving performance of activities of daily living.	1	McCabe et al. (2015)
2	SMART arm with electrical stim may produce greater improvements in performance of activities of daily living than No Treatment.	1	Barker et al. (2008)
1b	Intermittent theta burst stimulation with Physical therapy may produce greater improvements in performance of activities of daily living than Physical Therapy.	1	Khan et al. (2019)
1b	Intermittent theta burst stimulation with Physical therapy may not have a difference in efficacy when compared to functional electrical stimulation with Physical therapy for improving performance of activities of daily living.	1	Khan et al. (2019)
1b	Electromyography neuromuscular electrical stimulation with mental imagery training may not have a difference in efficacy when compared to electromyography neuromuscular electrical stimulation for improving performance of activities of daily living.	1	Park et al. (2020a)
1b	Functional electrical stimulation with brain-computer interface may not have a difference in efficacy when compared to neuromuscular electrical stimulation for improving performance of activities of daily living.	1	Chen et al. (2021e)
1b	Repetitive peripheral sensory stimulation with functional electrical stimulation and task specific training may not have a difference in efficacy when compared to Sham RPSS with functional electrical stimulation and TST for improving performance of activities of daily living.	1	Conforto et al. (2021)
2	Purposeful activity with electrical stimulation therapy (functional electrical stimulation) and occupational therapy may produce greater improvements in performance of activities of daily living than occupational therapy.	1	Minami et al. (2021)
1b	Bilateral transcranial direct current stimulation with neuromuscular electrical stimulation and coventional care may not have a difference	1	Wei et al. (2022)

	in efficacy when compared to Sham transcranial direct current stimulation and neuromuscular electrical stimulation with conventional care for improving performance of activities of daily living.		
1b	Electromyography bridge therapy with conventional therapy may not have a difference in efficacy when compared to neuromuscular electrical stimulation with conventional rehab for improving performance of activities of daily living.	1	Zhao Q. et al. (2022)
2	Functional electrical stimulation-Biofeedback mirror therapy with conventional may not have a difference in efficacy when compared to Mirror therapy with conventional rehab for improving performance of activities of daily living.	1	Kim et al. (2023a)
1b	Motor imagery brain-computer interface with conventional rehab may produce greater improvements in performance of activities of daily living than functional electrical stimulation with conventional rehab.	1	Liu et al. (2023)
1b	Electrical stim with repetitive task practice may produce greater improvements in performance of activities of daily living than Sham electrical with repetitive task practice.	1	Gharib et al. (2015)
1b	Static arm positioning with neuromuscular electrical stimulation may not have a difference in efficacy when compared to sham positioning and sham neuromuscular electrical stimulation for improving performance of activities of daily living.	1	deJong et al. (2013)
2	Functional electrical therapy applied in the acute phase may not have a difference in efficacy when compared to functional electrical therapy applied in the chronic phase for improving performance of activities of daily living.	1	Popovic et al. (2004)
1b	EMG driven NMES Robot arm may not have a difference in efficacy when compared to Conventional Therapy for improving performance of activities of daily living.	1	Qian et al. (2017)
1b	FES with Task specific training may produce greater improvements in performance of activities of daily living than Sham with Task specific training.	1	Thorsen et al. (2013)
1b	FES with botulinum toxin-A and home based task-oriented exercise may not have a difference in efficacy when compared to Botulinum toxin-A with home-based exercise program for improving performance of activities of daily living.	1	Weber et al. (2010)
2	EMG triggered NMS (EMG-Stim) with Wrist Strengthening Exercises may produce greater improvements in performance of activities of daily living than Wrist Exercises.	1	Francisco et al. (1998)
1b	Task Specific EMG triggered ES therapy with Conventional PT may not have a difference in efficacy when compared to Conventional PT for improving performance of activities of daily living.	1	Kirac-Unal et al. (2019)
1b	There is conflicting evidence about the effect of dual-tDCS combined with PNMES with CIMT when compared to CIMT for improving performance of activities of daily living.	1	Takebayashi et al. (2017)
2	Functional electrical stimulation with biofeedback with mirror therapy may produce greater improvements in performance of activities of daily living than Conventional rehabilitation.	1	Kim et al. (2015c)
2	Functional electrical stimulation with biofeedback with mirror therapy may not have a difference in efficacy when compared to FES with mirror therapy for improving performance of activities of daily living.	1	Kim et al. (2015c)
1b	Mental training linked with EMG triggered stimulation may not have a difference in efficacy when compared to FES for improving performance of activities of daily living.	1	Su-jeonYOU et al. (2013)

1b	PNF with NMES may produce greater improvements in performance of activities of daily living than PNF.	1	Sahin et al. (2012)
2	Integrated volitional electrical stimulator (IVES) with wrist splint may not have a difference in efficacy when compared to wrist splint for improving performance of activities of daily living.	1	Shindo et al. (2011)

DEXTERITY			
LoE	**Conclusion Statement**	**RCTs**	**References**
1b	Functional electrical stimulation combined with other interventions: some approaches may produce greater improvements in dexterity than others.	1	Knutson et al. (2016)
2	Functional electrical stimulation combined with other interventions may not have a difference in efficacy when compared to fes for improving dexterity.	1	Knutson et al. (2024)
1a	Neuromuscular electrical stimulation may produce greater improvements in dexterity than conventional therapy.	3	Sentandreu-Mañó et al. (2021); Mohamed Faisal et al. (2012); Powell et al. (1999)
2	Functional electrical stimulation combined with other interventions may not have a difference in efficacy when compared to neuromuscular electrical stimulation for improving dexterity.	1	Knutson et al. (2020)
2	Arm with Hand Contralaterally Controlled Functional Electrical Stimulation may not have a difference in efficacy when compared to Hand contralaterally controlled functional electrical stimulation or Arm with Hand Cyclic Neuromuscular Electrical Stimulation for improving dexterity.	1	Knutson et al. (2020)
1b	Neuromuscular electrical stimulation with repetitive transcranial magnetic stimulation may produce greater improvements in dexterity than Sham neuromuscular electrical stimulation with repetitive transcranial magnetic stimulation.	1	Etoh et al. (2019)
1b	Blocked neuromuscular electrical stimulation training (neuromuscular electrical stimulation with Hand range of motion training) may produce greater improvements in dexterity than Hand range of motion exercises (Passive movements, voluntary UE extensions or abduction).	1	Cauraugh et al. (2003a)
1b	Blocked neuromuscular electrical stimulation training (neuromuscular electrical stimulation with Hand range of motion training) may not have a difference in efficacy when compared to Random neuromuscular electrical stimulation training (neuromuscular electrical stimulation with Hand range of motion training) for improving dexterity.	1	Cauraugh et al. (2003a)
2	There is conflicting evidence about the effect of Functional electrical stimulation combined with other interventions when compared to task-specific training for improving dexterity.	2	Alon et al. (2008); Alon et al. (2007)
2	Contralaterally controlled functional electrical stimulation with Task specific training may produce greater improvements in dexterity than Cyclic neuromuscular electrical stimulation with Task specific training.	1	Knutson et al. (2012)
1b	Functional Electrical Stimulation with Mirror Therapy may not have a difference in efficacy when compared to Functional Electrical Stimulation with Sham Mirror Therapy for improving dexterity.	1	Kim et al. (2014a)
1b	There is conflicting evidence about the effect of Electromyography-triggered neuromuscular electrical stimulation combined with other interventions when compared to emg-triggered nmes for improving dexterity.	2	Schick et al. (2017); Kim et al. (2016d)

2	Electromyography-triggered neuromuscular electrical stimulation may produce greater improvements in dexterity than conventional therapy.	2	Shin et al. (2008); Cauraugh et al. (2000)
2	Different approaches to electromyography-triggered neuromuscular electrical stimulation combined with other interventions may not have a difference in efficacy when compared with one another for improving dexterity.	3	Kojima et al. (2014); Bhatt et al. (2007); Cauraugh & Kim (2002)
1b	Short-term bilateral arm training with electromyography triggered neuromuscular electrical stimulation may result in lesser improvements in dexterity when compared to Long-term bilateral arm training with electromyography triggered neuromuscular electrical stimulation.	1	Cauraugh et al. (2011)
2	Electromyography-Triggered neuromuscular electrical stimulation with Bilateral Arm Training may produce greater improvements in dexterity than Sham Stimulation with Bilateral Arm Training.	1	Cauraugh & Kim (2003)
2	Electromyography-Triggered neuromuscular electrical stimulation with Bilateral Arm Training may produce greater improvements in dexterity than electromyography-Triggered neuromuscular electrical stimulation with Bilateral Arm Training.	1	Cauraugh & Kim (2003)
1b	CNMES with task oriented training and conventional rehab may not have a difference in efficacy when compared to electromyography-triggered neuromuscular electrical stimulation with task oriented training and conventional rehab for improving dexterity.	1	Schick et al. (2022)
1b	Mirror therapy with Mesh glove (afferent stimulation, primarily neuromuscular electrical stimulation) may result in lesser improvements in dexterity when compared to task oriented exercise.	1	Lin et al. (2014a)
1b	Mirror therapy with Mesh glove (afferent stimulation, primarily neuromuscular electrical stimulation) may produce greater improvements in dexterity than Mirror therapy.	1	Lin et al. (2014a)
2	Functional electrical stimulation with Task-specific training may produce greater improvements in dexterity than Task-specific training.	1	Alon et al. (2009)
1b	Mechanical arm trainer may produce greater improvements in dexterity than Electrical muscle stimulation of paretic wrist extensors.	1	Hesse et al. (2008a)
1b	Robot-assisted arm therapy with hand functional electrical stimulation (RAT and functional electrical stimulation) may not have a difference in efficacy when compared to Conventional Therapy for improving dexterity.	1	Straudi et al. (2020)
1b	Robot Exoskeleton with electromyography-Triggered functional electrical stimulation (RETRAINER) may produce greater improvements in dexterity than Conventional Therapy.	1	Ambrosini et al. (2021)
2	Coupled bilateral training with load with electromyography-triggered neuromuscular electrical stimulation may produce greater improvements in dexterity than unilateral arm training.	1	Cauraugh et al. (2009)
2	Coupled bilateral training with load with electromyography-triggered neuromuscular electrical stimulation may not have a difference in efficacy when compared to Coupled bilateral training with no load with electromyography-triggered neuromuscular electrical stimulation for improving dexterity.	1	Cauraugh et al. (2009)
1b	Motor relearning with electrical stim may not have a difference in efficacy when compared to Bobath treatment with electrical stim for improving dexterity.	1	El-Bahrawy et al. (2012)
1b	EMG-Controlled FES during task oriented training with Robotic training may not have a difference in efficacy when compared to Conventional rehab (TST) for improving dexterity.	1	Perini et al. (2020)

2	High Frequency NMES (40Hz) may result in lesser improvements in dexterity when compared to Low Frequency NMES (20Hz).	1	Doucet & Griffin (2013)
1b	Virtual Reality with Functional Electrical Stimulation may not have a difference in efficacy when compared to Functional Electrical Stimulation for improving dexterity.	1	Lee et al. (2018c)
2	Mirror therapy may not have a difference in efficacy when compared to EMG-triggered neuromuscular stimulation for improving dexterity.	1	Amasyali et al. (2016)
2	Functional electrical stimulation with biofeedback with mirror therapy may produce greater improvements in dexterity than Conventional rehabilitation.	1	Kim et al. (2015c)
2	Functional electrical stimulation with biofeedback with mirror therapy may produce greater improvements in dexterity than FES with mirror therapy.	1	Kim et al. (2015c)
1b	Dry Needling with FES and conventional exercise may produce greater improvements in dexterity than Sham-Needling with FES and Conventional exercise.	1	Panahi et al. (2024)
2	EMG-triggered neuromuscular stimulation may not have a difference in efficacy when compared to Conventional care for improving dexterity.	1	Amasyali et al. (2016)

Key Points

- 120min electrical stimulation with repetitive task specific practice may be beneficial for improving motor function and performance of activities of daily living after stroke when compared to 60min electrical stimulation therapy with repetitive task specific practice or 30min electrical stimulation therapy and repetitive task specific practice.
- Bilateral arm training with functional electrical stimulation and conventional occupational therapy may be beneficial for improving motor function and range of motion, but not performance of activities of daily living, spasticity, and muscle strength, after stroke when compared to Bilateral arm training with sham functional electrical stimulation and conventional occupational therapy.
- Neuromuscular electrical stimulation combined with other interventions may be beneficial for improving motor function, range of motion, and muscle strength, but not spasticity, after stroke when compared to sham.
- Functional electrical stimulation may be beneficial for improving stroke severity, muscle strength, spasticity, and range of motion, but not motor function and performance of activities of daily living, after stroke when compared to conventional therapy.
- Functional electrical stimulation combined with other interventions may not be beneficial for improving motor function, dexterity, and performance of activities of daily living after stroke when compared to fes.
- Neuromuscular electrical stimulation may be beneficial for improving motor function, but not performance of activities of daily living, after stroke when compared to sham.
- Neuromuscular electrical stimulation may be less beneficial than sham for improving muscle strength after stroke.
- Neuromuscular electrical stimulation may be beneficial for improving motor function, muscle strength, range of motion, and dexterity, but not stroke severity, spasticity, and performance of activities of daily living, after stroke when compared to conventional therapy.
- High neuromuscular electrical stimulation may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Low neuromuscular electrical stimulation.
- Functional electrical stimulation combined with other interventions may be beneficial for improving range of motion, but not performance of activities of daily living and dexterity, after stroke when compared to neuromuscular electrical stimulation; the literature is mixed regarding motor function and muscle strength.
- Arm with Hand Contralaterally Controlled Functional Electrical Stimulation may not be beneficial for improving dexterity and performance of activities of daily living after stroke when compared to Hand

contralaterally controlled functional electrical stimulation or Arm with Hand Cyclic Neuromuscular Electrical Stimulation; the literature is mixed regarding motor function.

- Neuromuscular Electrical Stimulation with Conventional Rehabilitation may not be beneficial for improving motor function, performance of activities of daily living, spasticity, and muscle strength after stroke when compared to Noxious Thermal Stimulation with Conventional Rehabilitation or Thermal Stimulation, Neuromuscular Electrical stimulation and Conventional Rehabilitation.
- Neuromuscular electrical stimulation with repetitive transcranial magnetic stimulation may be beneficial for improving dexterity and spasticity, but not motor function, after stroke when compared to Sham neuromuscular electrical stimulation with repetitive transcranial magnetic stimulation.
- Cyclic Neuromuscular Electrical Stimulation may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Electromyographically-triggered Neuromuscular Electrical Stimulatiom or Sensory Stimulation.
- Electromyography-triggered neuromuscular electrical stimulation with repetitive transcranial magnetic stimulation may not be beneficial for improving motor function, spasticity, and range of motion after stroke when compared to electromyography-triggered neuromuscular electrical stimulation with Sham repetitive transcranial magnetic stimulation.
- The literature is mixed regarding the effect of Functional electrical stimulation combined with other interventions on motor function and dexterity after stroke when compared to task-specific training.
- Neuromuscular electrical stimulation combined with other interventions may not be beneficial for improving motor function, performance of activities of daily living, spasticity, and muscle strength after stroke when compared to orthotics.
- Contralaterally controlled functional electrical stimulation with Task specific training may be beneficial for improving motor function, dexterity, performance of activities of daily living, and range of motion after stroke when compared to Cyclic neuromuscular electrical stimulation with Task specific training.
- Electromyography-triggered neuromuscular electrical stimulation may not be beneficial for improving motor function and muscle strength after stroke when compared to cyclic neuromuscular electrical stimulation.
- Motor electrical stimulation involving cyclic (neuromuscular electrical stimulation) and electromyography may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Percutaneous Sensory electrical stimulation.
- Functional Electrical Stimulation with Mirror Therapy may not be beneficial for improving dexterity after stroke when compared to Functional Electrical Stimulation with Sham Mirror Therapy; the literature is mixed regarding motor function and stroke severity.
- Electromyography-triggered neuromuscular electrical stimulation combined with other interventions may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to emg-triggered nmes; the literature is mixed regarding dexterity.
- Electromyogrpahical bridge may be beneficial for improving motor function and stroke severity, but not range of motion, after stroke when compared to Cyclic neuromuscular electrical stimulation.
- Neuromuscular electrical stimulation combined with other interventions may be beneficial for improving performance of activities of daily living, but not motor function, stroke severity, spasticity, and range of motion, after stroke when compared to conventional therapy.
- Neuromuscular electrical stimulation with Conventional therapy may not be beneficial for improving motor function after stroke when compared to Peripheral Pulse Electromagnetic Waves (rPMS) with Conventional therapy.
- Neuromuscular electrical stimulation with conventional rehabilitation may not be beneficial for improving motor function, performance of activities of daily living, spasticity, and range of motion after stroke when compared to transcutaneous electrical nerve stimulation with conventional rehabilitation.
- The literature is mixed regarding the effect of Functional electrical stimulation combined with other interventions on motor function, muscle strength, spasticity, and performance of activities of daily living after stroke when compared to conventional therapy.
- Electromyography-triggered neuromuscular electrical stimulation may be beneficial for improving dexterity, but not motor function, muscle strength, and performance of activities of daily living, after stroke when compared to conventional therapy.

- Electromuscular Stimulation may not be beneficial for improving motor function, performance of activities of daily living, and stroke severity after stroke when compared to Transcutaneous Electrical Nerve Stimulation; the literature is mixed regarding muscle strength.
- CNMES with task oriented training and conventional rehab may not be beneficial for improving motor function and dexterity after stroke when compared to electromyography-triggered neuromuscular electrical stimulation with task oriented training and conventional rehab.
- Functional electrical stimulation may not be beneficial for improving motor function after stroke when compared to No treatment.
- Position triggered ES with conventional rehabilitation may not be beneficial for improving motor function and muscle strength after stroke when compared to Passive ES with conventional rehabilitation.
- Arm hand function training (electromyography triggered biofeedback with movement imagery) and usual therapy may not be beneficial for improving motor function after stroke when compared to Electrical stimulation (without the electromyography-triggered feedback function) with usual therapy.
- Mental Practice with electromyography neuromuscular electrical stimulation and Conventional Rehab may be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Conventional Rehab.
- Mirror therapy with Mesh glove (afferent stimulation, primarily neuromuscular electrical stimulation) may be beneficial for improving motor function, but not performance of activities of daily living, after stroke when compared to task oriented exercise.
- Mirror therapy with Mesh glove (afferent stimulation, primarily neuromuscular electrical stimulation) may be less beneficial than task oriented exercise for improving dexterity after stroke.
- Mirror therapy with Mesh glove (afferent stimulation, primarily neuromuscular electrical stimulation) may be beneficial for improving dexterity, but not motor function and performance of activities of daily living, after stroke when compared to Mirror therapy.
- Functional electrical stimulation with Task-specific training may be beneficial for improving motor function and dexterity after stroke when compared to Task-specific training.
- Functional Electrical Stimulation may be beneficial for improving motor function, but not performance of activities of daily living, after stroke when compared to Mirror Therapy.
- Functional Electrical Stimulation may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Functional Electrical Stimulation with Mirror Therapy.
- Mirror Therapy may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Functional Electrical Stimulation with Mirror Therapy.
- Mechanical arm trainer may be beneficial for improving dexterity, but not motor function, spasticity, and muscle strength, after stroke when compared to Electrical muscle stimulation of paretic wrist extensors.
- Botulinum Toxin A injection with neuromuscular electrical stimulation may be beneficial for improving motor function after stroke when compared to Placebo with neuromuscular electrical stimulation; the literature is mixed regarding spasticity and range of motion.
- Brain-computer interface with functional electrical stimulation may not be beneficial for improving motor function and spasticity after stroke when compared to Functional Electrical Stimulation.
- Low frequency repetitive transcranial magnetic stimulation may not be beneficial for improving motor function, performance of activities of daily living, spasticity, stroke severity, and muscle strength after stroke when compared to Physical therapy.
- Robot-assisted arm therapy with hand functional electrical stimulation (RAT and functional electrical stimulation) may not be beneficial for improving motor function, dexterity, performance of activities of daily living, and spasticity after stroke when compared to Conventional Therapy.
- Robotic Assisted Therapy (Bi-Manu-track robot) may be beneficial for improving motor function and muscle strength, but not spasticity, after stroke when compared to electromyography-initiated electrical stimulation.
- Robot Exoskeleton with electromyography-Triggered functional electrical stimulation (RETRAINER) may be beneficial for improving motor function and dexterity, but not performance of activities of daily living and muscle strength, after stroke when compared to Conventional Therapy.

- Modified constraint-induced movement therapy may not be beneficial for improving motor function, performance of activities of daily living, proprioception, and muscle strength after stroke when compared to Usual care.
- Mental Imagery Training with electromyography-Triggered Electrical Stimulation may be beneficial for improving motor function, but not spasticity and performance of activities of daily living, after stroke when compared to Generalized Functional Electric Stimulation.
- Electromyography neuromuscular electrical stimulation robot may not be beneficial for improving spasticity after stroke when compared to electromyography robot; the literature is mixed regarding motor function.
- Action Observation with EEG-Mediated Functional Electrical Stimulation Brain-Computer Interface may be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Functional Electrical Stimulation.
- Neuromuscular electrical stimulation electromyography robotic hand may be beneficial for improving spasticity, but not motor function and performance of activities of daily living, after stroke when compared to electromyography robotic hand.
- Neuromuscular electrical stimulation robotic to distal fingers may be beneficial for improving spasticity after stroke when compared to neuromuscular electrical stimulation robotic to proximal wrist-elbow joints; the literature is mixed regarding motor function.
- Dual transcranial direct current stimulation with functional electrical stimulation may be beneficial for improving muscle strength, but not motor function and range of motion, after stroke when compared to Sham transcranial direct current stimulation with functional electrical stimulation.
- Bilateral active transcranial direct current stimulation with functional electrical stimulation may be beneficial for improving motor function, but not spasticity, after stroke when compared to sham transcranial direct current stimulation with functional electrical stimulation.
- Functional electrical stimulation with Action observation training and brain computer interface may be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Conventional therapy.
- Distal (wrist or hand Functional Electrical Stimulation) may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to functional electrical stimulation with Robot assisted Whole arm.
- Distal (wrist or hand Functional Electrical Stimulation) may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Proximal (Shoulder or elbow) (Functional Electrical Stimulation with inMotion robot).
- Neuromuscular electrical stimulation with robot therapy may not be beneficial for improving motor function, performance of activities of daily living, and spasticity after stroke when compared to Robot therapy with Sham.
- Robotic training (InMotion ARM) with motor learning may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Motor learning.
- Electrical stim with repetitive task practice may be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Sham electrical with repetitive task practice.
- Static arm positioning with neuromuscular electrical stimulation may not be beneficial for improving motor function, spasticity, range of motion, and performance of activities of daily living after stroke when compared to Sham positioning and sham neuromuscular electrical stimulation.
- Intermittent theta burst stimulation with Physical therapy may be beneficial for improving motor function, performance of activities of daily living, and stroke severity after stroke when compared to Physical Therapy.
- Intermittent theta burst stimulation with Physical therapy may not be beneficial for improving motor function, performance of activities of daily living, and stroke severity after stroke when compared to functional electrical stimulation with Physical therapy.
- Electromyography neuromuscular electrical stimulation with mental imagery training may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to electromyography neuromuscular electrical stimulation.

- Functional electrical stimulation with brain-computer interface may be beneficial for improving motor function and muscle strength, but not performance of activities of daily living, after stroke when compared to neuromuscular electrical stimulation.
- Repetitive peripheral sensory stimulation with functional electrical stimulation and task specific training may not be beneficial for improving motor function, performance of activities of daily living, spasticity, range of motion, and muscle strength after stroke when compared to Sham RPSS with functional electrical stimulation and TST.
- Purposeful activity with electrical stimulation therapy (functional electrical stimulation) and occupational therapy may be beneficial for improving motor function and performance of activities of daily living, but not muscle strength, after stroke when compared to occupational therapy.
- Bilateral transcranial direct current stimulation with neuromuscular electrical stimulation and coventional care may not be beneficial for improving motor function, performance of activities of daily living, and spasticity after stroke when compared to Sham transcranial direct current stimulation and neuromuscular electrical stimulation with conventional care.
- Low-frequency repetitive transcranial magnetic stimulation with functional electrical stimulation and conventional rehab may be beneficial for improving motor function after stroke when compared to functional electrical stimulation with conventional rehab.
- Low-frequency repetitive transcranial magnetic stimulation with functional electrical stimulation and conventional rehab may be beneficial for improving motor function after stroke when compared to Low-frequency repetitive transcranial magnetic stimulation with conventional rehab.
- Electromyography bridge therapy with conventional therapy may not be beneficial for improving motor function, performance of activities of daily living, range of motion, and muscle strength after stroke when compared to neuromuscular electrical stimulation with conventional rehab.
- Brain-computer interface-functional electrical stimulation with Conventional rehab may not be beneficial for improving motor function after stroke when compared to functional electrical stimulation with Conventional Rehab.
- Functional electrical stimulation-Biofeedback mirror therapy with conventional may be beneficial for improving motor function and range of motion, but not performance of activities of daily living and stroke severity, after stroke when compared to Mirror therapy with conventional rehab.
- Motor imagery brain-computer interface with conventional rehab may be beneficial for improving motor function and performance of activities of daily living after stroke when compared to functional electrical stimulation with conventional rehab.
- Portable brain-computer interface-based hand robot system with Conventional therapy and neuromuscular electrical stimulation may be beneficial for improving motor function after stroke when compared to Task-specific training with Conventional therapy and neuromuscular electrical stimulation.
- Brain-computer interface with functional electrical stimulation may be beneficial for improving motor function, but not range of motion and muscle strength, after stroke when compared to Sham brain-computer interface with functional electrical stimulation.
- Robot therapy with Electroymography-triggered neuromuscular electrical stimulation (ENMES) may be beneficial for improving motor function after stroke when compared to Robot therapy or ENMES.
- Functional electrical stimulation may not be beneficial for improving motor function and range of motion after stroke when compared to routine therapy.
- Functional electrical therapy applied in the acute phase may be beneficial for improving motor function, but not performance of activities of daily living and spasticity, after stroke when compared to functional electrical therapy applied in the chronic phase.
- Cyclic neuromuscular electrical stimulation with mirror therapy may be beneficial for improving motor function, but not spasticity, after stroke when compared to neuromuscular electrical stimulation or mirror therapy alone.
- Blocked neuromuscular electrical stimulation training (neuromuscular electrical stimulation with Hand range of motion training) may be beneficial for improving dexterity and muscle strength after stroke when compared to Hand range of motion exercises (Passive movements, voluntary UE extensions or abduction).
- Blocked neuromuscular electrical stimulation training (neuromuscular electrical stimulation with Hand range of motion training) may not be beneficial for improving dexterity after stroke when compared to

Random neuromuscular electrical stimulation training (neuromuscular electrical stimulation with Hand range of motion training).

- Short-term bilateral arm training with electromyography triggered neuromuscular electrical stimulation may be less beneficial than long-term bilateral arm training with electromyography triggered neuromuscular electrical stimulation for improving muscle strength and dexterity after stroke.
- Electromyography-Triggered neuromuscular electrical stimulation with Bilateral Arm Training may be beneficial for improving dexterity after stroke when compared to Sham Stimulation with Bilateral Arm Training.
- Electromyography-Triggered neuromuscular electrical stimulation with Bilateral Arm Training may be beneficial for improving dexterity after stroke when compared to electromyography-Triggered neuromuscular electrical stimulation with Bilateral Arm Training.
- Coupled bilateral training with load with electromyography-triggered neuromuscular electrical stimulation may be beneficial for improving dexterity after stroke when compared to unilateral arm training.
- Coupled bilateral training with load with electromyography-triggered neuromuscular electrical stimulation may not be beneficial for improving dexterity after stroke when compared to Coupled bilateral training with no load with electromyography-triggered neuromuscular electrical stimulation.
- Motor relearning with electrical stim may not be beneficial for improving dexterity and spasticity after stroke when compared to Bobath treatment with electrical stim.
- Motor relearning with electrical stim may be less beneficial than Bobath treatment with electrical stim for improving muscle strength after stroke.
- SMART arm with outcome triggered electrical stim and usual therapy may not be beneficial for improving performance of activities of daily living, spasticity, and muscle strength after stroke when compared to Usual therapy.
- SMART arm with electrical stim may be beneficial for improving performance of activities of daily living and spasticity after stroke when compared to No Treatment.
- Anodal transcranial direct current stimulation with functional electrical stimulation may be beneficial for improving spasticity after stroke when compared to Sham transcranial direct current stimulation with functional electrical stimulation.
- Electromyography-trigerred functional electrical stimulation may be beneficial for improving range of motion, but not spasticity, after stroke when compared to Conventional therapy.
- Botolinum Toxin-A with Extracorporeal shock wave therapy (extracorporeal shockwave therapy) may be beneficial for improving spasticity after stroke when compared to botulinum toxin A with electrical stimulation (ES).
- Neuromuscular electrical stimulation may be beneficial for improving spasticity after stroke when compared to passive stretching.
- EMG-triggered neuromuscular electrical stimulation may be beneficial for improving muscle strength, but not spasticity, after stroke when compared to conventional therapy.
- Electrical Stimulation to Wrist and Finger Extensors with Splint may not be beneficial for improving range of motion after stroke when compared to Splint.
- Botox 1000u with cyclic neuromuscular electrical stimulation may not be beneficial for improving proprioception after stroke when compared to Placebo.
- Bilateral electromyography-triggered multi-channel electrostimulation with mirror therapy may not be beneficial for improving proprioception after stroke when compared to bilateral electromyography-triggered multi-channel electrostimulation.
- Functional Electrical Stimulation with 1:1 On/Off Ratio may be less beneficial than Functional Electrical Stimulation with 1:3 On/Off Ratio or Functional Electrical Stimulation with 1:5 On/Off Ratio for improving muscle strength after stroke.
- Cryotherapy on spastic wrist flexors with Kinesiotherapy may not be beneficial for improving muscle strength after stroke when compared to neuromuscular electrical stimulation on wrist extensors.
- Different approaches to FES may not have a difference in efficacy when compared with one another for improving motor function.

- EMG-Controlled FES during task oriented training with Robotic training may be beneficial for improving motor function, but not dexterity, after stroke when compared to Conventional rehab (TST).
- EMG driven NMES Robot arm may be beneficial for improving spasticity, but not performance of activities of daily living, after stroke when compared to Conventional Therapy; the literature is mixed regarding motor function.
- Long NMES (12Hr) may be beneficial for improving motor function, but not spasticity, after stroke when compared to Short NMES (30min).
- High Frequency NMES (40Hz) may not be beneficial for improving muscle strength after stroke when compared to Low Frequency NMES (20Hz).
- FES with Task specific training may be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Sham with Task specific training.
- FES with botulinum toxin-A and home based task-oriented exercise may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Botulinum toxin-A with home-based exercise program.
- EMG triggered NMS (EMG-Stim) with Wrist Strengthening Exercises may be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Wrist Exercises.
- Neuromuscular electrical stimulation combined with other interventions may be beneficial for improving motor function after stroke when compared to stretching and positioning programs.
- Transcranial Random Noise stimulation (tRNS) with FES may not be beneficial for improving muscle strength after stroke when compared to Sham-tRNS with active FES; the literature is mixed regarding motor function.
- Task Specific EMG triggered ES therapy with Conventional PT may be beneficial for improving motor function, stroke severity, and muscle strength, but not performance of activities of daily living, after stroke when compared to Conventional PT.
- Virtual Reality with Functional Electrical Stimulation may not be beneficial for improving motor function and dexterity after stroke when compared to Functional Electrical Stimulation.
- Dual-tDCS combined with PNMES with CIMT may be beneficial for improving motor function after stroke when compared to CIMT; the literature is mixed regarding performance of activities of daily living.
- Mirror therapy may not be beneficial for improving motor function, muscle strength, and dexterity after stroke when compared to EMG-triggered neuromuscular stimulation.
- Functional electrical stimulation with biofeedback with mirror therapy may be beneficial for improving motor function, performance of activities of daily living, and dexterity, but not muscle strength, spasticity, and range of motion, after stroke when compared to Conventional rehabilitation.
- Functional electrical stimulation with biofeedback with mirror therapy may be beneficial for improving motor function, muscle strength, and dexterity, but not range of motion and performance of activities of daily living, after stroke when compared to FES with mirror therapy.
- Mental training linked with EMG triggered stimulation may be beneficial for improving motor function, but not spasticity, range of motion, and performance of activities of daily living, after stroke when compared to FES.
- PNF with NMES may be beneficial for improving stroke severity, spasticity, range of motion, and performance of activities of daily living after stroke when compared to PNF.
- Integrated volitional electrical stimulator (IVES) with wrist splint may be beneficial for improving motor function, but not performance of activities of daily living, after stroke when compared to wrist splint.
- Dry Needling with FES and conventional exercise may be beneficial for improving motor function, muscle strength, and dexterity, but not spasticity, after stroke when compared to Sham-Needling with FES and Conventional exercise.
- Functional electrical stimulation combined with other interventions: some approaches may be more beneficial than others for improving dexterity; different approaches to functional electrical stimulation combined with other interventions may not have a difference in efficacy when compared with one another for improving motor function and performance of activities of daily living.
- Different approaches to neuromuscular electrical stimulation may not have a difference in efficacy when compared with one another for improving motor function, muscle strength, spasticity, range of motion, and performance of activities of daily living.

- Electromyography-triggered neuromuscular electrical stimulation combined with other interventions: some approaches may be more beneficial than others for improving range of motion; different approaches to electromyography-triggered neuromuscular electrical stimulation combined with other interventions may not have a difference in efficacy when compared with one another for improving motor function and dexterity.
- FES with Conventional rehab may be beneficial for improving motor function after stroke when compared to Sham FES with Conventional rehab.
- High Frequency NMES (40Hz) may be less beneficial than Low Frequency NMES (20Hz) for improving dexterity after stroke.
- Functional electrical stimulation: some approaches may be more beneficial than others for improving range of motion.
- EMG-triggered neuromuscular stimulation may not be beneficial for improving motor function, muscle strength, and dexterity after stroke when compared to Conventional care.

Summary of Key Points: Neuromuscular Electrical Stimulation (NMES)

Intervention	Control(s)	Function domain(s)	Effect
120min electrical stimulation with repetitive task specific practice	60min electrical stimulation therapy with repetitive task specific practice or 30min electrical stimulation therapy and repetitive task specific practice	Motor function, performance of activities of daily living	+
Functional electrical stimulation combined with other interventions	One another (different approaches compared)	Motor function, performance of activities of daily living	–
Bilateral arm training with functional electrical stimulation and conventional occupational therapy	Bilateral arm training with sham functional electrical stimulation and conventional occupational therapy	Motor function, range of motion	+
Bilateral arm training with functional electrical stimulation and conventional occupational therapy	Bilateral arm training with sham functional electrical stimulation and conventional occupational therapy	Performance of activities of daily living, spasticity, muscle strength	–
Neuromuscular electrical stimulation combined with other interventions	sham	Motor function, range of motion, muscle strength	+
Neuromuscular electrical stimulation combined with other interventions	sham	Spasticity	–
Functional electrical stimulation	conventional therapy	Stroke severity, muscle strength, spasticity, range of motion	+
Functional electrical stimulation	conventional therapy	Motor function, performance of activities of daily living	–
Functional electrical stimulation combined with other interventions	fes	Motor function, dexterity, performance of activities of daily living	–
Neuromuscular electrical stimulation	sham	Motor function	+
Neuromuscular electrical stimulation	sham	Performance of activities of daily living, muscle strength	–
Neuromuscular electrical stimulation	conventional therapy	Motor function, muscle strength, range of motion, dexterity	+
Neuromuscular electrical stimulation	conventional therapy	Stroke severity, spasticity, performance of activities of daily living	–
High neuromuscular electrical stimulation	Low neuromuscular electrical stimulation	Motor function, performance of activities of daily living	–

Functional electrical stimulation combined with other interventions	neuromuscular electrical stimulation	Range of motion	+
Functional electrical stimulation combined with other interventions	neuromuscular electrical stimulation	Performance of activities of daily living, dexterity	–
Functional electrical stimulation combined with other interventions	neuromuscular electrical stimulation	Motor function, muscle strength	=
Arm with Hand Contralaterally Controlled Functional Electrical Stimulation	Hand contralaterally controlled functional electrical stimulation or Arm with Hand Cyclic Neuromuscular Electrical Stimulation	Dexterity, performance of activities of daily living	–
Arm with Hand Contralaterally Controlled Functional Electrical Stimulation	Hand contralaterally controlled functional electrical stimulation or Arm with Hand Cyclic Neuromuscular Electrical Stimulation	Motor function	=
Neuromuscular Electrical Stimulation with Conventional Rehabilitation	Noxious Thermal Stimulation with Conventional Rehabilitation or Thermal Stimulation, Neuromuscular Electrical stimulation and Conventional Rehabilitation	Motor function, performance of activities of daily living, spasticity, muscle strength	–
Neuromuscular electrical stimulation with repetitive transcranial magnetic stimulation	Sham neuromuscular electrical stimulation with repetitive transcranial magnetic stimulation	Dexterity, spasticity	+
Neuromuscular electrical stimulation with repetitive transcranial magnetic stimulation	Sham neuromuscular electrical stimulation with repetitive transcranial magnetic stimulation	Motor function	–
Cyclic Neuromuscular Electrical Stimulation	Electromyographically-triggered Neuromuscular Electrical Stimulatiom or Sensory Stimulation	Motor function, performance of activities of daily living	–
Electromyography-triggered neuromuscular electrical stimulation with repetitive transcranial magnetic stimulation	electromyography-triggered neuromuscular electrical stimulation with Sham repetitive transcranial magnetic stimulation	Motor function, spasticity, range of motion	–
Neuromuscular electrical stimulation combined with other interventions	orthotics	Motor function, performance of activities of daily living, spasticity, muscle strength	–
Contralaterally controlled functional electrical stimulation with Task specific training	Cyclic neuromuscular electrical stimulation with Task specific training	Motor function, dexterity, performance of activities of daily living, range of motion	+
Neuromuscular electrical stimulation	One another (different approaches compared)	Motor function, performance of activities of daily living, spasticity, range of motion, muscle strength	–
Electromyography-triggered neuromuscular electrical stimulation	cyclic neuromuscular electrical stimulation	Motor function, muscle strength	–
Motor electrical stimulation involving cyclic (neuromuscular electrical stimulation) and electromyography	Percutaneous Sensory electrical stimulation	Motor function, performance of activities of daily living	–
Functional Electrical Stimulation with Mirror Therapy	Functional Electrical Stimulation with Sham Mirror Therapy	Dexterity	–
Functional Electrical Stimulation with Mirror Therapy	Functional Electrical Stimulation with Sham Mirror Therapy	Motor function, stroke severity	=

Electromyography-triggered neuromuscular electrical stimulation combined with other interventions	emg-triggered nmes	Motor function, performance of activities of daily living	-
Electromyography-triggered neuromuscular electrical stimulation combined with other interventions	emg-triggered nmes	Dexterity	=
Electromyogrpahical bridge	Cyclic neuromuscular electrical stimulation	Motor function, stroke severity	+
Electromyogrpahical bridge	Cyclic neuromuscular electrical stimulation	Range of motion	-
Neuromuscular electrical stimulation combined with other interventions	conventional therapy	Performance of activities of daily living	+
Neuromuscular electrical stimulation combined with other interventions	conventional therapy	Motor function, stroke severity, spasticity, range of motion	-
Neuromuscular electrical stimulation with Conventional therapy	Peripheral Pulse Electromagnetic Waves (rPMS) with Conventional therapy	Motor function	-
Neuromuscular electrical stimulation with conventional rehabilitation	transcutaneous electrical nerve stimulation with conventional rehabilitation	Motor function, performance of activities of daily living, spasticity, range of motion	-
Functional electrical stimulation combined with other interventions	conventional therapy	Motor function, muscle strength, spasticity, performance of activities of daily living	=
Electromyography-triggered neuromuscular electrical stimulation	conventional therapy	Dexterity	+
Electromyography-triggered neuromuscular electrical stimulation	conventional therapy	Motor function, muscle strength, performance of activities of daily living	-
Electromyography-triggered neuromuscular electrical stimulation combined with other interventions	One another (different approaches compared)	Motor function, dexterity	-
Electromuscular Stimulation	Transcutaneous Electrical Nerve Stimulation	Motor function, performance of activities of daily living, stroke severity	-
Electromuscular Stimulation	Transcutaneous Electrical Nerve Stimulation	Muscle strength	=
CNMES with task oriented training and conventional rehab	electromyography-triggered neuromuscular electrical stimulation with task oriented training and conventional rehab	Motor function, dexterity	-
Functional electrical stimulation	No treatment	Motor function	-
Position triggered ES with conventional rehabilitation	Passive ES with conventional rehabilitation	Motor function, muscle strength	-
Arm hand function training (electromyography triggered biofeedback with movement imagery) and usual therapy	Electrical stimulation (without the electromyography-triggered feedback function) with usual therapy	Motor function	-
Mental Practice with electromyography neuromuscular electrical stimulation and Conventional Rehab	Conventional Rehab	Motor function, performance of activities of daily living	+
Mirror therapy with Mesh glove (afferent stimulation, primarily neuromuscular electrical stimulation)	task oriented exercise	Motor function	+

Mirror therapy with Mesh glove (afferent stimulation, primarily neuromuscular electrical stimulation)	task oriented exercise	Dexterity, performance of activities of daily living	–
Mirror therapy with Mesh glove (afferent stimulation, primarily neuromuscular electrical stimulation)	Mirror therapy	Dexterity	+
Mirror therapy with Mesh glove (afferent stimulation, primarily neuromuscular electrical stimulation)	Mirror therapy	Motor function, performance of activities of daily living	–
Functional electrical stimulation with Task-specific training	Task-specific training	Motor function, dexterity	+
Functional Electrical Stimulation	Mirror Therapy	Motor function	+
Functional Electrical Stimulation	Mirror Therapy	Performance of activities of daily living	–
Functional Electrical Stimulation	Functional Electrical Stimulation with Mirror Therapy	Motor function, performance of activities of daily living	–
Mirror Therapy	Functional Electrical Stimulation with Mirror Therapy	Motor function, performance of activities of daily living	–
Mechanical arm trainer	Electrical muscle stimulation of paretic wrist extensors	Dexterity	+
Mechanical arm trainer	Electrical muscle stimulation of paretic wrist extensors	Motor function, spasticity, muscle strength	–
Botulinum Toxin A injection with neuromuscular electrical stimulation	Placebo with neuromuscular electrical stimulation	Motor function	+
Botulinum Toxin A injection with neuromuscular electrical stimulation	Placebo with neuromuscular electrical stimulation	Spasticity, range of motion	=
Brain-computer interface with functional electrical stimulation	Functional Electrical Stimulation	Motor function, spasticity	–
Low frequency repetitive transcranial magnetic stimulation	Physical therapy	Motor function, performance of activities of daily living, spasticity, stroke severity, muscle strength	–
Robot-assisted arm therapy with hand functional electrical stimulation (RAT and functional electrical stimulation)	Conventional Therapy	Motor function, dexterity, performance of activities of daily living, spasticity	–
Robotic Assisted Therapy (Bi-Manu-track robot)	electromyography-initiated electrical stimulation	Motor function, muscle strength	+
Robotic Assisted Therapy (Bi-Manu-track robot)	electromyography-initiated electrical stimulation	Spasticity	–
Robot Exoskeleton with electromyography-Triggered functional electrical stimulation (RETRAINER)	Conventional Therapy	Motor function, dexterity	+
Robot Exoskeleton with electromyography-Triggered functional electrical stimulation (RETRAINER)	Conventional Therapy	Performance of activities of daily living, muscle strength	–
Modified constraint-induced movement therapy	Usual care	Motor function, performance of activities of daily living, proprioception, muscle strength	–
Mental Imagery Training with electromyography-Triggered Electrical Stimulation	Generalized Functional Electric Stimulation	Motor function	+

Mental Imagery Training with electromyography-Triggered Electrical Stimulation	Generalized Functional Electric Stimulation	Spasticity, performance of activities of daily living	–
Electromyography neuromuscular electrical stimulation robot	electromyography robot	Spasticity	–
Electromyography neuromuscular electrical stimulation robot	electromyography robot	Motor function	=
Action Observation with EEG-Mediated Functional Electrical Stimulation Brain-Computer Interface	Functional Electrical Stimulation	Motor function, performance of activities of daily living	+
Neuromuscular electrical stimulation electromyography robotic hand	electromyography robotic hand	Spasticity	+
Neuromuscular electrical stimulation electromyography robotic hand	electromyography robotic hand	Motor function, performance of activities of daily living	–
Neuromuscular electrical stimulation robotic to distal fingers	neuromuscular electrical stimulation robotic to proximal wrist-elbow joints	Spasticity	+
Neuromuscular electrical stimulation robotic to distal fingers	neuromuscular electrical stimulation robotic to proximal wrist-elbow joints	Motor function	=
Dual transcranial direct current stimulation with functional electrical stimulation	Sham transcranial direct current stimulation with functional electrical stimulation	Muscle strength	+
Dual transcranial direct current stimulation with functional electrical stimulation	Sham transcranial direct current stimulation with functional electrical stimulation	Motor function, range of motion	–
Bilateral active transcranial direct current stimulation with functional electrical stimulation	sham transcranial direct current stimulation with functional electrical stimulation	Motor function	+
Bilateral active transcranial direct current stimulation with functional electrical stimulation	sham transcranial direct current stimulation with functional electrical stimulation	Spasticity	–
Functional electrical stimulation with Action observation training and brain computer interface	Conventional therapy	Motor function, performance of activities of daily living	+
Distal (wrist or hand Functional Electrical Stimulation)	functional electrical stimulation with Robot assisted Whole arm	Motor function, performance of activities of daily living	–
Distal (wrist or hand Functional Electrical Stimulation)	Proximal (Shoulder or elbow) (Functional Electrical Stimulation with inMotion robot)	Motor function, performance of activities of daily living	–
Neuromuscular electrical stimulation with robot therapy	Robot therapy with Sham	Motor function, performance of activities of daily living, spasticity	–
Robotic training (InMotion ARM) with motor learning	Motor learning	Motor function, performance of activities of daily living	–
Electrical stim with repetitive task practice	Sham electrical with repetitive task practice	Motor function, performance of activities of daily living	+
Static arm positioning with neuromuscular electrical stimulation	Sham positioning and sham neuromuscular electrical stimulation	Motor function, spasticity, range of motion, performance of activities of daily living	–
Intermittent theta burst stimulation with Physical therapy	Physical Therapy	Motor function, performance of activities of daily living, stroke severity	+

Intermittent theta burst stimulation with Physical therapy	functional electrical stimulation with Physical therapy	Motor function, performance of activities of daily living, stroke severity	–
Electromyography neuromuscular electrical stimulation with mental imagery training	electromyography neuromuscular electrical stimulation	Motor function, performance of activities of daily living	–
Functional electrical stimulation with brain-computer interface	neuromuscular electrical stimulation	Motor function, muscle strength	+
Functional electrical stimulation with brain-computer interface	neuromuscular electrical stimulation	Performance of activities of daily living	–
Repetitive peripheral sensory stimulation with functional electrical stimulation and task specific training	Sham RPSS with functional electrical stimulation and TST	Motor function, performance of activities of daily living, spasticity, range of motion, muscle strength	–
Purposeful activity with electrical stimulation therapy (functional electrical stimulation) and occupational therapy	occupational therapy	Motor function, performance of activities of daily living	+
Purposeful activity with electrical stimulation therapy (functional electrical stimulation) and occupational therapy	occupational therapy	Muscle strength	–
Bilateral transcranial direct current stimulation with neuromuscular electrical stimulation and coventional care	Sham transcranial direct current stimulation and neuromuscular electrical stimulation with conventional care	Motor function, performance of activities of daily living, spasticity	–
Low-frequency repetitive transcranial magnetic stimulation with functional electrical stimulation and conventional rehab	functional electrical stimulation with conventional rehab	Motor function	+
Low-frequency repetitive transcranial magnetic stimulation with functional electrical stimulation and conventional rehab	Low-frequency repetitive transcranial magnetic stimulation with conventional rehab	Motor function	+
Electromyography bridge therapy with conventional therapy	neuromuscular electrical stimulation with conventional rehab	Motor function, performance of activities of daily living, range of motion, muscle strength	–
Brain-computer interface-functional electrical stimulation with Conventional rehab	functional electrical stimulation with Conventional Rehab	Motor function	–
Functional electrical stimulation-Biofeedback mirror therapy with conventional	Mirror therapy with conventional rehab	Motor function, range of motion	+
Functional electrical stimulation-Biofeedback mirror therapy with conventional	Mirror therapy with conventional rehab	Performance of activities of daily living, stroke severity	–
Motor imagery brain-computer interface with conventional rehab	functional electrical stimulation with conventional rehab	Motor function, performance of activities of daily living	+
Portable brain-computer interface-based hand robot system with Conventional therapy and neuromuscular electrical stimulation	Task-specific training with Conventional therapy and neuromuscular electrical stimulation	Motor function	+
Brain-computer interface with functional electrical stimulation	Sham brain-computer interface with functional electrical stimulation	Motor function	+
Brain-computer interface with functional electrical stimulation	Sham brain-computer interface with functional electrical stimulation	Range of motion, muscle strength	–

Robot therapy with Electroymography-triggered neuromuscular electrical stimulation (ENMES)	Robot therapy or ENMES	Motor function	+
Functional electrical stimulation	routine therapy	Motor function, range of motion	–
Functional electrical therapy applied in the acute phase	functional electrical therapy applied in the chronic phase	Motor function	+
Functional electrical therapy applied in the acute phase	functional electrical therapy applied in the chronic phase	Performance of activities of daily living, spasticity	–
Cyclic neuromuscular electrical stimulation with mirror therapy	neuromuscular electrical stimulation or mirror therapy alone	Motor function	+
Cyclic neuromuscular electrical stimulation with mirror therapy	neuromuscular electrical stimulation or mirror therapy alone	Spasticity	–
Functional electrical stimulation combined with other interventions	One another (different approaches compared)	Dexterity	+
Blocked neuromuscular electrical stimulation training (neuromuscular electrical stimulation with Hand range of motion training)	Hand range of motion exercises (Passive movements, voluntary UE extensions or abduction)	Dexterity, muscle strength	+
Blocked neuromuscular electrical stimulation training (neuromuscular electrical stimulation with Hand range of motion training)	Random neuromuscular electrical stimulation training (neuromuscular electrical stimulation with Hand range of motion training)	Dexterity	–
Short-term bilateral arm training with electromyography triggered neuromuscular electrical stimulation	Long-term bilateral arm training with electromyography triggered neuromuscular electrical stimulation	Muscle strength, dexterity	–
Electromyography-Triggered neuromuscular electrical stimulation with Bilateral Arm Training	Sham Stimulation with Bilateral Arm Training	Dexterity	+
Electromyography-Triggered neuromuscular electrical stimulation with Bilateral Arm Training	electromyography-Triggered neuromuscular electrical stimulation with Bilateral Arm Training	Dexterity	+
Coupled bilateral training with load with electromyography-triggered neuromuscular electrical stimulation	unilateral arm training	Dexterity	+
Coupled bilateral training with load with electromyography-triggered neuromuscular electrical stimulation	Coupled bilateral training with no load with electromyography-triggered neuromuscular electrical stimulation	Dexterity	–
Motor relearning with electrical stim	Bobath treatment with electrical stim	Dexterity, spasticity, muscle strength	–
SMART arm with outcome triggered electrical stim and usual therapy	Usual therapy	Performance of activities of daily living, spasticity, muscle strength	–
SMART arm with electrical stim	No Treatment	Performance of activities of daily living, spasticity	+
Anodal transcranial direct current stimulation with functional electrical stimulation	Sham transcranial direct current stimulation with functional electrical stimulation	Spasticity	+

Electromyography-trigerred functional electrical stimulation	Conventional therapy	Range of motion	+
Electromyography-trigerred functional electrical stimulation	Conventional therapy	Spasticity	−
Botolinum Toxin-A with Extracorporeal shock wave therapy (extracorporeal shockwave therapy)	botulinum toxin A with electrical stimulation (ES)	Spasticity	+
Neuromuscular electrical stimulation	passive stretching	Spasticity	+
EMG-triggered neuromuscular electrical stimulation	conventional therapy	Muscle strength	+
EMG-triggered neuromuscular electrical stimulation	conventional therapy	Spasticity	−
Functional electrical stimulation	One another (different approaches compared)	Range of motion	+
Electromyography-triggered neuromuscular electrical stimulation combined with other interventions	One another (different approaches compared)	Range of motion	+
Electrical Stimulation to Wrist and Finger Extensors with Splint	Splint	Range of motion	−
Botox 1000u with cyclic neuromuscular electrical stimulation	Placebo	Proprioception	−
Bilateral electromyography-triggered multi-channel electrostimulation with mirror therapy	bilateral electromyography-triggered multi-channel electrostimulation	Proprioception	−
Functional Electrical Stimulation with 1:1 On/Off Ratio	Functional Electrical Stimulation with 1:3 On/Off Ratio or Functional Electrical Stimulation with 1:5 On/Off Ratio	Muscle strength	−
Cryotherapy on spastic wrist flexors with Kinesiotherapy	neuromuscular electrical stimulation on wrist extensors	Muscle strength	−
FES with Conventional rehab	Sham FES with Conventional rehab	Motor function	+
EMG-Controlled FES during task oriented training with Robotic training	Conventional rehab (TST)	Motor function	+
EMG-Controlled FES during task oriented training with Robotic training	Conventional rehab (TST)	Dexterity	−
EMG driven NMES Robot arm	Conventional Therapy	Spasticity	+
EMG driven NMES Robot arm	Conventional Therapy	Performance of activities of daily living	−
EMG driven NMES Robot arm	Conventional Therapy	Motor function	=
Long NMES (12Hr)	Short NMES (30min)	Motor function	+
Long NMES (12Hr)	Short NMES (30min)	Spasticity	−
High Frequency NMES (40Hz)	Low Frequency NMES (20Hz)	Muscle strength, dexterity	−
FES with Task specific training	Sham with Task specific training	Motor function, performance of activities of daily living	+

FES with botulinum toxin-A and home based task-oriented exercise	Botulinum toxin-A with home-based exercise program	Motor function, performance of activities of daily living	–
EMG triggered NMS (EMG-Stim) with Wrist Strengthening Exercises	Wrist Exercises	Motor function, performance of activities of daily living	+
FES	One another (different approaches compared)	Motor function	–
Functional electrical stimulation combined with other interventions	task-specific training	Motor function, dexterity	=
Neuromuscular electrical stimulation combined with other interventions	stretching and positioning programs	Motor function	+
Transcranial Random Noise stimulation (tRNS) with FES	Sham-tRNS with active FES	Muscle strength	–
Transcranial Random Noise stimulation (tRNS) with FES	Sham-tRNS with active FES	Motor function	=
Task Specific EMG triggered ES therapy with Conventional PT	Conventional PT	Motor function, stroke severity, muscle strength	+
Task Specific EMG triggered ES therapy with Conventional PT	Conventional PT	Performance of activities of daily living	–
Virtual Reality with Functional Electrical Stimulation	Functional Electrical Stimulation	Motor function, dexterity	–
Dual-tDCS combined with PNMES with CIMT	CIMT	Motor function	+
Dual-tDCS combined with PNMES with CIMT	CIMT	Performance of activities of daily living	=
Mirror therapy	EMG-triggered neuromuscular stimulation	Motor function, muscle strength, dexterity	–
Functional electrical stimulation with biofeedback with mirror therapy	Conventional rehabilitation	Motor function, performance of activities of daily living, dexterity	+
Functional electrical stimulation with biofeedback with mirror therapy	Conventional rehabilitation	Muscle strength, spasticity, range of motion	–
Functional electrical stimulation with biofeedback with mirror therapy	FES with mirror therapy	Motor function, muscle strength, dexterity	+
Functional electrical stimulation with biofeedback with mirror therapy	FES with mirror therapy	Range of motion, performance of activities of daily living	–
Mental training linked with EMG triggered stimulation	FES	Motor function	+
Mental training linked with EMG triggered stimulation	FES	Spasticity, range of motion, performance of activities of daily living	–
PNF with NMES	PNF	Stroke severity, spasticity, range of motion, performance of activities of daily living	+
Integrated volitional electrical stimulator (IVES) with wrist splint	wrist splint	Motor function	+
Integrated volitional electrical stimulator (IVES) with wrist splint	wrist splint	Performance of activities of daily living	–
Dry Needling with FES and conventional exercise	Sham-Needling with FES and Conventional exercise	Motor function, muscle strength, dexterity	+
Dry Needling with FES and conventional exercise	Sham-Needling with FES and Conventional exercise	Spasticity	–

EMG-triggered neuromuscular stimulation	Conventional care	Motor function, muscle strength, dexterity	–

Transcutaneous Electrical Nerve Stimulation (TENS)



Adapted from: http://www.massageprocedures.com/complementary-modalities/tens/

A total of fourteen RCTs were found that evaluated transcutaneous electrical nerve stimulation (TENS) for upper extremity motor rehabilitation. Four RCTs compared transcutaneous electrical stimulation (TENS) with sham (Ertzgaard et al. (2018); Cho et al. (2013); Tekeoglu et al. (1998); Leandri et al. (1990)). One RCT compared transcutaneous electrical stimulation (TENS) with conventional therapy (Sonde et al. (1998)). One RCT evaluated transcutaneous electrical stimulation (TENS) combined with other interventions (Moniruzzaman et al. (2010)). One RCT compared transcutaneous electrical stimulation (TENS) combined with other interventions with transcutaneous electrical stimulation (tens) or sham (Marco et al. (2007)). Two RCTs compared transcutaneous electrical stimulation (TENS) combined with other interventions with sham or task-specific training (Moon et al. (2021); Jung et al. (2017)). One RCT compared interferential current therapy combined with other interventions with neurodevelopmental techniques (bobath approach) (van Vliet et al. (2005)). One RCT compared transcutaneous electrical stimulation (TENS) combined with other interventions with no treatment (Chen et al. (2022a)). One RCT compared transcutaneous electrical stimulation (TENS) combined with other interventions with nerve block (Ersoy et al. (2023)). One RCT compared transcutaneous electrical stimulation (TENS) combined with other interventions with transcutaneous electrical stimulation (tens) or task-specific training (Jung K.-S. et al. (2024)). One RCT compared transcutaneous electrical stimulation (TENS) combined with other interventions with task-specific training (Wang M.-H. et al. (2024)).

In addition, 10 RCTs in which transcutaneous electrical nerve stimulation (TENS) formed part of a combined or comparative intervention are cross-referenced at the end of Table 23; their primary listings appear in other tables.

The methodological details and results of all fourteen RCTs are presented in Table 23.

Table 23. RCTs Evaluating Transcutaneous Electrical Nerve Stimulation (TENS) for Upper Extremity Motor Rehabilitation

Authors (Year) Study Design (PEDro Score) Sample Size start Sample Size end Time post stroke category Study design	Interventions Duration: Session length, frequency per week for total number of weeks	Outcome Measures Result (direction of effect)

Transcutaneous electrical stimulation (TENS) compared to sham		
Ertzgaard et al. (2018) RCT Crossover (10) NStart=31 NEnd=27 TPS=Chronic A vs 0	E: Self admin electrical stimulation (TENS) C: Sham stimulation Duration: 1hr/d, 3-4d/wk for 6wks active period, 6wks inactive period, 6wk washout after both treatment groups	E vs C: Timed up and Go (-) Gait test CHT+FGT (-) ARAT (-) WMFT (-) Mod Ashworth scale (-) EQ-VAS (-) SF-36V2/6D (-) NRS Pain (-) NRS Spasticity (-) Goal attainment scale
Cho et al. (2013) RCT (5) NStart=50 NEnd=42 TPS=Chronic A vs 0	E: TENS C: Sham TENS Duration: 30 min conventional therapy, 60 min TENS or sham	E vs C: Postural Sway EYes Open (-) EYes Closed (+exp) Unstable Surface EYes Open (-) Modified Ashworth Scale (+exp) Hand Held Dynamometer (+exp)
Tekeoglu et al. (1998) RCT (5) NStart=60 NEnd=60 TPS=Subacute A vs 0	E: TENS 100Hz C: Sham TENS Duration: 30min/d, 5d/wk, 8wk	E vs C: Barthel Index (+exp) Ashworth Scale (-)
Leandri et al. (1990) RCT (4) NStart=60 NEnd=60 TPS=Subacute A1 vs A2 vs 0	E1: High intensity TENS + Conventional therapy E2: Low intensity TENS + Conventional therapy C: Sham TENS + Conventional therapy Duration: 12 sessions, 4wks	E1/E2 vs C: Passive range of motion (no between group stats)
Transcutaneous electrical stimulation (TENS) compared to conventional therapy		
Sonde et al. (1998) RCT (4) NStart=44 NEnd=44 TPS=Chronic A vs 0	E: Low-TENS + physiotherapy C: Physiotherapy Duration: 60min, 5d/wk for 12wk TENS; 2x/wk physiotherapy	E vs C: Fugl-Meyer Assessment (+exp) more severely affected arm group (-) less severly affected arm group (+exp) Barthel Index (-)
Transcutaneous electrical stimulation (TENS) combined with other interventions compared to control		
Moniruzzaman et al. (2010) RCT (4) NStart=45 NEnd=45 TPS=Subacute A vs B *Also in Table 27 (Additional Afferent and Peripheral Stimulation Methods)*	E1: Non invasive TENS + conventional treatment (NSAID + Exercise+ ADL instructions) E2: Ultrasound therapy + conventional treatment (NSAID + Exercise+ ADL instructions) Duration: 45min/d, 3d/wk, 5wk	E1 vs E2: Range of Motion (+exp1) Muscle strength (+exp1) Lattinen Index pain (-)
Transcutaneous electrical stimulation (TENS) combined with other interventions compared to transcutaneous electrical stimulation (tens) or sham		
Marco et al. (2007)	E: TENS + BTA infiltration	E vs C:

RCT (10) NStart=31 NEnd=29 TPS=Chronic A + B vs A/B *Also in Table 33 (Botulinum Toxin)*	C: TENS + Placebo 2.5mL saline Duration: 6 week period	VAS pain (+exp) Mod Ashforth scale (-) Shoulder range of motion flexion (-) abduction (-) external rotation (+exp) MEP amplitude (+exp) MEP latency (-)
Transcutaneous electrical stimulation (TENS) combined with other interventions compared to sham or task-specific training		
Moon et al. (2021) RCT (7) NStart=48 NEnd=43 TPS=Subacute A + B vs A/B *Also in Table 4 (Task-Specific Training)*	E: TENS + Task oriented occupational therapy + conventional therapy C: Sham TENS + Task oriented occupational therapy + conventional therapy Duration: 1hr/d(30min TENS; 30 mins OT), 5d/wk, 4wks	E vs C: MAS (-) JTHFT (-) MFT (+exp) MBI (-)
Jung et al. (2017) RCT (7) NStart=46 NEnd=46 TPS=Chronic A + B vs A/B *Also in Table 4 (Task-Specific Training)*	E: Transcutaneous Electrical Nerve Stimulation and Task-Related Training C: Sham Transcutaneous Electrical Nerve Stimulation and Task-Related Training Duration: 1h, 5d/wk for 4wk	E vs C: Manual Muscle strength test (+exp) Active range of motion (+exp) Fugl-Meyer Assessment-Upper extremity (+exp)
Interferential current therapy combined with other interventions compared to neurodevelopmental techniques (bobath approach)		
van Vliet et al. (2005) RCT (7) NStart=120 NEnd=99 TPS=Acute A vs B *Also in Table 1 (Neurodevelopmental Techniques)*	E1: Movement science based training E2: Bobath concept Duration: 23min, 5d/wk for 4wk	E1 vs E2: Motor Assessment Scale (-) Barthel Index (-) Extended activities of daily living scale (-) 10-hole peg test (-) 6m walk test (-) Modified Ashworth Scale (-) Rivermead Motor Assessment (-)
Transcutaneous electrical stimulation (TENS) combined with other interventions compared to no treatment		
Chen et al. (2022a) RCT (8) NStart=120 NEnd=111 TPS=Chronic A + B1 vs A + B2 vs A vs 0 *Also in Table 4 (Task-Specific Training)*	E1: Bi-TENS + Task Oriented Training (TOT) E2: Uni-TENS + TOT E3: Placebo-TENS + TOT C: No Treatment Duration: 60min/d,3d/wk, 7wks (20 sessions)	E1/E2/E3 vs C: E1 vs E2/E3/C: FMA-UE (+exp1)
Transcutaneous electrical stimulation (TENS) combined with other interventions compared to nerve block		
Ersoy et al. (2023) RCT (4) NStart=25 NEnd=24 TPS=Chronic A vs B *Also in Table 35 (Nerve Block)*	E: TENS + conventional rehab C: Suprascapular nerve block + conventional rehab Duration: 30min/d, 5d/wk, 3wks	E vs C: Pain-VAS (+exp) PROM (-) MAS (-) MBI (-) SS-Qol (+exp)

Transcutaneous electrical stimulation (TENS) combined with other interventions compared to transcutaneous electrical stimulation (tens) or task-specific training		
Jung K.-S. et al. (2024) RCT (5) NStart=42 NEnd=40 TPS=Chronic A + B + C vs A/A + B *Also in Table 9 (Orthotics and Taping); Table 4 (Task-Specific Training)*	E: TENS + wrist extensor taping + Tast-related training C: TENS + task-related training Duration: 30min TENS + 30min TRT/d, 5d/wk, 6wks	E vs C: Modified ashworth scale (+exp) Isometric muscle strength - wrist extensor (dynamometer) (-) FMA - UE (+exp)
Transcutaneous electrical stimulation (TENS) combined with other interventions compared to task-specific training		
Wang M.-H. et al. (2024) Pilot RCT (5) NStart=42 NEnd=40 TPS=Subacute A + B vs A/B *Also in Table 4 (Task-Specific Training)*	E: Transcutaneous auricular vagus nerve stimulation + task-oriented training C: Task-oriented training Duration: 60min/d, 5d/wk, 4wks	E vs C: FMA - UE (+exp) ARAT (+exp) mBI (+exp) Heart rate variability (-) fNIRS (+exp) MEP amplitude (-) MEP Latency (+exp)
Cross-Referenced RCTs: Combined or Comparative Interventions Involving Transcutaneous Electrical Nerve Stimulation (TENS) (results included in this table's levels of evidence)		
Senarath et al. (2023) RCT (6) NStart=108 NEnd=106 TPS=Chronic A vs B *Primary listing: Table 26 (Extracorporeal Shockwave Therapy)*	E: rESWT C: TENS Duration: E: 1d/wk, 4wks, C:15min/d, 1d/wk, 4wks	E vs C: FMA-UE (no stat) MAS (no stat) ARAT (no stat) voluntary control grading VCG (no stat)
de Freitas Zanona A. et al. (2023) RCT (8) NStart=36 NEnd=36 TPS=Subacute A + B + C + D vs A + B + C vs A vs 0 *Primary listing: Table 29 (Repetitive Transcranial Magnetic Stimulation (rTMS))*	E1: rTMS + Sham TENS with Mirror therapy and Nonelectrical somatosensory stimulation E2: Sham rTMS + TENS with Mirror therapy and Nonelectrical somatosensory stimulation E3: rTMS + TENS with Mirror therapy and Nonelectrical somatosensory stimulation C: Sham rTMS + Sham TENS with Mirror therapy and Nonelectrical somatosensory stimulation Duration: 80mins/d (20 mins of rTMS, 15 mins of Nonelectrical somatosensory stimulation, 45 minutes of mirror therapy with TENS); 5d/wk, 2wks	E1 vs E2 vs E3 vs C: MEP amplitude (-) somatosensory evoked potential (-) ASY index (no stat)
Alwhaibi et al. (2021) RCT (7) NStart=40 NEnd=40 TPS=Chronic A + B vs A/B *Primary listing: Table 4 (Task-Specific Training)*	E: Task specific training + TENS acupoint C: Task-specific training + Sham electrical stimulation Duration: 80min/d, 3d/wk, 6wks	E vs C: FMA-UE (-) BBT (-) QEEG (+exp)
Abramovich et al. (2020)	E1: Botulinumtoxin therapy in combination with dynamic electric	E1 vs C:

RCT (3) NStart=96 NEnd=96 TPS=Subacute A + B vs A vs B vs 0 *Primary listing: Table 33 (Botulinum Toxin)*	neurostimulation (the explanation is consistent with TENS) and basic therapy, including massage and therapeutic exercises E2: Botulinum toxin therapy and basic therapy E3: Dynamic electric neurostimulation and basic therapy C: Basic Therapy Duration: 30-60min/d for 20 sessions over 2 weeks	mAS distal sections of UE (+exp1) proximal sections of UE (+exp1) Rivermead Motor Assessment (+exp1) amplitude of voluntary movements shoulder (-) elbow (+exp1) wrist (+exp1) E1 vs E2: mAS distal sections of UE (+exp1) proximal sections of UE (+exp1) Rivermead Motor Assessment (+exp1) amplitude of voluntary movements shoulder (-) elbow (+exp1) wrist (+exp1) E1 vs E3: mAS distal sections of UE (+exp1) proximal sections of UE (+exp1) Rivermead Motor Assessment (+exp1) amplitude of voluntary movements shoulder (-) elbow (+exp1) wrist (+exp1)
Yurdakul et al. (2020) RCT (6) NStart=33 NEnd=30 TPS=Subacute A + B vs A/B *Primary listing: Table 22 (Neuromuscular Electrical Stimulation (NMES))*	E: Electromuscular Stimulation C: Transcutaneous Electrical Nerve Stimulation Duration: 70min/sessions, 5sessions/wk, 6wks	E vs C: Fugl-Meyer Assessment (-) Functional Independence Measure (-) Brunnstrom Recovery Stages (-) Muscle Power- Arm Maximal Flexion (+exp) Mean Flexion (+exp) Maximal Extension (-) Mean Extension (-)
Zhou et al. (2018) RCT (6) NStart=90 NEnd=81 TPS=Subacute A vs B vs 0 *Primary listing: Table 22 (Neuromuscular Electrical Stimulation (NMES))*	E1: NMES + conventional rehabilitation E2: TENS + conventional rehabilitation C: Conventional rehabilitation Duration: 1hr/d, 5d/wk for 4wks	E1/E2 vs C: NRS-shoulder pain (+exp1/2) mAS-adductors (-) AROM (-) PROM (-) FMA (-) BI (-) Stroke Specific QoL (-) E1 vs E2: NRS-shoulder pain (+exp1) mAS-adductors (-) AROM (-) PROM (-) FMA (-) BI (-) Stroke Specific QoL (-)
Jan et al. (2017) RCT (6)	E: LASER therapy C: Interferential current treatment	E vs C: Visual Analog Scale -Pain (+exp)

NStart=38 NEnd=38 TPS=Not Reported A vs B *Primary listing: Table 27 (Additional Afferent and Peripheral Stimulation Methods)*	Duration: Laser: 10min/d, 10d; IFC: 30min/d, 10d	Penn Shoulder Score (PSS) pain (-) satisfaction (+exp) function (-) Shoulder Pain and Disability Index (SPADI) Pain (+exp) disability (-)
Chuang et al. (2017) RCT (6) NStart=38 NEnd=38 TPS=Chronic A + B vs A + C *Primary listing: Table 22 (Neuromuscular Electrical Stimulation (NMES))*	E1: EMG-NMES + BAT E2: TENS +BAT Duration: 40min/d, 3d/wk for 4wk	E1 vs E2: FMA (-) Pain-NRS + Brief pain inventory
Kim et al. (2013a) RCT (6) NStart=34 NEnd=30 TPS=Chronic A + B vs A/B *Primary listing: Table 4 (Task-Specific Training)*	E: Task related training + TENS C: Task related training + Sham TENS Duration: 30 min/d, 5d/wk, for 4 wks	E vs C: Fugl-Meyer Assessment (+exp) Manual Function Test (+exp) Box and Block Test (+exp) Modified Ashworth Scale (-)
Lakse et al. (2009) RCT (6) NStart=38 NEnd=38 TPS=Chronic A + B vs A/B *Primary listing: Table 36 (Steroids)*	E: Triamcinolone acetonide + TENS + Therapeutic exercise program C: TENS + Therapeutic exercise program Duration: Single Injection of Triamcinolone Acetonide (1mL) + local anesthetic (9mL), 20min/d, 5d/wk for 3wks TENS, 5d/wk, for 3wks exercise	E vs C: Verbal Analogue Scale Felxion (+exp) Abduction (+exp) Internal rotation (+exp) External rotation (+exp) Visual Analogue Scale Rest (+exp) Activity (+exp) Night (+exp) Passive Range of Motion (+exp) MAS (-) Modified Barthel Index (-) Brunnstrom Recovery Stages (-)

Abbreviations and table notes: C=control group; D=days; E=experimental group; H=hours; Min=minutes; RCT=randomized controlled trial; TPS=time post stroke category (Acute: less than 30 days, Subacute: more than 1 month but less than 6 months, Chronic: over 6 months); Wk=weeks.

+exp indicates a statistically significant between groups difference at α=0.05 in favour of the experimental group

+exp1/+exp2/+exp3 indicates a statistically significant between groups difference at α=0.05 in favour of the first, second or third experimental group

+con indicates a statistically significant between groups difference at α=0.05 in favour of the control group

- indicates no statistically significant between groups differences at α=0.05

1. Body Functions and Structures

MOTOR FUNCTION			
LoE	**Conclusion Statement**	**RCTs**	**References**
1b	Transcutaneous electrical stimulation (transcutaneous electrical nerve stimulation) may not have a difference in efficacy when compared to sham for improving motor function.	1	Ertzgaard et al. (2018)

2	Low-transcutaneous electrical nerve stimulation with physiotherapy may produce greater improvements in motor function than Physiotherapy.	1	Sonde et al. (1998)
1a	Transcutaneous electrical stimulation (transcutaneous electrical nerve stimulation) combined with other interventions may produce greater improvements in motor function than sham or task-specific training.	2	Moon et al. (2021); Jung et al. (2017)
1b	Movement science based training may not have a difference in efficacy when compared to Bobath concept for improving motor function.	1	van Vliet et al. (2005)
1b	Bi-transcutaneous electrical nerve stimulation with Task Oriented Training (TOT) may produce greater improvements in motor function than No Treatment.	1	Chen et al. (2022a)
2	Transcutaneous electrical nerve stimulation with wrist extensor taping and Tast-related training may produce greater improvements in motor function than transcutaneous electrical nerve stimulation with task-related training.	1	Jung K.-S. et al. (2024)
1b	Task related training with transcutaneous electrical nerve stimulation may produce greater improvements in motor function than Task related training with Sham transcutaneous electrical nerve stimulation.	1	Kim et al. (2013a)
1b	There is conflicting evidence about the effect of Neuromuscular electrical stimulation with conventional rehabilitation when compared to Conventional rehabilitation for improving motor function.	1	Zhou et al. (2018)
1b	There is conflicting evidence about the effect of Neuromuscular electrical stimulation with conventional rehabilitation when compared to transcutaneous electrical nerve stimulation with conventional rehabilitation for improving motor function.	1	Zhou et al. (2018)
2	Botulinumtoxin therapy in combination with dynamic electric neurostimulation (the explanation is consistent with transcutaneous electrical nerve stimulation) and basic therapy, including massage and therapeutic exercises may produce greater improvements in motor function than Basic Therapy.	1	Abramovich et al. (2020)
2	Botulinumtoxin therapy in combination with dynamic electric neurostimulation (the explanation is consistent with transcutaneous electrical nerve stimulation) and basic therapy, including massage and therapeutic exercises may produce greater improvements in motor function than Botulinum toxin therapy and basic therapy.	1	Abramovich et al. (2020)
2	Botulinumtoxin therapy in combination with dynamic electric neurostimulation (the explanation is consistent with transcutaneous electrical nerve stimulation) and basic therapy, including massage and therapeutic exercises may produce greater improvements in motor function than Dynamic electric neurostimulation and basic therapy.	1	Abramovich et al. (2020)
1b	Electromuscular Stimulation may not have a difference in efficacy when compared to Transcutaneous Electrical Nerve Stimulation for improving motor function.	1	Yurdakul et al. (2020)
1b	Electromyography-triggered neuromuscular electrical stimulation with BAT may not have a difference in efficacy when compared to transcutaneous electrical nerve stimulation with BAT for improving motor function.	1	Chuang et al. (2017)
1b	Task specific training with transcutaneous electrical nerve stimulation acupoint may not have a difference in efficacy when compared to Task-specific training with Sham electrical stimulation for improving motor function.	1	Alwhaibi et al. (2021)

2	Transcutaneous auricular vagus nerve stimulation with task-oriented training may produce greater improvements in motor function than Task-oriented training.	1	Wang M.-H. et al. (2024)

STROKE SEVERITY			
LoE	**Conclusion Statement**	**RCTs**	**References**
1b	Electromuscular Stimulation may not have a difference in efficacy when compared to Transcutaneous Electrical Nerve Stimulation for improving stroke severity.	1	Yurdakul et al. (2020)
1b	Triamcinolone acetonide with transcutaneous electrical nerve stimulation and Therapeutic exercise program may not have a difference in efficacy when compared to transcutaneous electrical nerve stimulation with Therapeutic exercise program for improving stroke severity.	1	Lakse et al. (2009)

MUSCLE STRENGTH			
LoE	**Conclusion Statement**	**RCTs**	**References**
2	Non invasive transcutaneous electrical nerve stimulation with conventional treatment (NSAID, Exercise and activities of daily living instructions) may produce greater improvements in muscle strength than Ultrasound therapy with conventional treatment (NSAID, Exercise and activities of daily living instructions).	1	Moniruzzaman et al. (2010)
1b	Transcutaneous electrical stimulation (transcutaneous electrical nerve stimulation) combined with other interventions may produce greater improvements in muscle strength than sham or task-specific training.	1	Jung et al. (2017)
2	Transcutaneous electrical nerve stimulation with wrist extensor taping and Tast-related training may not have a difference in efficacy when compared to transcutaneous electrical nerve stimulation with task-related training for improving muscle strength.	1	Jung K.-S. et al. (2024)
1b	There is conflicting evidence about the effect of Electromuscular Stimulation when compared to Transcutaneous Electrical Nerve Stimulation for improving muscle strength.	1	Yurdakul et al. (2020)
2	Transcutaneous electrical nerve stimulation (TENS) may produce greater improvements in muscle strength than sham TENS.	1	Cho et al. (2013)

SPASTICITY			
LoE	**Conclusion Statement**	**RCTs**	**References**
1b	Transcutaneous electrical stimulation (transcutaneous electrical nerve stimulation) may not have a difference in efficacy when compared to sham for improving spasticity.	3	Ertzgaard et al. (2018); Cho et al. (2013); Tekeoglu et al. (1998)
1b	Transcutaneous electrical nerve stimulation with BTA infiltration may not have a difference in efficacy when compared to transcutaneous electrical nerve stimulation with Placebo 2.5mL saline for improving spasticity.	1	Marco et al. (2007)
1b	Transcutaneous electrical stimulation (transcutaneous electrical nerve stimulation) combined with other interventions may not have a difference in efficacy when compared to sham or task-specific training for improving spasticity.	1	Moon et al. (2021)
1b	Movement science based training may not have a difference in efficacy when compared to Bobath concept for improving spasticity.	1	van Vliet et al. (2005)
2	Transcutaneous electrical nerve stimulation with conventional rehab may not have a difference in efficacy when compared to	1	Ersoy et al. (2023)

	Suprascapular nerve block with conventional rehab for improving spasticity.		
2	Transcutaneous electrical nerve stimulation with wrist extensor taping and Tast-related training may produce greater improvements in spasticity than transcutaneous electrical nerve stimulation with task-related training.	1	Jung K.-S. et al. (2024)
1b	Task related training with transcutaneous electrical nerve stimulation may not have a difference in efficacy when compared to Task related training with Sham transcutaneous electrical nerve stimulation for improving spasticity.	1	Kim et al. (2013a)
1b	Neuromuscular electrical stimulation with conventional rehabilitation may not have a difference in efficacy when compared to Conventional rehabilitation for improving spasticity.	1	Zhou et al. (2018)
1b	Neuromuscular electrical stimulation with conventional rehabilitation may not have a difference in efficacy when compared to transcutaneous electrical nerve stimulation with conventional rehabilitation for improving spasticity.	1	Zhou et al. (2018)
2	Botulinumtoxin therapy in combination with dynamic electric neurostimulation (the explanation is consistent with transcutaneous electrical nerve stimulation) and basic therapy, including massage and therapeutic exercises may produce greater improvements in spasticity than Basic Therapy.	1	Abramovich et al. (2020)
2	Botulinumtoxin therapy in combination with dynamic electric neurostimulation (the explanation is consistent with transcutaneous electrical nerve stimulation) and basic therapy, including massage and therapeutic exercises may produce greater improvements in spasticity than Botulinum toxin therapy and basic therapy.	1	Abramovich et al. (2020)
2	Botulinumtoxin therapy in combination with dynamic electric neurostimulation (the explanation is consistent with transcutaneous electrical nerve stimulation) and basic therapy, including massage and therapeutic exercises may produce greater improvements in spasticity than Dynamic electric neurostimulation and basic therapy.	1	Abramovich et al. (2020)
1b	Triamcinolone acetonide with transcutaneous electrical nerve stimulation and Therapeutic exercise program may not have a difference in efficacy when compared to transcutaneous electrical nerve stimulation with Therapeutic exercise program for improving spasticity.	1	Lakse et al. (2009)

RANGE OF MOTION			
LoE	**Conclusion Statement**	**RCTs**	**References**
2	Non invasive transcutaneous electrical nerve stimulation with conventional treatment (NSAID, Exercise and activities of daily living instructions) may produce greater improvements in range of motion than Ultrasound therapy with conventional treatment (NSAID, Exercise and activities of daily living instructions).	1	Moniruzzaman et al. (2010)
1b	Transcutaneous electrical nerve stimulation with BTA infiltration may not have a difference in efficacy when compared to transcutaneous electrical nerve stimulation with Placebo 2.5mL saline for improving range of motion.	1	Marco et al. (2007)
1b	Transcutaneous electrical stimulation (transcutaneous electrical nerve stimulation) combined with other interventions may produce greater improvements in range of motion than sham or task-specific training.	1	Jung et al. (2017)
2	Transcutaneous electrical nerve stimulation with conventional rehab may not have a difference in efficacy when compared to	1	Ersoy et al. (2023)

	Suprascapular nerve block with conventional rehab for improving range of motion.		
1b	Neuromuscular electrical stimulation with conventional rehabilitation may not have a difference in efficacy when compared to Conventional rehabilitation for improving range of motion.	1	Zhou et al. (2018)
1b	Neuromuscular electrical stimulation with conventional rehabilitation may not have a difference in efficacy when compared to transcutaneous electrical nerve stimulation with conventional rehabilitation for improving range of motion.	1	Zhou et al. (2018)
1b	Triamcinolone acetonide with transcutaneous electrical nerve stimulation and Therapeutic exercise program may produce greater improvements in range of motion than transcutaneous electrical nerve stimulation with Therapeutic exercise program.	1	Lakse et al. (2009)

2. Activities

ACTIVITIES OF DAILY LIVING			
LoE	**Conclusion Statement**	**RCTs**	**References**
1b	Transcutaneous electrical stimulation (transcutaneous electrical nerve stimulation) may produce greater improvements in performance of activities of daily living than sham.	2	Ertzgaard et al. (2018); Tekeoglu et al. (1998)
2	Low-transcutaneous electrical nerve stimulation with physiotherapy may not have a difference in efficacy when compared to Physiotherapy for improving performance of activities of daily living.	1	Sonde et al. (1998)
1b	Transcutaneous electrical stimulation (transcutaneous electrical nerve stimulation) combined with other interventions may not have a difference in efficacy when compared to sham or task-specific training for improving performance of activities of daily living.	1	Moon et al. (2021)
1b	Movement science based training may not have a difference in efficacy when compared to Bobath concept for improving performance of activities of daily living.	1	van Vliet et al. (2005)
2	Transcutaneous electrical nerve stimulation with conventional rehab may not have a difference in efficacy when compared to Suprascapular nerve block with conventional rehab for improving performance of activities of daily living.	1	Ersoy et al. (2023)
1b	LASER therapy may not have a difference in efficacy when compared to Interferential current treatment for improving performance of activities of daily living.	1	Jan et al. (2017)
1b	Neuromuscular electrical stimulation with conventional rehabilitation may not have a difference in efficacy when compared to Conventional rehabilitation for improving performance of activities of daily living.	1	Zhou et al. (2018)
1b	Neuromuscular electrical stimulation with conventional rehabilitation may not have a difference in efficacy when compared to transcutaneous electrical nerve stimulation with conventional rehabilitation for improving performance of activities of daily living.	1	Zhou et al. (2018)
1b	Electromuscular Stimulation may not have a difference in efficacy when compared to Transcutaneous Electrical Nerve Stimulation for improving performance of activities of daily living.	1	Yurdakul et al. (2020)
1b	Triamcinolone acetonide with transcutaneous electrical nerve stimulation and Therapeutic exercise program may not have a difference in efficacy when compared to transcutaneous electrical nerve stimulation with Therapeutic exercise program for improving performance of activities of daily living.	1	Lakse et al. (2009)

2	Transcutaneous auricular vagus nerve stimulation with task-oriented training may produce greater improvements in performance of activities of daily living than Task-oriented training.	1	Wang M.-H. et al. (2024)

DEXTERITY			
LoE	**Conclusion Statement**	**RCTs**	**References**
1b	Movement science based training may not have a difference in efficacy when compared to Bobath concept for improving dexterity.	1	van Vliet et al. (2005)
1b	Task related training with transcutaneous electrical nerve stimulation may produce greater improvements in dexterity than Task related training with Sham transcutaneous electrical nerve stimulation.	1	Kim et al. (2013a)
1b	Task specific training with transcutaneous electrical nerve stimulation acupoint may not have a difference in efficacy when compared to Task-specific training with Sham electrical stimulation for improving dexterity.	1	Alwhaibi et al. (2021)

Key Points

- Transcutaneous electrical stimulation (transcutaneous electrical nerve stimulation) may be beneficial for improving performance of activities of daily living, but not motor function and spasticity, after stroke when compared to sham.
- Low-transcutaneous electrical nerve stimulation with physiotherapy may be beneficial for improving motor function, but not performance of activities of daily living, after stroke when compared to Physiotherapy.
- Transcutaneous electrical stimulation (transcutaneous electrical nerve stimulation) combined with other interventions may be beneficial for improving motor function, range of motion, and muscle strength, but not performance of activities of daily living and spasticity, after stroke when compared to sham or task-specific training.
- Movement science based training may not be beneficial for improving motor function, dexterity, performance of activities of daily living, and spasticity after stroke when compared to Bobath concept.
- Bi-transcutaneous electrical nerve stimulation with Task Oriented Training (TOT) may be beneficial for improving motor function after stroke when compared to No Treatment.
- Transcutaneous electrical nerve stimulation with wrist extensor taping and Tast-related training may be beneficial for improving motor function and spasticity, but not muscle strength, after stroke when compared to transcutaneous electrical nerve stimulation with task-related training.
- Task related training with transcutaneous electrical nerve stimulation may be beneficial for improving motor function and dexterity, but not spasticity, after stroke when compared to Task related training with Sham transcutaneous electrical nerve stimulation.
- Neuromuscular electrical stimulation with conventional rehabilitation may not be beneficial for improving performance of activities of daily living, spasticity, and range of motion after stroke when compared to Conventional rehabilitation; the literature is mixed regarding motor function.
- Neuromuscular electrical stimulation with conventional rehabilitation may not be beneficial for improving performance of activities of daily living, spasticity, and range of motion after stroke when compared to transcutaneous electrical nerve stimulation with conventional rehabilitation; the literature is mixed regarding motor function.
- Botulinumtoxin therapy in combination with dynamic electric neurostimulation (the explanation is consistent with transcutaneous electrical nerve stimulation) and basic therapy, including massage and therapeutic exercises may be beneficial for improving motor function and spasticity after stroke when compared to Basic Therapy.
- Botulinumtoxin therapy in combination with dynamic electric neurostimulation (the explanation is consistent with transcutaneous electrical nerve stimulation) and basic therapy, including massage and therapeutic exercises may be beneficial for improving motor function and spasticity after stroke when compared to Botulinum toxin therapy and basic therapy.

- Botulinumtoxin therapy in combination with dynamic electric neurostimulation (the explanation is consistent with transcutaneous electrical nerve stimulation) and basic therapy, including massage and therapeutic exercises may be beneficial for improving motor function and spasticity after stroke when compared to Dynamic electric neurostimulation and basic therapy.
- Electromuscular Stimulation may not be beneficial for improving motor function, performance of activities of daily living, and stroke severity after stroke when compared to Transcutaneous Electrical Nerve Stimulation; the literature is mixed regarding muscle strength.
- Electromyography-triggered neuromuscular electrical stimulation with BAT may not be beneficial for improving motor function after stroke when compared to transcutaneous electrical nerve stimulation with BAT.
- Task specific training with transcutaneous electrical nerve stimulation acupoint may not be beneficial for improving motor function and dexterity after stroke when compared to Task-specific training with Sham electrical stimulation.
- Transcutaneous electrical nerve stimulation with conventional rehab may not be beneficial for improving performance of activities of daily living, spasticity, and range of motion after stroke when compared to Suprascapular nerve block with conventional rehab.
- LASER therapy may not be beneficial for improving performance of activities of daily living after stroke when compared to Interferential current treatment.
- Triamcinolone acetonide with transcutaneous electrical nerve stimulation and Therapeutic exercise program may be beneficial for improving range of motion, but not performance of activities of daily living, spasticity, and stroke severity, after stroke when compared to transcutaneous electrical nerve stimulation with Therapeutic exercise program.
- Transcutaneous electrical nerve stimulation with BTA infiltration may not be beneficial for improving spasticity and range of motion after stroke when compared to transcutaneous electrical nerve stimulation with Placebo 2.5mL saline.
- Non invasive transcutaneous electrical nerve stimulation with conventional treatment (NSAID, Exercise and activities of daily living instructions) may be beneficial for improving range of motion and muscle strength after stroke when compared to Ultrasound therapy with conventional treatment (NSAID, Exercise and activities of daily living instructions).
- Transcutaneous electrical nerve stimulation (TENS) may be beneficial for improving muscle strength after stroke when compared to sham TENS.
- Transcutaneous auricular vagus nerve stimulation with task-oriented training may be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Task-oriented training.

Summary of Key Points: Transcutaneous Electrical Nerve Stimulation (TENS)

Intervention	Control(s)	Function domain(s)	Effect
Transcutaneous electrical stimulation (transcutaneous electrical nerve stimulation)	sham	Performance of activities of daily living	+
Transcutaneous electrical stimulation (transcutaneous electrical nerve stimulation)	sham	Motor function, spasticity	–
Low-transcutaneous electrical nerve stimulation with physiotherapy	Physiotherapy	Motor function	+
Low-transcutaneous electrical nerve stimulation with physiotherapy	Physiotherapy	Performance of activities of daily living	–
Transcutaneous electrical stimulation (transcutaneous electrical nerve stimulation) combined with other interventions	sham or task-specific training	Motor function, range of motion, muscle strength	+
Transcutaneous electrical stimulation (transcutaneous electrical nerve	sham or task-specific training	Performance of activities of daily living, spasticity	–

stimulation) combined with other interventions			
Movement science based training	Bobath concept	Motor function, dexterity, performance of activities of daily living, spasticity	–
Bi-transcutaneous electrical nerve stimulation with Task Oriented Training (TOT)	No Treatment	Motor function	+
Transcutaneous electrical nerve stimulation with wrist extensor taping and Tast-related training	transcutaneous electrical nerve stimulation with task-related training	Motor function, spasticity	+
Transcutaneous electrical nerve stimulation with wrist extensor taping and Tast-related training	transcutaneous electrical nerve stimulation with task-related training	Muscle strength	–
Task related training with transcutaneous electrical nerve stimulation	Task related training with Sham transcutaneous electrical nerve stimulation	Motor function, dexterity	+
Task related training with transcutaneous electrical nerve stimulation	Task related training with Sham transcutaneous electrical nerve stimulation	Spasticity	–
Neuromuscular electrical stimulation with conventional rehabilitation	Conventional rehabilitation	Performance of activities of daily living, spasticity, range of motion	–
Neuromuscular electrical stimulation with conventional rehabilitation	Conventional rehabilitation	Motor function	=
Neuromuscular electrical stimulation with conventional rehabilitation	transcutaneous electrical nerve stimulation with conventional rehabilitation	Performance of activities of daily living, spasticity, range of motion	–
Neuromuscular electrical stimulation with conventional rehabilitation	transcutaneous electrical nerve stimulation with conventional rehabilitation	Motor function	=
Botulinumtoxin therapy in combination with dynamic electric neurostimulation (the explanation is consistent with transcutaneous electrical nerve stimulation) and basic therapy, including massage and therapeutic exercises	Basic Therapy	Motor function, spasticity	+
Botulinumtoxin therapy in combination with dynamic electric neurostimulation (the explanation is consistent with transcutaneous electrical nerve stimulation) and basic therapy, including massage and therapeutic exercises	Botulinum toxin therapy and basic therapy	Motor function, spasticity	+
Botulinumtoxin therapy in combination with dynamic electric neurostimulation (the explanation is consistent with transcutaneous electrical nerve stimulation) and basic therapy, including massage and therapeutic exercises	Dynamic electric neurostimulation and basic therapy	Motor function, spasticity	+
Electromuscular Stimulation	Transcutaneous Electrical Nerve Stimulation	Motor function, performance of activities of daily living, stroke severity	–
Electromuscular Stimulation	Transcutaneous Electrical Nerve Stimulation	Muscle strength	=

Electromyography-triggered neuromuscular electrical stimulation with BAT	transcutaneous electrical nerve stimulation with BAT	Motor function	–
Task specific training with transcutaneous electrical nerve stimulation acupoint	Task-specific training with Sham electrical stimulation	Motor function, dexterity	–
Transcutaneous electrical nerve stimulation with conventional rehab	Suprascapular nerve block with conventional rehab	Performance of activities of daily living, spasticity, range of motion	–
Triamcinolone acetonide with transcutaneous electrical nerve stimulation and Therapeutic exercise program	transcutaneous electrical nerve stimulation with Therapeutic exercise program	Range of motion	+
Triamcinolone acetonide with transcutaneous electrical nerve stimulation and Therapeutic exercise program	transcutaneous electrical nerve stimulation with Therapeutic exercise program	Performance of activities of daily living, spasticity, stroke severity	–
Transcutaneous electrical nerve stimulation with BTA infiltration	transcutaneous electrical nerve stimulation with Placebo 2.5mL saline	Spasticity, range of motion	–
Non invasive transcutaneous electrical nerve stimulation with conventional treatment (NSAID, Exercise and activities of daily living instructions)	Ultrasound therapy with conventional treatment (NSAID, Exercise and activities of daily living instructions)	Range of motion, muscle strength	+
Transcutaneous electrical nerve stimulation (TENS)	sham TENS	Muscle strength	+
Transcutaneous auricular vagus nerve stimulation with task-oriented training	Task-oriented training	Motor function, performance of activities of daily living	+
LASER therapy	Interferential current treatment	Performance of activities of daily living	–

Thermal Stimulation



Adapted from: https://beautisecrets.com/paraffin-waxtreatment

Thermal stimulation is another method used to facilitate sensorimotor function, thermal stimulation applied either in a noxious or innocuous form have different effects on sensory receptors in the body (Lin et al. 2017). The perception of pain from nociceptors produced by noxious heat (>43°C) and cold (<8°C) activates brain regions such as the second somatosensory cortex, posterior insular cortex and the premotor area that would not be activated by warm and cold receptors from innocuous heat (40-43°C) and cold (20-28°C) temperatures (Lin et al. 2017). Innocuous thermal stimulation has also been found to induce greater corticomotor excitability, and as such has been suggested to influence cortical reorganization and neuroplasticity (Lin et al. 2017).

A total of nine RCTs were found that evaluated thermal stimulation for upper extremity motor rehabilitation. Two RCTs compared thermal stimulation with conventional therapy (Ozcan et al. (2019); Chen et al. (2005)). Two RCTs compared different approaches to thermal stimulation (Lin et al. (2017); Tai et al. (2014)). One RCT compared thermal stimulation with sham (Wang et al. (2017b)). One RCT compared thermal stimulation combined with other interventions with lower extremity exercise interventions (Wu et al. (2010b)). One RCT compared thermal stimulation combined with other interventions with neuromuscular electrical stimulation (Cruz et al. (2019)). One RCT compared thermal stimulation combined with other interventions with meridian acupressure and massage therapy (Sun et al. (2024)). One RCT compared thermal stimulation combined with other interventions with upper limb cycling (Chiu et al. (2024)).

In addition, 4 RCTs in which thermal stimulation formed part of a combined or comparative intervention are cross-referenced at the end of Table 24; their primary listings appear in other tables.

The methodological details and results of all nine RCTs are presented in Table 24.

Table 24. RCTs Evaluating Thermal Stimulation for Upper Extremity Motor Rehabilitation

Authors (Year) **Study Design (PEDro Score)** **Sample Size start** **Sample Size end** **Time post stroke category** **Study design**	**Interventions** **Duration: Session length, frequency per week for total number of weeks**	**Outcome Measures** **Result (direction of effect)**
Thermal stimulation compared to conventional therapy		
Ozcan et al. (2019) RCT (6) NStart=32 NEnd=30 TPS=Subacute A vs 0	E: Fluidotherapy (40 °C) + Conventional Therapy C: Conventional Therapy Duration: 20min/d, 5d/wk, 3wks Fluidotherapy, 2-4h/d, 5d/wk, 3wks Conventional therapy	E vs C: Decrease in Edema Volume (+exp) painDETECT questionnaire (PDQ) (+exp) Brunnstrom Motor Recovery Stages of Upper Extremity and Hand (-) Functional Independence Measure (-) pain-VAS (-) Sensory Deficits-pinprick, light touch, etc (No stats)
Chen et al. (2005) RCT (6) NStart=46 NEnd=29 TPS=Acute A vs 0	E: Thermal stimulation + Standard Treatment C: Standard therapy Duration: 30min/d, 5d/wk, 6wk	E vs C: Brunstrom recover stages (+exp) modified motor assessment scale (+exp) grasp strength (-) angles of wrist extension (+exp) angles of wrist flexion (+exp) sensation (+exp) modifed ashworth scale (-)
Different approaches to thermal stimulation compared against one another		
Lin et al. (2017) RCT (7) NStart=79 NEnd=63 TPS=Acute A1 vs A2	E: Noxious Thermal stimulation C: Innocuous Thermal Stimulation Duration: 30min/d, 5-7d/wk, for 2mo	E vs C: Fugl-Meyer Assessment (-) Action Research Arm Test (-) Motricity Index (-) Barthel Index (-) Modified Ashworth Scale (-)

Tai et al. (2014) RCT (7) NStart=16 NEnd=16 TPS=Chronic A1 vs A2	E: thermal stimulation with noxious heat (46C-47C) and cold (7C-8C) stimuli C: thermal stimulation with innocuous heat (40C-41C) and cold (20C-21C) stimuli Duration: 30min, 1x	E vs C: Motor threshold affected hemisphere (-) Nonaffected hemisphere (-) motor evoked potentials affected hemisphere (+exp) Nonaffected hemisphere (-) Map size affected hemisphere (+exp) Nonaffected hemisphere (-)
Thermal stimulation compared to sham		
Wang et al. (2017b) RCT (8) NStart=53 NEnd=52 TPS=Subacute A vs 0	E: Paraffin wax thermal stimulation (Heat: 40-42°C) C: Placebo paraffin thermal stimulation (room temperature sand picks) Duration: 30 min, 1x/d, 5d/wk	E vs C: Modified Ashworth Scale (+exp) Brunnstrom Recovery Stages (-) VAS Pain
Thermal stimulation combined with other interventions compared to lower extremity exercise interventions		
Wu et al. (2010b) RCT (6) NStart=23 NEnd=23 TPS=Chronic A vs B *Also in Table 3 (Exercise and Strength Training)*	E: upper extremity thermal stimulation C: lower extremity thermal stimulation Duration: 3d/wk, 8wk	E vs C: Stroke Rehabilitation Assessment of Movement (+exp) Action Research Arm Test (+exp) Modified Ashworth Scale (-) Barthel Index (-)
Thermal stimulation combined with other interventions compared to neuromuscular electrical stimulation		
Cruz et al. (2019) RCT (5) NStart=40 NEnd=40 TPS=Chronic A + B vs C *Also in Table 9 (Orthotics and Taping); Table 22 (Neuromuscular Electrical Stimulation (NMES))*	E: Cryotherapy on spastic wrist flexors + Kinesiotherapy C: NMES on wrist extensors Duration: 25min/d, 2d/wk, 8wks	E1 vs E2 vs C: Palmar Grip Strength (-)
Thermal stimulation combined with other interventions compared to meridian acupressure and massage therapy		
Sun et al. (2024) RCT (8) NStart=100 NEnd=100 TPS=Not Reported A + B + C vs A/A + B *Also in Table 25 (Muscle Vibration); Table 46 (Meridian Acupressure and Massage Therapy)*	E: Vibrational heated pressure therapy + Meridian dredging exercise + conventional rehab C: meridian dredging exercise + conventional treatment Duration: 30min/d, 3d/wk, 4wks	E vs C: MAS (+exp) FMA UE (+exp) LE (+exp) BI (+exp) SSQOL (+exp)
Thermal stimulation combined with other interventions compared to upper limb cycling		
Chiu et al. (2024) Pilot RCT (6) NStart=24 NEnd=24 TPS=Acute	E: Alternating hot-cold water immersion (AHCWI) + Standard rehabilitation C: Upper limb cycling exercises + Standard rehabilitation	E vs C: FMA-UE (+exp) Motricity Index-UE (+exp) modified Motor Assessment Scale (-) upper limb (+exp)

A vs B *Also in Table 3 (Exercise and Strength Training)*	Duration: 30min/d, 5d/wk for 6wks AHCWI or cycling + 50min/d 5d/wk standard rehabilitation	BBS (-) Barthel Index (-) modified Ashworth scale (-)
Cross-Referenced RCTs: Combined or Comparative Interventions Involving Thermal Stimulation (results included in this table's levels of evidence)		
Ayub I. et al. (2024) RCT (6) NStart=26 NEnd=23 TPS=Chronic A vs B *Primary listing: Table 17 (Virtual Reality)*	E: Nintendo Wii Sports C: Neutral warmth Duration: E: 15min/d, 5d/wk, 4wks; C: 3hr/d, 3d/wk, 4wks	E vs C: mAS (-) Fatigue severity scale (+exp) BBT (-) AROM Shoulder abduction (+exp) Shoulder flexion (-) Shoulder extrenal rotation (+exp) Elbow flexion (-) Wrist flexion (+exp) Wrist extension (+exp)
Sugiarto & Kesoema (2023) RCT (5) NStart=30 NEnd=30 TPS=Chronic A + B + C vs A/A + B *Primary listing: Table 26 (Extracorporeal Shockwave Therapy)*	E: Radial Shock Wave Therapy + Infrared therapy + Static Stretching C: Infrared therapy + Static Stretching Duration: 1d/wk, 6wks (Radial Shock Wave Therapy); 15mins/d, 3d/wk, 6wks (infrared therapy); 5mins/d, 3d/wk, 6wks (static stretching)	E vs C: Tardieu Spasticity Scale wrist resistance (+exp) fingers resistance (+exp)
Chen et al. (2019a) RCT (7) NStart=43 NEnd=40 TPS=Chronic A + B vs A vs B *Primary listing: Table 22 (Neuromuscular Electrical Stimulation (NMES))*	E1: Neuromuscular Electrical Stimulation + Conventional Rehabilitation E2: Noxious Thermal Stimulation + Conventional Rehabilitation E3: Thermal Stimulation + Neuromuscular Electrical stimulation + Conventional Rehabilitation Duration: 30min/d, 3d/wk, 8wk	E1 vs E2 vs E3: Fugl-Meyer Assessment upper extremity (-) modified Barthel Index (-) modified Ashworth scale (-) Motricity Index (-)
Huang et al. (2017b) Pilot RCT (6) NStart=79 NEnd=79 TPS=Subacute A + B vs A/B *Primary listing: Table 44 (Acupuncture)*	E: Heat/Cool Therapy + Accupuncture+ routine rehabilitation C: Accupuncture+ routine rehabilitation Duration: E: 30min/d acupuncture + 30min/d thermal stimulation, 6d/wk for 4wks C: 30min/d, 6d/wk for 4wks	E vs C: Visual Analogue Scale: Pain (+exp) FMA-UE (+exp) MBI (-) symptoms and motor function according to SHS criteria (+exp)

Abbreviations and table notes: C=control group; D=days; E=experimental group; H=hours; Min=minutes; RCT=randomized controlled trial; TPS=time post stroke category (Acute: less than 30 days, Subacute: more than 1 month but less than 6 months, Chronic: over 6 months); Wk=weeks.

+exp indicates a statistically significant between groups difference at α=0.05 in favour of the experimental group

+exp1/+exp2/+exp3 indicates a statistically significant between groups difference at α=0.05 in favour of the first, second or third experimental group

+con indicates a statistically significant between groups difference at α=0.05 in favour of the control group

- indicates no statistically significant between groups differences at α=0.05

1. Body Functions and Structures

MOTOR FUNCTION			
LoE	**Conclusion Statement**	**RCTs**	**References**
1b	Different approaches to thermal stimulation may not have a difference in efficacy when compared with one another for improving motor function.	1	Lin et al. (2017)
1b	Upper extremity thermal stimulation may produce greater improvements in motor function than lower extremity thermal stimulation.	1	Wu et al. (2010b)
1b	Vibrational heated pressure therapy with Meridian dredging exercise and conventional rehab may produce greater improvements in motor function than meridian dredging exercise with conventional treatment.	1	Sun et al. (2024)
1b	Neuromuscular Electrical Stimulation with Conventional Rehabilitation may not have a difference in efficacy when compared to Noxious Thermal Stimulation with Conventional Rehabilitation or Thermal Stimulation, Neuromuscular Electrical stimulation and Conventional Rehabilitation for improving motor function.	1	Chen et al. (2019a)
1b	Alternating hot-cold water immersion (AHCWI) with Standard rehabilitation may produce greater improvements in motor function than Upper limb cycling exercises with Standard rehabilitation.	1	Chiu et al. (2024)
1b	Heat/Cool Therapy with Accupuncture and routine rehabilitation may produce greater improvements in motor function than Accupuncture with routine rehabilitation.	1	Huang et al. (2017b)

STROKE SEVERITY			
LoE	**Conclusion Statement**	**RCTs**	**References**
1b	Paraffin wax thermal stimulation may not have a difference in efficacy when compared to Placebo paraffin thermal stimulation (room temperature sand picks) for improving stroke severity.	1	Wang et al. (2017b)
1a	There is conflicting evidence about the effect of Thermal stimulation when compared to conventional therapy for improving stroke severity.	2	Ozcan et al. (2019); Chen et al. (2005)

MUSCLE STRENGTH			
LoE	**Conclusion Statement**	**RCTs**	**References**
1b	Thermal stimulation may not have a difference in efficacy when compared to conventional therapy for improving muscle strength.	1	Chen et al. (2005)
1b	Different approaches to thermal stimulation may not have a difference in efficacy when compared with one another for improving muscle strength.	1	Lin et al. (2017)
2	Cryotherapy on spastic wrist flexors with Kinesiotherapy may not have a difference in efficacy when compared to neuromuscular electrical stimulation on wrist extensors for improving muscle strength.	1	Cruz et al. (2019)
1b	Neuromuscular Electrical Stimulation with Conventional Rehabilitation may not have a difference in efficacy when compared to Noxious Thermal Stimulation with Conventional Rehabilitation or Thermal Stimulation, Neuromuscular Electrical stimulation and Conventional Rehabilitation for improving muscle strength.	1	Chen et al. (2019a)

1b	Alternating hot-cold water immersion (AHCWI) with Standard rehabilitation may produce greater improvements in muscle strength than Upper limb cycling exercises with Standard rehabilitation.	1	Chiu et al. (2024)

SPASTICITY			
LoE	**Conclusion Statement**	**RCTs**	**References**
1b	Thermal stimulation may not have a difference in efficacy when compared to conventional therapy for improving spasticity.	1	Chen et al. (2005)
1b	Different approaches to thermal stimulation may not have a difference in efficacy when compared with one another for improving spasticity.	1	Lin et al. (2017)
1b	Paraffin wax thermal stimulation may produce greater improvements in spasticity than Placebo paraffin thermal stimulation (room temperature sand picks).	1	Wang et al. (2017b)
1b	Upper extremity thermal stimulation may not have a difference in efficacy when compared to lower extremity thermal stimulation for improving spasticity.	1	Wu et al. (2010b)
1b	Vibrational heated pressure therapy with Meridian dredging exercise and conventional rehab may produce greater improvements in spasticity than meridian dredging exercise with conventional treatment.	1	Sun et al. (2024)
1b	Neuromuscular Electrical Stimulation with Conventional Rehabilitation may not have a difference in efficacy when compared to Noxious Thermal Stimulation with Conventional Rehabilitation or Thermal Stimulation, Neuromuscular Electrical stimulation and Conventional Rehabilitation for improving spasticity.	1	Chen et al. (2019a)
2	Radial Shock Wave Therapy with Infrared therapy and Static Stretching may produce greater improvements in spasticity than Infrared therapy with Static Stretching.	1	Sugiarto & Kesoema (2023)
1b	Nintendo Wii Sports may not have a difference in efficacy when compared to Neutral warmth for improving spasticity.	1	Ayub I. et al. (2024)
1b	Alternating hot-cold water immersion (AHCWI) with Standard rehabilitation may not have a difference in efficacy when compared to Upper limb cycling exercises with Standard rehabilitation for improving spasticity.	1	Chiu et al. (2024)

RANGE OF MOTION			
LoE	**Conclusion Statement**	**RCTs**	**References**
1b	Nintendo Wii Sports may produce greater improvements in range of motion than Neutral warmth.	1	Ayub I. et al. (2024)

2. Activities

ACTIVITIES OF DAILY LIVING			
LoE	**Conclusion Statement**	**RCTs**	**References**
1a	There is conflicting evidence about the effect of Thermal stimulation when compared to conventional therapy for improving performance of activities of daily living.	2	Ozcan et al. (2019); Chen et al. (2005)
1b	Different approaches to thermal stimulation may not have a difference in efficacy when compared with one another for improving performance of activities of daily living.	1	Lin et al. (2017)

1b	Upper extremity thermal stimulation may not have a difference in efficacy when compared to lower extremity thermal stimulation for improving performance of activities of daily living.	1	Wu et al. (2010b)
1b	Vibrational heated pressure therapy with Meridian dredging exercise and conventional rehab may produce greater improvements in performance of activities of daily living than meridian dredging exercise with conventional treatment.	1	Sun et al. (2024)
1b	Neuromuscular Electrical Stimulation with Conventional Rehabilitation may not have a difference in efficacy when compared to Noxious Thermal Stimulation with Conventional Rehabilitation or Thermal Stimulation, Neuromuscular Electrical stimulation and Conventional Rehabilitation for improving performance of activities of daily living.	1	Chen et al. (2019a)
1b	Alternating hot-cold water immersion (AHCWI) with Standard rehabilitation may not have a difference in efficacy when compared to Upper limb cycling exercises with Standard rehabilitation for improving performance of activities of daily living.	1	Chiu et al. (2024)
1b	Heat/Cool Therapy with Accupuncture and routine rehabilitation may not have a difference in efficacy when compared to Accupuncture with routine rehabilitation for improving performance of activities of daily living.	1	Huang et al. (2017b)

DEXTERITY			
LoE	**Conclusion Statement**	**RCTs**	**References**
1b	Nintendo Wii Sports may not have a difference in efficacy when compared to Neutral warmth for improving dexterity.	1	Ayub I. et al. (2024)

Key Points

- Upper extremity thermal stimulation may be beneficial for improving motor function, but not performance of activities of daily living and spasticity, after stroke when compared to lower extremity thermal stimulation.
- Vibrational heated pressure therapy with Meridian dredging exercise and conventional rehab may be beneficial for improving motor function, performance of activities of daily living, and spasticity after stroke when compared to meridian dredging exercise with conventional treatment.
- Neuromuscular Electrical Stimulation with Conventional Rehabilitation may not be beneficial for improving motor function, performance of activities of daily living, spasticity, and muscle strength after stroke when compared to Noxious Thermal Stimulation with Conventional Rehabilitation or Thermal Stimulation, Neuromuscular Electrical stimulation and Conventional Rehabilitation.
- Nintendo Wii Sports may be beneficial for improving range of motion, but not dexterity and spasticity, after stroke when compared to Neutral warmth.
- Thermal stimulation may not be beneficial for improving spasticity and muscle strength after stroke when compared to conventional therapy; the literature is mixed regarding performance of activities of daily living and stroke severity.
- Paraffin wax thermal stimulation may be beneficial for improving spasticity, but not stroke severity, after stroke when compared to Placebo paraffin thermal stimulation (room temperature sand picks).
- Radial Shock Wave Therapy with Infrared therapy and Static Stretching may be beneficial for improving spasticity after stroke when compared to Infrared therapy with Static Stretching.
- Cryotherapy on spastic wrist flexors with Kinesiotherapy may not be beneficial for improving muscle strength after stroke when compared to neuromuscular electrical stimulation on wrist extensors.
- Alternating hot-cold water immersion (AHCWI) with Standard rehabilitation may be beneficial for improving motor function and muscle strength, but not spasticity and performance of activities of daily living, after stroke when compared to Upper limb cycling exercises with Standard rehabilitation.

- Heat/Cool Therapy with Accupuncture and routine rehabilitation may be beneficial for improving motor function, but not performance of activities of daily living, after stroke when compared to Accupuncture with routine rehabilitation.
- Different approaches to thermal stimulation may not have a difference in efficacy when compared with one another for improving motor function, muscle strength, spasticity, and performance of activities of daily living.

Summary of Key Points: Thermal Stimulation

Intervention	Control(s)	Function domain(s)	Effect
Thermal stimulation	One another (different approaches compared)	Motor function, performance of activities of daily living, spasticity, muscle strength	–
Upper extremity thermal stimulation	lower extremity thermal stimulation	Motor function	+
Upper extremity thermal stimulation	lower extremity thermal stimulation	Performance of activities of daily living, spasticity	–
Vibrational heated pressure therapy with Meridian dredging exercise and conventional rehab	meridian dredging exercise with conventional treatment	Motor function, performance of activities of daily living, spasticity	+
Neuromuscular Electrical Stimulation with Conventional Rehabilitation	Noxious Thermal Stimulation with Conventional Rehabilitation or Thermal Stimulation, Neuromuscular Electrical stimulation and Conventional Rehabilitation	Motor function, performance of activities of daily living, spasticity, muscle strength	–
Nintendo Wii Sports	Neutral warmth	Range of motion	+
Nintendo Wii Sports	Neutral warmth	Dexterity, spasticity	–
Thermal stimulation	conventional therapy	Spasticity, muscle strength	–
Thermal stimulation	conventional therapy	Performance of activities of daily living, stroke severity	=
Paraffin wax thermal stimulation	Placebo paraffin thermal stimulation (room temperature sand picks)	Spasticity	+
Paraffin wax thermal stimulation	Placebo paraffin thermal stimulation (room temperature sand picks)	Stroke severity	–
Radial Shock Wave Therapy with Infrared therapy and Static Stretching	Infrared therapy with Static Stretching	Spasticity	+
Cryotherapy on spastic wrist flexors with Kinesiotherapy	neuromuscular electrical stimulation on wrist extensors	Muscle strength	–
Alternating hot-cold water immersion (AHCWI) with Standard rehabilitation	Upper limb cycling exercises with Standard rehabilitation	Motor function, muscle strength	+
Alternating hot-cold water immersion (AHCWI) with Standard rehabilitation	Upper limb cycling exercises with Standard rehabilitation	Spasticity, performance of activities of daily living	–
Heat/Cool Therapy with Accupuncture and routine rehabilitation	Accupuncture with routine rehabilitation	Motor function	+
Heat/Cool Therapy with Accupuncture and routine rehabilitation	Accupuncture with routine rehabilitation	Performance of activities of daily living	–

Muscle Vibration



Adapted from: https://www.humanlocomotion.org/products/focal-vibration-motors

Various forms of muscle vibration applications exist including: focal muscle vibration, whole body vibration, and stochastic resonance stimulation. Whole body vibration involves standing, sitting, or performing various tasks/movements on a vibration platform with the purpose of improving muscle strength and function (Liao et al. 2015; Park et al. 2018). Focal muscle vibration is a new therapeutic approach that involves the application of low-amplitude/high- frequency vibratory stimulation to a specific muscle through small portable devices (Celletti et al. 2017).

A total of sixteen RCTs were found that evaluated muscle vibration for upper extremity motor rehabilitation. Six RCTs compared muscle vibration with conventional therapy (Abit Kocaman et al. (2023); Wang et al. (2023c); Sade et al. (2021); Annino et al. (2019); Paoloni et al. (2014); Tavernese et al. (2013)). One RCT evaluated muscle vibration combined with other interventions (Ahn et al. (2019)). Five RCTs compared muscle vibration with sham (Seim C. et al. (2023); Toscano et al. (2019); CostantiNo et al. (2017); Casale et al. (2014); Caliandro et al. (2012)). One RCT compared muscle vibration combined with other interventions with stretching and positioning programs or no treatment (Noma et al. (2012)). One RCT compared muscle vibration with no treatment (Ageranioti et al. (1990)). Two RCTs compared muscle vibration combined with other interventions with conventional therapy (Celletti et al. (2017); Lee et al. (2016e)).

In addition, 4 RCTs in which muscle vibration formed part of a combined or comparative intervention are cross-referenced at the end of Table 25; their primary listings appear in other tables.

The methodological details and results of all sixteen RCTs are presented in Table 25.

Table 25. RCTs Evaluating Muscle Vibration for Upper Extremity Motor Rehabilitation

Authors (Year) **Study Design (PEDro Score)** **Sample Size start** **Sample Size end** **Time post stroke category** **Study design**	**Interventions** **Duration: Session length, frequency per week for total number of weeks**	**Outcome Measures** **Result (direction of effect)**
Muscle vibration compared to conventional therapy		
Abit Kocaman et al. (2023) RCT (5) NStart=28	E: Muscle Vibration + conventional therapy C: conventional rehab	E vs C: WMFT (no stat) EMG (no stat)

NEnd=24 TPS=Chronic A vs 0	Duration: 15min/d, 3d/wk, 4wks vibration + 45-60min/d, 5d/wk, 4wks conventional therapy	FIM (no stat)
Wang et al. (2023c) RCT (6) NStart=29 NEnd=29 TPS=Not Reported A vs 0	E: Focal muscle vibration + Conventional Therapy C: Conventional therapy Duration: 40min of conventional therapy + 35-45min of occupational therapy + 10min of focal vibration, 6d/wk for 4wks	E vs C: Modified ashworth scale (+exp) BRS UE (+exp) Hand (-) FMA-UE (+exp) mBI (+exp) MEP amplitude (-) latency (-) somatosensory evoked potential (SEP)-N20 latency (-) amplitude (+exp)
Sade et al. (2021) RCT (5) NStart=46 NEnd=43 TPS=Chronic A vs 0	E: Whole Body Vibration Therapy (WBVT) + Conventional Rehabilitation C: Conventional Rehabilitation Duration: E: 2min, 5d/wk, for 3wks; C: 3wk	E vs C: ROM shoulder flexion (-) shoulder abduction (-) elbow flexion (-) elbow extension (+exp) wrist extension (-) Jebsen-Taylor Hand Function Test (-)
Annino et al. (2019) RCT (5) NStart=37 NEnd=34 TPS=Chronic A vs 0	E: Segmental muscle vibration C: Conventional care Duration: E: 30Hz, 2mm, 5min/session, 3session/wk, 8wk; C: 30min/session, 3session/wk, 8wk	E vs C: Barthel Index (-) Modified Ashworth Scale (-) Elbow Range of Motion (-) Manual Muscle Strength Test (-)
Paoloni et al. (2014) Pilot RCT (7) NStart=22 NEnd=22 TPS=Chronic A vs 0	E: Conventional PT + 120 Hz Segmental muscle vibration C: Conventional PT Duration: 60min/d, 5d/wk, for 2wks Conventional PT, 30min/d, 5d/wk, for 2wks SMV	E vs C: EMG parameters: Muscle onset time PD (+exp) Co-Contraction Index; PD/BB (+exp) AD/BB (+exp) BB/TB (+exp) AD/PD (+con) FCU/ECR (-) AD/TB (-) Modulation ratio; AD (+exp) BB (+exp) PD (-) TB (-) FCU (-) ECR (-) %MVC; BB (+exp) AD (-) PD (-) TB (-) FCU (-) ECR (-)
Tavernese et al. (2013)	E: Segmental muscle vibration + standard therapy	E vs C:

RCT (8) NStart=44 NEnd=44 TPS=Chronic A vs 0	C: Standard Therapy Duration: 30min/d, 5d/wk for 2wk	Angular velocity at shoulder (+exp) Movement duration (+exp) Normalized jerk (+exp) Elbow angle (-) Shoulder angle (-) Shoulder abduction (-)
Muscle vibration combined with other interventions compared to control		
Ahn et al. (2019) RCT (4) NStart=60 NEnd=60 TPS=Subacute A + B vs A + C *Also in Table 3 (Exercise and Strength Training); Table 4 (Task-Specific Training)*	E1: Whole-body vibration + Task Oriented Training + Conventional PT E2: Upper- and lower-Cycle group+ Task Specific Training + Conventional PT Duration: 30min/d, 5d/wk for 4wk	E1 vs E2: Manual Function Test (+exp1) Grip Strength (+exp1)
Muscle vibration compared to sham		
Seim C. et al. (2023) RCT Crossover (8) NStart=14 NEnd=14 TPS=Chronic A vs 0	E1: Agonist Muscle Stimulation (over flexor digitorum superficialis) E2: Antagonist Muscle Stimulation (Extensor digitorum) E3: Cutaneous Stimulation C: Sham Muscle stimulation Duration: 20 mins/session, 4 sessions (1 session in for each intervention)	E1 vs E2: Modified Ashworth Scale (no stat) Modified Tardieu Scale; MTS Rating (no stat); MTS Angle (no stat) 3D Motion Capture MTS Angle (no stat) Isometric Force Pillow (no stat) E3 vs E1: Modified Ashworth Scale (no stat) Modified Tardieu Scale; MTS Rating (no stat); MTS Angle (no stat) 3D Motion Capture MTS Angle (no stat) Isometric Force Pillow (no stat) E3 vs E2: Modified Ashworth Scale (no stat) Modified Tardieu Scale; MTS Rating (no stat); MTS Angle (no stat) 3D Motion Capture MTS Angle (no stat) Isometric Force Pillow (no stat) E3 vs C: Modified Ashworth Scale (no stat) Modified Tardieu Scale; MTS Rating (no stat); MTS Angle (no stat) 3D Motion Capture MTS Angle (no stat) Isometric Force Pillow (no stat)
Toscano et al. (2019) RCT (7) NStart=22 NEnd=22 TPS=Acute A vs 0	E: Repetitive focal muscle vibration (rMV) + conventional PT C: Sham+ conventional PT Duration: 30min/d, for 3d	E vs C: Fugl Meyer Assessment: (+exp) Motricity index: (+exp) National Institutes of Health Stroke Scale: (+exp) Modified Ashworth Scale: (-)
CostantiNo et al. (2017) Pilot RCT (6) NStart=32 NEnd=32 TPS=Chronic A vs 0	E: High Frequency MechaNo-Acoustic Vibratory Treatment C: Sham Vibration Duration: 300Hz 30min/3x/wk for 4wk	E vs C: Hand Grip Strength Test (+exp) Modified Ashworth Scale (+exp) Functional Independence Measure (+exp) Fugl Meyer Assessment (+exp) Jebsen-Taylor Hand Function Test (+exp)

		QuickDASH Score (+exp) Visual Numerical Scale for Pain (+exp)
Casale et al. (2014) RCT (7) NStart=30 NEnd=30 TPS=Chronic A vs 0	E: Vibration therapy+Physio C: Sham + Standard physiotherapy Duration: 60min physio + 30min stimulation or sham, 5d/wk, 2wk	E vs C: MAS (+exp) Robot-Aided motor tasks task completion (+exp) time (+exp) trajectory length (-)
Caliandro et al. (2012) Pilot RCT (8) NStart=49 NEnd=36 TPS=Chronic A vs 0	E: Repetitive Focal muscle vibration C: Sham condition Duration: 30min/d, for 3d	E vs C: Wolf Motor Function Test (+exp) Modified Ashworth Scale (-) Visual Analog Scale (-)
Muscle vibration combined with other interventions compared to stretching and positioning programs or no treatment		
Noma et al. (2012) RCT (7) NStart=36 NEnd=36 TPS=Subacute A vs B vs 0 *Also in Table 8 (Stretching Programs)*	E: Muscle vibration C1: Stretch control C2: Rest control Duration: 1x, 5min	E vs C1: Modified Ashworth Scale Elbow flex: (+exp) Wrist flex: (+exp) E vs C2: Modified Ashworth Scale Elbow flex: (+exp) Wrist flex: (+exp) C1 vs C2: Modified Ashworth Scale Elbow flex: (-) Wrist flex: (-) F-wave amplitude F/M ratio F-wave persistence
Muscle vibration compared to no treatment		
Ageranioti et al. (1990) RCT Crossover (5) NStart=29 NEnd=29 TPS=Chronic A vs 0	E: Muscle Vibration C: Rest Duration: 1min/condition, 10min washout	E vs C: Hypertonia total resistive torque of wrist joint (+exp) component nonlinear stiffness (+exp) damping torques (+exp) mean energy loss during passive wrist flexion (+exp) mean energy loss during wrist extension (+exp) hyperreflexia emg activity flexor (+exp) emg activity extensor (+exp)
Muscle vibration combined with other interventions compared to conventional therapy		
Celletti et al. (2017) Pilot RCT (6) NStart=18 NEnd=18 TPS=Chronic A + B vs A/B vs 0	E1: Focal muscle vibration + progressive modular rebalancing E2: Focal muscle vibration + conventional physiotherapy C: Conventional physiotherapy Duration: 60min, 2d/wk for 6wks progressive modular rebalancing or	E1/E2 vs C: Wolf Motor Function Test (WMFT) (-) the Modified Ashworth Scale (MAS) (-) Motricity Index (-) VAS-Pain

Also in Table 3 (Exercise and Strength Training)	conventional physiotherapy + 30 min/d for 3d muscle vibration	
Lee et al. (2016e) Pilot RCT (6) NStart=56 NEnd=45 TPS=Chronic A + B vs A/B vs 0 *Also in Table 4 (Task-Specific Training)*	E1: Whole-Body Vibration (5-15 Hz) E2: Whole-Body Vibration + Task-Related Training C: Conventional Physical Therapy Duration: 30 min/d, 3d/wk, 4wks	E1/E2 vs C: Fugl-Meyer Assessment- Upper Extremity (+exp1,+exp2) Wolf Motor Function Test (+exp2) Modified Ashworth Scale Shoulder (+exp1,+exp2,+con) Elbow (+exp2) Wrist and Finger (+exp2) Maximal Grip Strength (+exp2)
Cross-Referenced RCTs: Combined or Comparative Interventions Involving Muscle Vibration (results included in this table's levels of evidence)		
Sun et al. (2024) RCT (8) NStart=100 NEnd=100 TPS=Not Reported A + B + C vs A/A + B *Primary listing: Table 24 (Thermal Stimulation)*	E: Vibrational heated pressure therapy + Meridian dredging exercise + conventional rehab C: meridian dredging exercise + conventional treatment Duration: 30min/d, 3d/wk, 4wks	E vs C: MAS (+exp) FMA UE (+exp) LE (+exp) BI (+exp) SSQOL (+exp)
Oliveira et al. (2018) Pilot RCT (3) NStart=21 NEnd=21 TPS=Chronic A vs B vs 0 *Primary listing: Table 10 (Mirror Therapy)*	E1: Mirror therapy E2: Vibration therapy C: Conventional therapy Duration: 15min, 3x/wk, 4wk	E1 vs C: Rivermead Mobility Index (+exp1) Jebsen Hand Function Test - Time (+exp1) Wolf Motor Function Test; - Time (+exp1); - Score (+exp1) E2 vs C: Rivermead Mobility Index (+exp2) Jebsen Hand Function Test - Time (+exp2) Wolf Motor Function Test; - Time (+exp2); - Score (+exp2) E1 vs E2: Rivermead Mobility Index (-) Jebsen Hand Function Test - Time (-) Wolf Motor Function Test (-)
Calabro et al. (2017) Pilot RCT (7) NStart=20 NEnd=20 TPS=Subacute A + B vs A/B *Primary listing: Table 16 (Robotics)*	E: Robotic training (Armeo) + Muscle vibration C: Robotic training (Armeo) + Sham muscle vibration Duration: 60min/d, 5d/wk, 8wk Armeo-Power training	E vs C: Modified Ashworth Scale (+exp) EMG findings (+exp) Functional Independence Measure (+exp) Fugl-Meyer Assessment (+exp) MEP (+exp) HADS (+exp) shoulder force range of movement
Cordo et al. (2013) RCT (5) NStart=46 NEnd=43 TPS=Chronic A + B1 vs A + B2 *Primary listing: Table 16 (Robotics)*	E1: AMES robot + torque biofeedback + muscle vibration E2: AMES robot + EMG biofeedback + muscle vibration Duration: 30min/d, 3d/wk, 10wk	E1 vs E2: Fugl-Meyer Assessment Upper Extremity (-) Box and Block Test (-) EMG Strength Test Flexion (+exp) Extension (-) Stroke Impact Scale (-)

Abbreviations and table notes: C=control group; D=days; E=experimental group; H=hours; Min=minutes; RCT=randomized controlled trial; TPS=time post stroke category (Acute: less than 30 days, Subacute: more than 1 month but less than 6 months, Chronic: over 6 months); Wk=weeks.

+exp indicates a statistically significant between groups difference at α=0.05 in favour of the experimental group

+exp1/+exp2/+exp3 indicates a statistically significant between groups difference at α=0.05 in favour of the first, second or third experimental group

+con indicates a statistically significant between groups difference at α=0.05 in favour of the control group

- indicates no statistically significant between groups differences at α=0.05

1. Body Functions and Structures

MOTOR FUNCTION			
LoE	**Conclusion Statement**	**RCTs**	**References**
1b	There is conflicting evidence about the effect of Muscle vibration when compared to conventional therapy for improving motor function.	2	Wang et al. (2023c); Sade et al. (2021)
2	Whole-body vibration with Task Oriented Training and Conventional physical therapy may produce greater improvements in motor function than Upper- and lower-Cycle group with Task Specific Training and Conventional physical therapy.	1	Ahn et al. (2019)
1a	Muscle vibration may produce greater improvements in motor function than sham.	3	Toscano et al. (2019); CostantiNo et al. (2017); Caliandro et al. (2012)
2	AMES robot with torque biofeedback and muscle vibration may not have a difference in efficacy when compared to AMES robot with electromyography biofeedback and muscle vibration for improving motor function.	1	Cordo et al. (2013)
1b	Vibrational heated pressure therapy with Meridian dredging exercise and conventional rehab may produce greater improvements in motor function than meridian dredging exercise with conventional treatment.	1	Sun et al. (2024)
1b	Focal muscle vibration with progressive modular rebalancing may not have a difference in efficacy when compared to Conventional physiotherapy for improving motor function.	1	Celletti et al. (2017)
2	Mirror therapy may produce greater improvements in motor function than Conventional therapy.	1	Oliveira et al. (2018)
2	Vibration therapy may produce greater improvements in motor function than Conventional therapy.	1	Oliveira et al. (2018)
2	Mirror therapy may not have a difference in efficacy when compared to Vibration therapy for improving motor function.	1	Oliveira et al. (2018)
1b	Robotic training (Armeo) with Muscle vibration may produce greater improvements in motor function than Robotic training (Armeo) with Sham muscle vibration.	1	Calabro et al. (2017)
1b	There is conflicting evidence about the effect of Whole-Body Vibration (5-15 Hz) when compared to Conventional Physical Therapy for improving motor function.	1	Lee et al. (2016e)
1b	Whole-Body Vibration with Task-Related Training may produce greater improvements in motor function than Conventional Physical Therapy.	1	Lee et al. (2016e)

STROKE SEVERITY			
LoE	**Conclusion Statement**	**RCTs**	**References**
1b	There is conflicting evidence about the effect of Muscle vibration when compared to conventional therapy for improving stroke severity.	1	Wang et al. (2023c)
1b	Muscle vibration may produce greater improvements in stroke severity than sham.	1	Toscano et al. (2019)

MUSCLE STRENGTH			
LoE	**Conclusion Statement**	**RCTs**	**References**
2	Muscle vibration may not have a difference in efficacy when compared to conventional therapy for improving muscle strength.	1	Annino et al. (2019)
2	Whole-body vibration with Task Oriented Training and Conventional physical therapy may produce greater improvements in muscle strength than Upper- and lower-Cycle group with Task Specific Training and Conventional physical therapy.	1	Ahn et al. (2019)
1a	Muscle vibration may produce greater improvements in muscle strength than sham.	2	Toscano et al. (2019); CostantiNo et al. (2017)
2	Muscle vibration may produce greater improvements in muscle strength than rest.	1	Ageranioti et al. (1990)
1b	Focal muscle vibration with progressive modular rebalancing may not have a difference in efficacy when compared to Conventional physiotherapy for improving muscle strength.	1	Celletti et al. (2017)
1b	Whole-Body Vibration (5-15 Hz) may not have a difference in efficacy when compared to Conventional Physical Therapy for improving muscle strength.	1	Lee et al. (2016e)
1b	Whole-Body Vibration with Task-Related Training may produce greater improvements in muscle strength than Conventional Physical Therapy.	1	Lee et al. (2016e)

SPASTICITY			
LoE	**Conclusion Statement**	**RCTs**	**References**
1b	There is conflicting evidence about the effect of Muscle vibration when compared to conventional therapy for improving spasticity.	2	Wang et al. (2023c); Annino et al. (2019)
1a	There is conflicting evidence about the effect of Muscle vibration when compared to sham for improving spasticity.	4	Toscano et al. (2019); CostantiNo et al. (2017); Casale et al. (2014); Caliandro et al. (2012)
1b	Muscle vibration may produce greater improvements in spasticity than Stretch control or Rest control.	1	Noma et al. (2012)
1b	Vibrational heated pressure therapy with Meridian dredging exercise and conventional rehab may produce greater improvements in spasticity than meridian dredging exercise with conventional treatment.	1	Sun et al. (2024)
1b	Focal muscle vibration with progressive modular rebalancing may not have a difference in efficacy when compared to Conventional physiotherapy for improving spasticity.	1	Celletti et al. (2017)
1b	Robotic training (Armeo) with Muscle vibration may produce greater improvements in spasticity than Robotic training (Armeo) with Sham muscle vibration.	1	Calabro et al. (2017)

1b	Whole-Body Vibration (5-15 Hz) may not have a difference in efficacy when compared to Conventional Physical Therapy for improving spasticity.	1	Lee et al. (2016e)
1b	Whole-Body Vibration with Task-Related Training may produce greater improvements in spasticity than Conventional Physical Therapy.	1	Lee et al. (2016e)

RANGE OF MOTION			
LoE	**Conclusion Statement**	**RCTs**	**References**
2	Muscle vibration may not have a difference in efficacy when compared to conventional therapy for improving range of motion.	2	Sade et al. (2021); Annino et al. (2019)
1b	Segmental muscle vibration with standard therapy may not have a difference in efficacy when compared to Standard Therapy for improving range of motion.	1	Tavernese et al. (2013)

2. Activities

ACTIVITIES OF DAILY LIVING			
LoE	**Conclusion Statement**	**RCTs**	**References**
1b	There is conflicting evidence about the effect of Muscle vibration when compared to conventional therapy for improving performance of activities of daily living.	2	Wang et al. (2023c); Annino et al. (2019)
1b	Vibrational heated pressure therapy with Meridian dredging exercise and conventional rehab may produce greater improvements in performance of activities of daily living than meridian dredging exercise with conventional treatment.	1	Sun et al. (2024)
1a	Muscle vibration may produce greater improvements in performance of activities of daily living than sham.	2	CostantiNo et al. (2017); Casale et al. (2014)
1b	Robotic training (Armeo) with Muscle vibration may produce greater improvements in performance of activities of daily living than Robotic training (Armeo) with Sham muscle vibration.	1	Calabro et al. (2017)

DEXTERITY			
LoE	**Conclusion Statement**	**RCTs**	**References**
2	AMES robot with torque biofeedback and muscle vibration may not have a difference in efficacy when compared to AMES robot with electromyography biofeedback and muscle vibration for improving dexterity.	1	Cordo et al. (2013)

Key Points

- Muscle vibration may not be beneficial for improving range of motion and muscle strength after stroke when compared to conventional therapy; the literature is mixed regarding motor function, performance of activities of daily living, spasticity, and stroke severity.
- Whole-body vibration with Task Oriented Training and Conventional physical therapy may be beneficial for improving motor function and muscle strength after stroke when compared to Upper- and lower-Cycle group with Task Specific Training and Conventional physical therapy.
- Muscle vibration may be beneficial for improving motor function, stroke severity, muscle strength, and performance of activities of daily living after stroke when compared to sham; the literature is mixed regarding spasticity.

- AMES robot with torque biofeedback and muscle vibration may not be beneficial for improving motor function and dexterity after stroke when compared to AMES robot with electromyography biofeedback and muscle vibration.
- Vibrational heated pressure therapy with Meridian dredging exercise and conventional rehab may be beneficial for improving motor function, performance of activities of daily living, and spasticity after stroke when compared to meridian dredging exercise with conventional treatment.
- Muscle vibration may be beneficial for improving spasticity after stroke when compared to Stretch control or Rest control.
- Muscle vibration may be beneficial for improving muscle strength after stroke when compared to rest.
- Focal muscle vibration with progressive modular rebalancing may not be beneficial for improving motor function, muscle strength, and spasticity after stroke when compared to Conventional physiotherapy.
- Mirror therapy may be beneficial for improving motor function after stroke when compared to Conventional therapy.
- Vibration therapy may be beneficial for improving motor function after stroke when compared to Conventional therapy.
- Mirror therapy may not be beneficial for improving motor function after stroke when compared to Vibration therapy.
- Robotic training (Armeo) with Muscle vibration may be beneficial for improving motor function, spasticity, and performance of activities of daily living after stroke when compared to Robotic training (Armeo) with Sham muscle vibration.
- Whole-Body Vibration (5-15 Hz) may not be beneficial for improving muscle strength and spasticity after stroke when compared to Conventional Physical Therapy; the literature is mixed regarding motor function.
- Whole-Body Vibration with Task-Related Training may be beneficial for improving motor function, muscle strength, and spasticity after stroke when compared to Conventional Physical Therapy.
- Segmental muscle vibration with standard therapy may not be beneficial for improving range of motion after stroke when compared to Standard Therapy.

Summary of Key Points: Muscle Vibration

Intervention	Control(s)	Function domain(s)	Effect
Muscle vibration	conventional therapy	Range of motion, muscle strength	−
Muscle vibration	conventional therapy	Motor function, performance of activities of daily living, spasticity, stroke severity	=
Whole-body vibration with Task Oriented Training and Conventional physical therapy	Upper- and lower-Cycle group with Task Specific Training and Conventional physical therapy	Motor function, muscle strength	+
Muscle vibration	sham	Motor function, stroke severity, muscle strength, performance of activities of daily living	+
Muscle vibration	sham	Spasticity	=
AMES robot with torque biofeedback and muscle vibration	AMES robot with electromyography biofeedback and muscle vibration	Motor function, dexterity	−
Vibrational heated pressure therapy with Meridian dredging exercise and conventional rehab	meridian dredging exercise with conventional treatment	Motor function, performance of activities of daily living, spasticity	+
Muscle vibration	Stretch control or Rest control	Spasticity	+
Muscle vibration	rest	Muscle strength	+

Focal muscle vibration with progressive modular rebalancing	Conventional physiotherapy	Motor function, muscle strength, spasticity	–
Mirror therapy	Conventional therapy	Motor function	+
Vibration therapy	Conventional therapy	Motor function	+
Mirror therapy	Vibration therapy	Motor function	–
Robotic training (Armeo) with Muscle vibration	Robotic training (Armeo) with Sham muscle vibration	Motor function, spasticity, performance of activities of daily living	+
Whole-Body Vibration (5-15 Hz)	Conventional Physical Therapy	Muscle strength, spasticity	–
Whole-Body Vibration (5-15 Hz)	Conventional Physical Therapy	Motor function	=
Whole-Body Vibration with Task-Related Training	Conventional Physical Therapy	Motor function, muscle strength, spasticity	+
Segmental muscle vibration with standard therapy	Standard Therapy	Range of motion	–

Extracorporeal Shockwave Therapy



Adapted from: https://unsplash.com/photos/therapist-using-ultrasound-device-on-patients-arm-PBdLYkML-b0

Extracorporeal shockwave therapy delivers acoustic pressure waves to muscle or the myotendinous junction, and has been investigated primarily for post-stroke spasticity of the upper limb; both radial and focused shockwave devices have been studied.

A total of sixteen RCTs were found that evaluated extracorporeal shockwave therapy for upper extremity motor rehabilitation. One RCT compared extracorporeal shockwave therapy combined with other interventions with neuromuscular electrical stimulation or botulinum toxin (botox) (Santamato et al. (2013)). Six RCTs compared extracorporeal shockwave therapy with sham (Fan et al. (2024); Haghighat et al. (2023); Yoon et al. (2017); Dymarek et al. (2016); Kim et al. (2016c); Li et al. (2016a)). Five RCTs compared extracorporeal shockwave therapy with conventional therapy (Özbek & Tikiz (2024); Brunelli et al. (2022); Leng et al. (2021); Tabra et al. (2021); Li et al. (2020)). One RCT compared extracorporeal shockwave therapy combined with other interventions with botulinum toxin (botox) (Wu et al. (2018)). One RCT compared extracorporeal shockwave therapy combined with other interventions with transcutaneous electrical stimulation (tens) (Senarath et al. (2023)). One RCT compared extracorporeal shockwave therapy combined with other interventions with thermal stimulation or stretching and positioning programs (Sugiarto & Kesoema (2023)). One RCT compared extracorporeal shockwave therapy combined with other interventions with sham or exercise and custom physiotherapy protocols (Khalifa et al. (2023)).

In addition, 3 RCTs in which extracorporeal shockwave therapy formed part of a combined or comparative intervention are cross-referenced at the end of Table 26; their primary listings appear in other tables.

The methodological details and results of all sixteen RCTs are presented in Table 26.

Table 26. RCTs Evaluating Extracorporeal Shockwave Therapy for Upper Extremity Motor Rehabilitation

Authors (Year) **Study Design (PEDro Score)** **Sample Size start** **Sample Size end** **Time post stroke category** **Study design**	**Interventions** **Duration: Session length, frequency per week for total number of weeks**	**Outcome Measures** **Result (direction of effect)**
Extracorporeal shockwave therapy combined with other interventions compared to neuromuscular electrical stimulation or botulinum toxin (botox)		
Santamato et al. (2013) RCT (6) NStart=32 NEnd=32 TPS=Chronic A + B vs A + C *Also in Table 33 (Botulinum Toxin); Table 22 (Neuromuscular Electrical Stimulation (NMES))*	E: Botolinum Toxin-A + Extracorporeal shock wave therapy (ESWT) C: BTX-A + electrical stimulation (ES) Duration: E: single dose BTX-A + 1x/d, 5d ESWT; C: single dose BTX-A + 30min, 2x/d, 5d ES	E vs C: modified Ashworth scale (+exp) spasm frequency scale (+exp) visual analogue scale (+exp) PAIN vas (+EXP)
Extracorporeal shockwave therapy compared to sham		
Fan et al. (2024) RCT (8) NStart=100 NEnd=91 TPS=Subacute A vs 0	E: Radial extracorporeal shockwave therapy (rESWT) C: Sham rESWT Duration: 1 session every third day for 3 sessions total	E vs C: modified Ashworth Scale (+exp) Hmax/Mmax (+exp) EMG measures root mean square value (+exp) co-contraction ratio (+exp) Digital muscle function assessment tone (+exp) stiffness (+exp) elasticity (-) mean relaxation time (+exp) creep (+exp)
Haghighat et al. (2023) RCT (5) NStart=43 NEnd=40 TPS=Not Reported A vs 0	E: Focused extracorporeal shockwave therapy + radial extracorporeal shockwave therapy + Conventional therapy C: Sham ESWT + Conventional therapy Duration: 3 sessions of focused ESWT 1x/wk, 5 sessions of radial ESWT 2x/wk	E vs C: FMA-UE (-) motor function (-) sensation (-) passive joint motion (-) pain (-) Passive Range of Motion abduction (-) forward flexion (-) external rotation (-) internal rotation (-) Pain-VAS (+exp) SPDI (-) pain (-) disability (-)

Yoon et al. (2017) RCT (5) NStart=138 NEnd=124 TPS=Chronic A1 vs A2 vs 0	E1: Extracorpeal shockwave on muscle belly E2: Extracorpeal shockwave on myotendinous junction C: Sham Duration: 1x/wk, 3wk	E1/E2 vs C: Modified Ashworth Scale: (-) Modified Tardieu Scale: (-) E1 vs E2: Modified Ashworth Scale: (no stat) Modified Tardieu Scale: (-)
Dymarek et al. (2016) RCT (6) NStart=60 NEnd=60 TPS=Chronic A vs 0	E: Radial extracorporeal shock wave stimulation (rESW) C: Sham rESW Duration: one session, 1d assessment	E vs C: Modified ashworth scale (+exp) Surface EMG activity Infrared Thermal imaging mean/max/min
Kim et al. (2016c) RCT (6) NStart=40 NEnd=34 TPS=Chronic A vs 0	E: Extracorporeal shockwave therapy C: Sham Duration: 45min/d, 4d/wk for 2wk; 8 sessions in total	E vs C: VAS pain (+exp) Constant-Murley scale (-) FMA (-) Mod Ashworth scale (-) shoulder RoM (-)
Li et al. (2016a) RCT (7) NStart=60 NEnd=60 TPS=Chronic A1 vs A2 vs 0	E1: Radial Shock Wave Therapy 3 session E2: Radial Shock Wave Therapy 1 session C: Sham Radial Shock Wave Therapy Duration: 1 session/wk, for 1 or 3wks of 1500 shots with a pressure of 3.5 bar and frequency of 5 Hz on flexor carpi ulnaris, 4000 shots with a pressure of 3 bar and frequency of5 Hz were used diffusely for the intrinsic muscles and flexor digitorum tendon	E1 vs C: Modified Ashworth Scale Hand (+exp) Wrist (+exp) Fugl-Meyer Assessment Hand Function (+exp) Wrist Control (+exp) E2 vs C: Modified Ashworth Scale Hand (+exp) Wrist (+exp) Fugl-Meyer Assessment Hand Function (-) Wrist Control (-) E1 vs E2: Modified Ashworth Scale Hand (+exp) Wrist (+exp) Fugl-Meyer Assessment Hand Function (+exp) Wrist Control (+exp)
Extracorporeal shockwave therapy compared to conventional therapy		
Özbek & Tikiz (2024) RCT (7) NStart=42 NEnd=42 TPS=Chronic A vs 0	E: Radial extracorpeal shockwave therapy + Conventional therapy C: Conventional care Duration: E: 5min/d 4d/wk, for 4wks rESWT + Conventional therapy 5ds/wk, for 4wks; C: 5d/wk for 4wks	E vs C: Shear wave elastography 180 degree extension (+exp) 90 degree flexion (+exp) Modified ashworth scale (-) Modified Tardieu spasticity scale (-) FMA-UE (-) FIM (-)
Brunelli et al. (2022) Pilot RCT (5) NStart=40 NEnd=32	E: Radial Extracorporeal Shock Wave Therapy (rESWT) + conventional rehab C: Conventional Rehab	E vs C: MAS wrist (-) elbow (-)

TPS=Subacute A vs 0	Duration: 1session/wk, 4wks; PT: 80min/d, 5d/wk, 4wks	shoulder (-)
Leng et al. (2021) RCT (7) NStart=30 NEnd=27 TPS=Chronic A vs 0	E: Radial Extracorporeal Shock Wave Therapy (rESWT) + Routine Therapy C: Routine Therapy Duration: 1 session rESWT + 90min/d, 5d routine rehab	E vs C: FMA (-) MAS (+exp) Mechanical muscle properties, viscosity components (+exp) Stiffness (+exp) Muscle Tone (+exp) Reactance (+exp) Resistance (-) Phase angle (-) Elastic component (-) Neural component (-)
Tabra et al. (2021) RCT (8) NStart=40 NEnd=40 TPS=Chronic A vs 0	E: radial Extracorpeal shock wave therapy + conventional therapy C: Conventional rehab Duration: 1d/wk, 3wks	E vs C: MAS (+exp) FMA-UE (+exp) MI (-) Hmax/Mmax (+exp)
Li et al. (2020) RCT (7) NStart=86 NEnd=82 TPS=Subacute A1 vs A2 vs 0	E1: Radial extracorporeal shockwave (rEWST) agonist muscle+ conventional therapy E2: extracorporeal shockwave (rEWST) antagonist muscle+ conventional therapy C: Conventional therapy Duration: 6d/wk, 3wks rehab + 1 session every 4d for 5 total sessions	E1 vs C: Modified Ashworth Scale: (+exp1, +exp2) Modified Tardieu Scale (R1, R2): (+exp1, +exp2) Fugle-Meyers Assessment Upper Extremity: (-) VAS-pain (+exp1, +exp2) swelling score (-) E1 vs E2: Modified Ashworth Scale: (-) Modified Tardieu Scale (R1, R2): (+exp2) Fugle-Meyers Assessment Upper Extremity: (-) modified Tardieu (+exp1) VAS-pain (-) swelling score (-)
Extracorporeal shockwave therapy combined with other interventions compared to botulinum toxin (botox)		
Wu et al. (2018) RCT (7) NStart=42 NEnd=40 TPS=Chronic A vs B *Also in Table 33 (Botulinum Toxin)*	E: Extracorpeal shockwave C: Botox Duration: 1x/wk, 3wk	E vs C: Modified Ashworth Scale- wrist (-) Modified Ashworth Scale- elbow (-) Tardieu wrist: (-) Tardieu elbow: (-) Fugl Meyer Upper Extremity: (+exp) Passive Range of Motion (+exp)
Extracorporeal shockwave therapy combined with other interventions compared to transcutaneous electrical stimulation (tens)		
Senarath et al. (2023) RCT (6) NStart=108 NEnd=106 TPS=Chronic A vs B	E: rESWT C: TENS Duration: E: 1d/wk, 4wks, C:15min/d, 1d/wk, 4wks	E vs C: FMA-UE (no stat) MAS (no stat) ARAT (no stat) voluntary control grading VCG (no stat)

Also in Table 23 (Transcutaneous Electrical Nerve Stimulation (TENS))		
Extracorporeal shockwave therapy combined with other interventions compared to thermal stimulation or stretching and positioning programs		
Sugiarto & Kesoema (2023) RCT (5) NStart=30 NEnd=30 TPS=Chronic A + B + C vs A/A + B *Also in Table 24 (Thermal Stimulation); Table 8 (Stretching Programs)*	E: Radial Shock Wave Therapy + Infrared therapy + Static Stretching C: Infrared therapy + Static Stretching Duration: 1d/wk, 6wks (Radial Shock Wave Therapy); 15mins/d, 3d/wk, 6wks (infrared therapy); 5mins/d, 3d/wk, 6wks (static stretching)	E vs C: Tardieu Spasticity Scale wrist resistance (+exp) fingers resistance (+exp)
Extracorporeal shockwave therapy combined with other interventions compared to sham or exercise and custom physiotherapy protocols		
Khalifa et al. (2023) RCT (8) NStart=30 NEnd=30 TPS=Subacute A + B vs A/B *Also in Table 3 (Exercise and Strength Training)*	E: Radial extracorporeal shock wave therapy (rESWT) + Designed physical therapy program for shoulder C: Sham rESWT + Designed physical therapy program for shoulder Duration: 15min rESWT + 60min physical therapy, 2d/wk, 4wks	E vs C: shoulder structure abnormality (Ultrasound) (+exp) Pressure-pain threshold (+exp) Shoulder Pain and Disability Index (+exp) pain score (+exp) disability score (+exp)
Cross-Referenced RCTs: Combined or Comparative Interventions Involving Extracorporeal Shockwave Therapy (results included in this table's levels of evidence)		
Lee & Yang (2024) RCT (6) NStart=16 NEnd=16 TPS=Chronic A + B vs A/B *Primary listing: Table 33 (Botulinum Toxin)*	E: Botulinum toxin injection + Extracorporeal shock wave therapy (ESWT) C: Botulinum toxin injection Duration: 1x/d for 5d	E vs C: modified Ashworth Scale elbow flexors (-) wrist flexors (-) finger flexors (-) modified Tardieu Scale elbow flexors (-) wrist flexors (-) finger flexors (-) FMA-UE (-) mBI (-) ARAT (-)
Yuan et al. (2023) RCT (4) NStart=60 NEnd=60 TPS=Subacute A + B vs A vs B vs 0 *Primary listing: Table 35 (Nerve Block)*	E1: Ultrasound-guided stellate ganglion block + Conventional Therapy E2: Extracorporeal shock wave therapy + Conventional therapy E3: Ultrasound-guided stellate ganglion block + Extracorporeal shock wave therapy + Conventional therapy C: Conventional therapy Duration: E1: every 3 days for 1mo; E2: 1mo; C: once a day for 1mo	E1/ E2/E3 vs C: mBI (+exp1, +exp 2, +exp 3) FMA-UE (+exp1, +exp 2, +exp 3) Upper Limb Rehabilitation Robot Performance Score +exp1, +exp 2, +exp 3 E1 vs E3: mBI (-) FMA-UE (+exp3) Upper Limb Rehabilitation Robot Performance Score (+exp3) E2 vs E3: mBI (-) FMA-UE (+exp3) Upper Limb Rehabilitation Robot Performance Score (+exp3) E1 vs E2: mBI (-)

		FMA-UE (-) Upper Limb Rehabilitation Robot Performance Score (-)
Zhang J. et al. (2023) RCT (7) NStart=42 NEnd=42 TPS=Subacute A vs B *Primary listing: Table 36 (Steroids)*	E1: Ultrasonic-guided betamethasone local injection + Routine Rehabilitation E2: Extracorporeal shock wave therapy + Routine Rehabilitation Duration: E1: (Rehab = 30 mins/d, 5d/wk, 2wks; Injection = one dose); E2: (Rehab = 30 mins/d, 5d/wk, 2wks; ESWT = 20 mins/d, 1d/wk 4wks)	E1 vs E2: VAS-Pain (-) Cytokine serum levels IL-1 (+exp1) IL-6 (+exp1) IL-8 (+exp1) TNF-α (+exp1) Neer Score (-) mBI (-) FMA (-) 24-Item Hamilton Depression Rating Scale (-) SF-36 (-)

Abbreviations and table notes: C=control group; D=days; E=experimental group; H=hours; Min=minutes; RCT=randomized controlled trial; TPS=time post stroke category (Acute: less than 30 days, Subacute: more than 1 month but less than 6 months, Chronic: over 6 months); Wk=weeks.

+exp indicates a statistically significant between groups difference at α=0.05 in favour of the experimental group

+exp1/+exp2/+exp3 indicates a statistically significant between groups difference at α=0.05 in favour of the first, second or third experimental group

+con indicates a statistically significant between groups difference at α=0.05 in favour of the control group

- indicates no statistically significant between groups differences at α=0.05

1. Body Functions and Structures

MOTOR FUNCTION			
LoE	**Conclusion Statement**	**RCTs**	**References**
1a	Extracorporeal shockwave therapy may not have a difference in efficacy when compared to sham for improving motor function.	3	Haghighat et al. (2023); Kim et al. (2016c); Li et al. (2016a)
1b	Radial Shock Wave Therapy 3 session may produce greater improvements in motor function than Radial Shock Wave Therapy 1 session.	1	Li et al. (2016a)
1a	Extracorporeal shockwave therapy may not have a difference in efficacy when compared to conventional therapy for improving motor function.	4	Özbek & Tikiz (2024); Leng et al. (2021); Tabra et al. (2021); Li et al. (2020)
1b	Radial extracorporeal shockwave (rEWST) agonist muscle with conventional therapy may not have a difference in efficacy when compared to extracorporeal shockwave (rEWST) antagonist muscle with conventional therapy for improving motor function.	1	Li et al. (2020)
1b	Extracorpeal shockwave may produce greater improvements in motor function than Botox.	1	Wu et al. (2018)
2	Ultrasound-guided stellate ganglion block with Conventional Therapy may produce greater improvements in motor function than Conventional therapy.	1	Yuan et al. (2023)
2	Ultrasound-guided stellate ganglion block with Conventional Therapy may result in lesser improvements in motor function when compared to Ultrasound-guided stellate ganglion block with Extracorporeal shock wave therapy and Conventional therapy.	1	Yuan et al. (2023)
2	Extracorporeal shock wave therapy with Conventional therapy may result in lesser improvements in motor function when compared to Ultrasound-guided stellate ganglion block with Extracorporeal shock wave therapy and Conventional therapy.	1	Yuan et al. (2023)

2	Ultrasound-guided stellate ganglion block with Conventional Therapy may not have a difference in efficacy when compared to Extracorporeal shock wave therapy with Conventional therapy for improving motor function.	1	Yuan et al. (2023)
1b	Ultrasonic-guided betamethasone local injection with Rehabilitation may not have a difference in efficacy when compared to Extracorporeal shock wave therapy with Rehabilitation for improving motor function.	1	Zhang J. et al. (2023)
1b	Botulinum toxin injection with Extracorporeal shock wave therapy (extracorporeal shockwave therapy) may not have a difference in efficacy when compared to Botulinum toxin injection for improving motor function.	1	Lee & Yang (2024)

MUSCLE STRENGTH			
LoE	**Conclusion Statement**	**RCTs**	**References**
1b	Extracorporeal shockwave therapy may not have a difference in efficacy when compared to conventional therapy for improving muscle strength.	1	Tabra et al. (2021)

SPASTICITY			
LoE	**Conclusion Statement**	**RCTs**	**References**
1b	Botolinum Toxin-A with Extracorporeal shock wave therapy (extracorporeal shockwave therapy) may produce greater improvements in spasticity than botulinum toxin A with electrical stimulation (ES).	1	Santamato et al. (2013)
1a	Extracorporeal shockwave therapy may produce greater improvements in spasticity than sham.	5	Fan et al. (2024); Yoon et al. (2017); Dymarek et al. (2016); Kim et al. (2016c); Li et al. (2016a)
2	Extracorpeal shockwave on muscle belly may not have a difference in efficacy when compared to Extracorpeal shockwave on myotendinous junction for improving spasticity.	1	Yoon et al. (2017)
1b	Radial Shock Wave Therapy 3 session may produce greater improvements in spasticity than Radial Shock Wave Therapy 1 session.	1	Li et al. (2016a)
1a	Extracorporeal shockwave therapy may produce greater improvements in spasticity than conventional therapy.	5	Özbek & Tikiz (2024); Brunelli et al. (2022); Leng et al. (2021); Tabra et al. (2021); Li et al. (2020)
1b	Radial extracorporeal shockwave (rEWST) agonist muscle with conventional therapy may result in lesser improvements in spasticity when compared to extracorporeal shockwave (rEWST) antagonist muscle with conventional therapy.	1	Li et al. (2020)
1b	Extracorpeal shockwave may not have a difference in efficacy when compared to Botox for improving spasticity.	1	Wu et al. (2018)
2	Radial Shock Wave Therapy with Infrared therapy and Static Stretching may produce greater improvements in spasticity than Infrared therapy with Static Stretching.	1	Sugiarto & Kesoema (2023)
1b	Botulinum toxin injection with Extracorporeal shock wave therapy (extracorporeal shockwave therapy) may not have a difference in efficacy when compared to Botulinum toxin injection for improving spasticity.	1	Lee & Yang (2024)

RANGE OF MOTION			
LoE	**Conclusion Statement**	**RCTs**	**References**
1b	Extracorporeal shockwave therapy may not have a difference in efficacy when compared to sham for improving range of motion.	2	Haghighat et al. (2023); Kim et al. (2016c)
1b	Extracorpeal shockwave may produce greater improvements in range of motion than Botox.	1	Wu et al. (2018)

2. Activities

ACTIVITIES OF DAILY LIVING			
LoE	**Conclusion Statement**	**RCTs**	**References**
2	Extracorporeal shockwave therapy may not have a difference in efficacy when compared to sham for improving performance of activities of daily living.	1	Haghighat et al. (2023)
1b	Extracorporeal shockwave therapy may not have a difference in efficacy when compared to conventional therapy for improving performance of activities of daily living.	1	Özbek & Tikiz (2024)
1b	Radial extracorporeal shock wave therapy (radial extracorporeal shockwave therapy) with Designed physical therapy program for shoulder may produce greater improvements in performance of activities of daily living than Sham radial extracorporeal shockwave therapy with Designed physical therapy program for shoulder.	1	Khalifa et al. (2023)
2	Ultrasound-guided stellate ganglion block with Conventional Therapy may produce greater improvements in performance of activities of daily living than Conventional therapy.	1	Yuan et al. (2023)
2	Ultrasound-guided stellate ganglion block with Conventional Therapy may not have a difference in efficacy when compared to Ultrasound-guided stellate ganglion block with Extracorporeal shock wave therapy and Conventional therapy for improving performance of activities of daily living.	1	Yuan et al. (2023)
2	Extracorporeal shock wave therapy with Conventional therapy may not have a difference in efficacy when compared to Ultrasound-guided stellate ganglion block with Extracorporeal shock wave therapy and Conventional therapy for improving performance of activities of daily living.	1	Yuan et al. (2023)
2	Ultrasound-guided stellate ganglion block with Conventional Therapy may not have a difference in efficacy when compared to Extracorporeal shock wave therapy with Conventional therapy for improving performance of activities of daily living.	1	Yuan et al. (2023)
1b	Ultrasonic-guided betamethasone local injection with Rehabilitation may not have a difference in efficacy when compared to Extracorporeal shock wave therapy with Rehabilitation for improving performance of activities of daily living.	1	Zhang J. et al. (2023)
1b	Botulinum toxin injection with Extracorporeal shock wave therapy (extracorporeal shockwave therapy) may not have a difference in efficacy when compared to Botulinum toxin injection for improving performance of activities of daily living.	1	Lee & Yang (2024)

Key Points

- Extracorporeal shockwave therapy may be beneficial for improving spasticity, but not motor function, performance of activities of daily living, and range of motion, after stroke when compared to sham.

- Radial Shock Wave Therapy 3 session may be beneficial for improving motor function and spasticity after stroke when compared to Radial Shock Wave Therapy 1 session.
- Extracorporeal shockwave therapy may be beneficial for improving spasticity, but not motor function, muscle strength, and performance of activities of daily living, after stroke when compared to conventional therapy.
- Radial extracorporeal shockwave (rEWST) agonist muscle with conventional therapy may not be beneficial for improving motor function after stroke when compared to extracorporeal shockwave (rEWST) antagonist muscle with conventional therapy.
- Radial extracorporeal shockwave (rEWST) agonist muscle with conventional therapy may be less beneficial than extracorporeal shockwave (rEWST) antagonist muscle with conventional therapy for improving spasticity after stroke.
- Extracorpeal shockwave may be beneficial for improving motor function and range of motion, but not spasticity, after stroke when compared to Botox.
- Ultrasound-guided stellate ganglion block with Conventional Therapy may be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Conventional therapy.
- Ultrasound-guided stellate ganglion block with Conventional Therapy may not be beneficial for improving performance of activities of daily living after stroke when compared to Ultrasound-guided stellate ganglion block with Extracorporeal shock wave therapy and Conventional therapy.
- Ultrasound-guided stellate ganglion block with Conventional Therapy may be less beneficial than Ultrasound-guided stellate ganglion block with Extracorporeal shock wave therapy and Conventional therapy for improving motor function after stroke.
- Extracorporeal shock wave therapy with Conventional therapy may not be beneficial for improving performance of activities of daily living after stroke when compared to Ultrasound-guided stellate ganglion block with Extracorporeal shock wave therapy and Conventional therapy.
- Extracorporeal shock wave therapy with Conventional therapy may be less beneficial than Ultrasound-guided stellate ganglion block with Extracorporeal shock wave therapy and Conventional therapy for improving motor function after stroke.
- Ultrasound-guided stellate ganglion block with Conventional Therapy may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Extracorporeal shock wave therapy with Conventional therapy.
- Ultrasonic-guided betamethasone local injection with Rehabilitation may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Extracorporeal shock wave therapy with Rehabilitation.
- Botulinum toxin injection with Extracorporeal shock wave therapy (extracorporeal shockwave therapy) may not be beneficial for improving motor function, performance of activities of daily living, and spasticity after stroke when compared to Botulinum toxin injection.
- Radial extracorporeal shock wave therapy (radial extracorporeal shockwave therapy) with Designed physical therapy program for shoulder may be beneficial for improving performance of activities of daily living after stroke when compared to Sham radial extracorporeal shockwave therapy with Designed physical therapy program for shoulder.
- Botolinum Toxin-A with Extracorporeal shock wave therapy (extracorporeal shockwave therapy) may be beneficial for improving spasticity after stroke when compared to botulinum toxin A with electrical stimulation (ES).
- Extracorpeal shockwave on muscle belly may not be beneficial for improving spasticity after stroke when compared to Extracorpeal shockwave on myotendinous junction.
- Radial Shock Wave Therapy with Infrared therapy and Static Stretching may be beneficial for improving spasticity after stroke when compared to Infrared therapy with Static Stretching.

Summary of Key Points: Extracorporeal Shockwave Therapy

Intervention	Control(s)	Function domain(s)	Effect
Extracorporeal shockwave therapy	sham	Spasticity	+

Extracorporeal shockwave therapy	sham	Motor function, performance of activities of daily living, range of motion	–
Radial Shock Wave Therapy 3 session	Radial Shock Wave Therapy 1 session	Motor function, spasticity	+
Extracorporeal shockwave therapy	conventional therapy	Spasticity	+
Extracorporeal shockwave therapy	conventional therapy	Motor function, muscle strength, performance of activities of daily living	–
Radial extracorporeal shockwave (rEWST) agonist muscle with conventional therapy	extracorporeal shockwave (rEWST) antagonist muscle with conventional therapy	Motor function, spasticity	–
Extracorpeal shockwave	Botox	Motor function, range of motion	+
Extracorpeal shockwave	Botox	Spasticity	–
Ultrasound-guided stellate ganglion block with Conventional Therapy	Conventional therapy	Motor function, performance of activities of daily living	+
Ultrasound-guided stellate ganglion block with Conventional Therapy	Ultrasound-guided stellate ganglion block with Extracorporeal shock wave therapy and Conventional therapy	Motor function, performance of activities of daily living	–
Extracorporeal shock wave therapy with Conventional therapy	Ultrasound-guided stellate ganglion block with Extracorporeal shock wave therapy and Conventional therapy	Motor function, performance of activities of daily living	–
Ultrasound-guided stellate ganglion block with Conventional Therapy	Extracorporeal shock wave therapy with Conventional therapy	Motor function, performance of activities of daily living	–
Ultrasonic-guided betamethasone local injection with Rehabilitation	Extracorporeal shock wave therapy with Rehabilitation	Motor function, performance of activities of daily living	–
Botulinum toxin injection with Extracorporeal shock wave therapy (extracorporeal shockwave therapy)	Botulinum toxin injection	Motor function, performance of activities of daily living, spasticity	–
Radial extracorporeal shock wave therapy (radial extracorporeal shockwave therapy) with Designed physical therapy program for shoulder	Sham radial extracorporeal shockwave therapy with Designed physical therapy program for shoulder	Performance of activities of daily living	+
Botolinum Toxin-A with Extracorporeal shock wave therapy (extracorporeal shockwave therapy)	botulinum toxin A with electrical stimulation (ES)	Spasticity	+
Extracorpeal shockwave on muscle belly	Extracorpeal shockwave on myotendinous junction	Spasticity	–
Radial Shock Wave Therapy with Infrared therapy and Static Stretching	Infrared therapy with Static Stretching	Spasticity	+

Additional Afferent and Peripheral Stimulation Methods



Adapted from: https://www.saebo.com/saebostim-micro/

A total of 56 RCTs were found that evaluated additional afferent and peripheral stimulation methods for upper extremity motor rehabilitation. Three RCTs compared peripheral Nerve Stimulation combined with other interventions with sham (Liang et al. (2024); Sattler et al. (2015); Celnik et al. (2009)). One RCT compared nerve pulsed radiofrequency combined with other interventions with nerve block (Alanbay et al. (2020)). One RCT compared transcutaneous laser therapy combined with other interventions with interferential current therapy (Jan et al. (2017)). One RCT compared peripheral magnetic stimulation combined with other interventions with low-frequency rtms (Chen et al. (2020a)). One RCT compared sensory stimulation with sham (Kattenstroth et al. (2018)). One RCT compared sensory stimulation combined with other interventions with sham or task-specific training (Ghaziani et al. (2018)). Six RCTs compared peripheral Nerve Stimulation with sham (Olczak & Truszczynska-Baszak (2022); Pan et al. (2018b); Liu et al. (2017); Klaiput et al. (2009); Celnik et al. (2007); Conforto et al. (2002)). Three RCTs compared non-electrical somatosensory stimulation with sham (Alwhaibi et al. (2022); Seim et al. (2021); Seo et al. (2020)). One RCT compared peripheral Nerve Stimulation combined with other interventions with task-specific training or sham (Fleming et al. (2015)). Two RCTs compared peripheral Nerve Stimulation combined with other interventions with sham or task-specific training (Sullivan et al. (2012); McDonnell et al. (2007)). Two RCTs compared intermittent pneumatic compression with conventional therapy (Kabbash S.I. et al. (2022); Roper et al. (1999)). One RCT compared peripheral Nerve Stimulation with no treatment (Wu et al. (2006)). One RCT compared non-electrical somatosensory stimulation with no treatment (Sim et al. (2015)). One RCT compared intermittent pneumatic compression with sham (Cambier et al. (2003)). One RCT compared different approaches to non-electrical somatosensory stimulation (Carey et al. (2011)). Four RCTs compared non-electrical somatosensory stimulation with conventional therapy (Parikh et al. (2022); Derakhshanfar et al. (2020); Choi et al. (2017); Hunter et al. (2011)). Three RCTs compared peripheral magnetic stimulation with sham (Fawaz et al. (2023); Ke et al. (2022); Krewer et al. (2014)). One RCT compared peripheral Nerve Stimulation combined with other interventions with sham or fes or task-specific training (Conforto et al. (2021)). One RCT compared nerve pulsed radiofrequency combined with other interventions with steroids (Kim & Chang (2021)). One RCT compared peripheral Nerve Stimulation combined with other interventions with conventional therapy (Sui et al. (2021)). One RCT compared transcutaneous auricular vagus nerve stimulation (tVNS) combined with other interventions with sham or robotics (Chang J.L. et al. (2021)). Two RCTs compared peripheral magnetic stimulation with conventional therapy (Fujimura et al. (2024); Jiang et al. (2022)). One RCT compared transcutaneous laser therapy combined with other interventions with stretching and positioning programs (Korkmaz et al. (2022)). Two RCTs compared transcutaneous auricular vagus nerve stimulation (tVNS) with sham (Li et al. (2022b); Wu et al. (2020)). One RCT compared peripheral Nerve Stimulation combined with other interventions with sham or mental practice (Brihmat et al. (2023)). One RCT compared peripheral magnetic stimulation combined with other interventions with conventional therapy (Qin et al. (2023)). One RCT compared transcutaneous laser therapy with

conventional therapy (Abdelhakiem et al. (2024)). One RCT compared peripheral magnetic stimulation combined with other interventions with sham or theta burst stimulation (tbs) (Chang et al. (2024b)). One RCT compared therapeutic ultrasound with sham (Inaba & Piorkowski (1972)). One RCT compared sensory stimulation combined with other interventions with sham or exoskeleton robotics (Egger et al. (2024)). One RCT compared transcutaneous auricular vagus nerve stimulation (tVNS) combined with other interventions with transcutaneous auricular vagus nerve stimulation (tVNS) or task-specific training (Badran et al. (2023)). One RCT compared peripheral Nerve Stimulation combined with other interventions with sham or conventional therapy (Rosso et al. (2022)). One RCT compared sensory stimulation with conventional therapy (Chatterjee et al. (2019)). One RCT compared remote ischemic conditioning with sham (Li et al. (2018b)). One RCT compared transcutaneous auricular vagus nerve stimulation (tVNS) with conventional therapy (Dawson et al. (2016)). One RCT compared peripheral Nerve Stimulation with conventional therapy (Wilson et al. (2014)). One RCT compared peripheral Nerve Stimulation combined with other interventions with sham or exercise and custom physiotherapy protocols (DosSantos-Fontes et al. (2013)). One RCT compared peripheral Nerve Stimulation combined with other interventions with task-specific training (IkuNo et al. (2012)).

In addition, 24 RCTs in which additional afferent and peripheral stimulation methods formed part of a combined or comparative intervention are cross-referenced at the end of Table 27; their primary listings appear in other tables.

The methodological details and results of all 56 RCTs are presented in Table 27.

Table 27. RCTs Evaluating Additional Afferent and Peripheral Stimulation Methods for Upper Extremity Motor Rehabilitation

Authors (Year) **Study Design (PEDro Score)** **Sample Size start** **Sample Size end** **Time post stroke category** **Study design**	**Interventions** **Duration: Session length, frequency per week for total number of weeks**	**Outcome Measures** **Result (direction of effect)**
Peripheral Nerve Stimulation combined with other interventions compared to sham		
Liang et al. (2024) Pilot RCT (8) NStart=45 NEnd=45 TPS=Subacute A + B vs A/B vs 0 *Also in Table 29 (Repetitive Transcranial Magnetic Stimulation (rTMS))*	E1: Paired associative stimulation (rTMS + rPMS) + physiotherapy E2: rTMS + physiotherapy C: Sham rTMS + physiotherapy Duration: 20min/d stimulation + 40min/d 5d/wk for 4wks physiotherapy	E1/E2 vs C: FMA-UE (+exp1/2) Functional Comprehensive Assessment (+exp1/2) Barthel Index (+exp1/2) neurophysiological changes MEP latency (-) MEP amplitude (-) rMT (-) short-interval intracortical inhibition (+exp1/2) E1 vs E2: FMA-UE (-) Functional Comprehensive Assessment (-) Barthel Index (-) neurophysiological changes MEP latency (-) MEP amplitude (-) rMT (-) short-interval intracortical inhibition (-)
Sattler et al. (2015) RCT (8) NStart=20 NEnd=20 TPS=Acute A + B vs A/B	E: Repetitive peripheral nerve stimulation + anodal tDCS C: Repetitive peripheral nerve stimulation+ sham tDCS Duration: 20min/d, 5d/wk for 4wk	E vs C: Jebsen Hand Function Test (+exp) Grip Strength (-) 9 Hole Peg Test (-) Hand Tapping Test (-) Fugl-Meyer Assessment (-)

		resting motor threshold active motor threshold
Celnik et al. (2009) RCT Crossover (8) NStart=9 NEnd=9 TPS=Chronic A + B vs A/B vs 0 *Also in Table 31 (Transcranial Direct Current Stimulation (tDCS))*	E1: Peripheral Nerve Stimulation (PNS) (1Hz), + Anodal tDCS (1mA) E2: PNS + sham tDCS E3: tDCS+ sham PNS C: Sham PNS + sham tDCS Duration: 120min/d, 4d PNS + 20min/d, 4d tDCS	E1/E2/E3 vs C: Percent Change of Mean Number of Correct Key Presses (speed) (+exp1) Sleep quality-VAS (-) sleep duration (hours) (-) Subjective sequence difficulty-VAS (-) hand tiredness-VAS (-) Fatigue-VAS (-) attention-VAS (-)
Nerve pulsed radiofrequency combined with other interventions compared to nerve block		
Alanbay et al. (2020) RCT (8) NStart=30 NEnd=30 TPS=Not Reported A vs B *Also in Table 35 (Nerve Block)*	E: suprascapular nerve pulsed radiofrequency C: Suprascapular Nerve Block with lidocain Duration: 120sec at 42°C at 2 Hz, 20 ms, and 45 V PRF 1 session, SSNB; 1 injection of mL 2% lidocaine hydrochloride and 5 mL 0.9% NaCl isotonic saline solution	E vs C: Shoulder Range of Motion (+exp) Goal Assessment Scale (+exp) pain VAS (+exp)
Transcutaneous laser therapy combined with other interventions compared to interferential current therapy		
Jan et al. (2017) RCT (6) NStart=38 NEnd=38 TPS=Not Reported A vs B *Also in Table 23 (Transcutaneous Electrical Nerve Stimulation (TENS))*	E: LASER therapy C: Interferential current treatment Duration: Laser: 10min/d, 10d; IFC: 30min/d, 10d	E vs C: Visual Analog Scale -Pain (+exp) Penn Shoulder Score (PSS) pain (-) satisfaction (+exp) function (-) Shoulder Pain and Disability Index (SPADI) Pain (+exp) disability (-)
Peripheral magnetic stimulation combined with other interventions compared to low-frequency rtms		
Chen et al. (2020a) RCT (7) NStart=40 NEnd=35 TPS=Subacute A vs B *Also in Table 29 (Repetitive Transcranial Magnetic Stimulation (rTMS))*	E: Functional Magnetic Stimulation (applied peripherally) C: Low-Frequency rTMS Duration: 5x/wk, 2wks	E vs C: Fugl-Meyer Assessment (+exp) Barthel Index (+exp)
Sensory stimulation compared to sham		
Kattenstroth et al. (2018) RCT (4) NStart=71 NEnd=46 TPS=Acute A vs 0	E: Repetitive Sensory Stimulation C: Sham Repetitive Sensory Stimulation Duration: 45min/d, 5d/wk for 2w	E vs C: Normalized performance index sensory (+exp) motor (-) proprioception (-) everyday (-) Tactile Discrimination with von Frey filaments (+exp) Grating Orientation Task (+exp) JAMAR Grip Strength (+exp) 9 Hole Peg Test (-) Jebsen Taylor Hand Function Test (-)

		Joint Position Sense Test (-)
Sensory stimulation combined with other interventions compared to sham or task-specific training		
Ghaziani et al. (2018) RCT (7) NStart=102 NEnd=98 TPS=Acute A + B vs A/B *Also in Table 4 (Task-Specific Training)*	E: High-dose electrical somatosensory stimulation + task oriented training C: Sham (Low dose) + task oriented training Duration: 60min/d ESS + 15min/d task-oriented training, 7d/wk, max 4wks	E vs C: BBT (-) FMA (-) grip/pinch strength (-) perceptual threshold of touch (-) pain in the arm (-) modified rankin scale (-)
Peripheral Nerve Stimulation compared to sham		
Olczak & Truszczynska-Baszak (2022) RCT Crossover (7) NStart=29 NEnd=29 TPS=Subacute A vs 0	E: Tipstim glove C: Placebo tipstim glove Duration: 60min/d, 5d, 1wk - 9d washout	E vs C: Stabilized position Hz wrist (+con) ROM wrist Finger 5 HZ (+con) ROM Finger 4 Hz (+con) ROM Finger 3 Hz (+con) ROM (+con) Finger 2 Hz (+con) ROM (+con) Finger 1 Hz ROM (+con) grip strength (+con) E vs C: Unstabilized position Hz wrist (+con) ROM wrist (+con) Finger 5 HZ (+con) ROM (-) Finger 4 Hz (+con) ROM (-) Finger 3 Hz (+con) ROM (+con) Finger 2 Hz (+con) ROM (+con) Finger 1 Hz (-) ROM (+con) grip strength (+con)
Pan et al. (2018b) RCT (6)	E: Peripheral electrical stimulation + routine hand function training	E vs C: FMA (-)

NStart=12 NEnd=12 TPS=Chronic A vs 0	C: Sham peripheral electrical stimulation + routine hand function training Duration: 40min/d, 2d/wk for 8wks	corticomuscular coherence (eeg) (+exp)
Liu et al. (2017) RCT Crossover (7) NStart=32 NEnd=32 TPS=Chronic A vs 0	E: Peripheral nerve electrical stimulation C: Sham Duration: 1hr, 1x, 1wk washout	E vs C: Pinch strength (-) Purdue dexterity score (+exp) MEP amplitude
Klaiput et al. (2009) RCT (7) NStart=20 NEnd=20 TPS=Acute A vs 0	E: Simultaneous median and ulnar stimulation (PNES) C: Sham stimulation Duration: 2hr session	E vs C: ARAT (-) Pinch strength (+exp)
Celnik et al. (2007) RCT Crossover (6) NStart=9 NEnd=9 TPS=Chronic A1 vs A2 vs 0	E1: SynchroNous PNS E2: asynchroNous PNS C: No stimulation Duration: 2hr/d, 2 d	E1 vs E2 vs C: Jebsen-Taylor Hand Function Test (+exp) Resting motor threshold (-) MEP amplitude (-) Short intracortical inhibition (+exp) intracortical facilitation (-)
Conforto et al. (2002) RCT Crossover (6) NStart=8 NEnd=8 TPS=Chronic A vs 0	E: Medial nerve (somatosensory) stimulation C: Sham stimulation Duration: 2h session	E vs C: Pinch muscle strength (+exp)
Non-electrical somatosensory stimulation compared to sham		
Alwhaibi et al. (2022) RCT (5) NStart=40 NEnd=37 TPS=Chronic A vs 0	E: Somatosensory Stimulation via Compressive Therapy (Inflatable Splint) + Exercise C: Sham Electrical Stimulation + Exercise Duration: 90min, 6x/wk, for 6wk	E vs C: Box and Block Test (BBT) (-) Perdue Pegboard Test (PPT) (-) Nottingham Sensory Assessment Scale (NSA) (-)
Seim et al. (2021) Pilot RCT (5) NStart=16 NEnd=16 TPS=Chronic A vs 0	E: VTS Glove wearable stimulation device C: Sham Glove Duration: 3hr/d, 7d/wk, 8wks	E vs C: Semmes Weinstein Monofilament Exam (+exp) Modified Ashworth Scale - Fingers (+exp) Range of Motion (No stats)
Seo et al. (2020) RCT Crossover (7) NStart=26 NEnd=25 TPS=Chronic A vs 0	E: Peripheral Sensory Stimulation (TheraBracelet Vibratory Stimulation) C: Sham Stimulation (vibration at 1% of sensory threshold) Duration: 8h/d, 7d/wk, 4wks -2wk washout	E vs C: Nine Hole Peg Test (+exp) Grip Strength (+exp) 2-point discrimination (+exp) monofilament test (-) modified Ashworth (-) Pain VAS (-) Wrist circumference swelling (-)

Peripheral Nerve Stimulation combined with other interventions compared to task-specific training or sham		
Fleming et al. (2015) RCT (6) NStart=33 NEnd=21 TPS=Chronic A + B vs A/B *Also in Table 4 (Task-Specific Training)*	E: Somatosensory (peripheral nerve) stimulation + task specific training C: Sham stimulation + task specific training Duration: 2h/d, 3d/wk for a total of 12 sessions of somatosensory stimulation (TENs); 30mins/d, 3d/wk for a total of 12 sessions of task-specific training	E vs C: ARAT grasp (+exp) grip (+exp) pinch (+exp) gross (+exp) FMA (-) MAI Amount of use (-) Quality (-9) Goal attainment scale (-)
Peripheral Nerve Stimulation combined with other interventions compared to sham or task-specific training		
Sullivan et al. (2012) RCT (8) NStart=43 NEnd=38 TPS=Chronic A + B vs A/B *Also in Table 4 (Task-Specific Training)*	E: Repetitive task exercise + sensory amplitude electrical stimulation (SES) C: repetitive task exercise + Sham stimulation Duration: 30min, 2x/d, 4wk	E vs C: Arm Motor Ability Test (-) median time (-) Fugl-Meyer Assessment (-) time difference (-) Motor Activity Log-14 (-) Nottingham Stereognosis Assessment (-) Perceptual Threshold Test – Electrical Stimulation (-) Stroke Impact Scale-16 (-)
McDonnell et al. (2007) Pilot RCT (8) NStart=20 NEnd=20 TPS=Subacute A + B vs A/B *Also in Table 4 (Task-Specific Training)*	E: Task-specific training + Peripheral Nerve Stimulation C: Task-specific training + Sham Stimulation Duration: 1h stim + 1h task-specific/d, 3d/wk for 3wk	E vs C: Corticospinal Excitability: (-) Fugl-Meyer Assessment (-) Action Research Arm Test (-) Grip lift task (+exp) Motor Activity Log (-) Grip strength (-) Tapping speed (-) Resting Motor Threshold (-) MEP Parameters Other EMG parameters (-)
Intermittent pneumatic compression compared to conventional therapy		
Kabbash S.I. et al. (2022) RCT (5) NStart=40 NEnd=40 TPS=Chronic A vs 0	E: Intermittent Pneumatic compressions + physical therapy plan C: Physical therapy plan Duration: 60min/d(30min compressions, 30min conventional therapy), 3d/wk, 6wks	E vs C: WMFT (+exp) QEEG (+exp)
Roper et al. (1999) RCT (7) NStart=43 NEnd=37 TPS=Subacute A vs 0	E: Intermittent pneumatic compression + standard physiotherapy C: Standard physiotherapy alone Duration: 2hr, 2x/d, 1mo	E vs C: Hand volume (-) Motricity index (-)
Peripheral Nerve Stimulation compared to no treatment		
Wu et al. (2006) RCT Crossover (4) NStart=9	E1: Paretic hand peripheral nerve (somatosensory) stimulation	E1 vs E2 vs C: Jebsen Taylor Hand Function Test (+exp)

NEnd=9 TPS=Chronic A1 vs A2 vs 0	E2: Paretic leg peripheral nerve (somatosensory) stimulation C: No stimulation Duration: 2hr, 1x	
Non-electrical somatosensory stimulation compared to no treatment		
Sim et al. (2015) RCT Crossover (3) NStart=14 NEnd=11 TPS=Chronic A1 vs A2 vs 0	E1: Vibratory Somatosensory Stimulation E2: Light Touch Somatosensory Stimulation (Brush) E3: Rough Touch Somatosensory Stimulation (Sand Paper) C: No Stimulation Duration: 5min, 1 condition/d, 4d	E1/E2/E3 vs C: Box and Block Test (+exp1,+exp2,+exp3) Jebsen-Taylor Hand Function Test (+exp1,+exp2,+exp3) Grip Strength (+exp1,+exp2) E1 vs E2 vs E3: Box and Block Test (-) Jebsen-Taylor Hand Function Test (+exp1>exp3) Grip Strength (+exp1>exp2) kinematic measures
Intermittent pneumatic compression compared to sham		
Cambier et al. (2003) RCT (5) NStart=23 NEnd=23 TPS=Subacute A vs 0	E: Intermittent pneumatic compression + conventional physiotherapy C: Sham short wave therapy + conventional physiotherapy Duration: 30min/d, 5d/wk for 4w	E vs C: Nottingham Sensory Assessment (+exp) Fugl-Meyer Assessment (+exp) Ashworth scale (-) Pain Visual Analogue Scale (-)
Different approaches to non-electrical somatosensory stimulation compared against one another		
Carey et al. (2011) RCT (8) NStart=50 NEnd=50 TPS=Chronic A1 vs A2	E: Generalized somatosensory discrimination training C: Repeated exposure to sensory stimuli Duration: 60min/d, 3d/wk for 4wk	E vs C: Standardized sensory deficit index Fabric match test: (+exp) Wrist position sense test: (+exp) Finger position sense test: (+exp) Function tactile object recognition test: (+exp)+ tactile discrimination test + WEST hand monofilament + temperature discrimination
Non-electrical somatosensory stimulation compared to conventional therapy		
Parikh et al. (2022) RCT (6) NStart=24 NEnd=22 TPS=Chronic A vs 0	E: myofascial release + conventional physiotherapy program C: conventional physiotherapy program Duration: 6min/d myofascial release; 30-40min/d, 6d/wk, 4wks conventional therapy	E vs C: MAS biceps brachii (+exp) pronator teres (+exp) long finger flexor (+exp) FMA-UE (+exp)
Derakhshanfar et al. (2020) RCT (7) NStart=60 NEnd=60 TPS=Chronic A vs 0	E: Modified Roods Approach (Brushing, Icing, Stretching, Weight Bearing) C: Conventional Therapy Duration: 45min/d, 4d/wk, 6 wks	E vs C: Fugl-Meyer Assessment (+exp) Barthel Index (+exp) Modified Ashworth Scale (+exp)
Choi et al. (2017) Pilot RCT (4) NStart=10 NEnd=10 TPS=Chronic	E: Vibratory stimulation C: Conventional PT Duration: 30min/session, 3x/wk, 4wks	E vs C: BBT (+exp) Grip strength (-) Weinstein monofilament test

A vs 0		
Hunter et al. (2011) Pilot RCT (7) NStart=76 NEnd=75 TPS=Subacute A1 vs A2 vs 0	E1: Conventional therapy + 30min Mobilisation and Tactile Stimulation (MTS) E2: Conventional therapy + 60min MTS E3: Conventional therapy + 120min MTS C: Conventional therapy Duration: E1: 30min, E2: 60min, E3: 120min, 5d/wk, 2wk	E1/E2/E3 vs C: Motricity index (-) ARAT (-)
Peripheral magnetic stimulation compared to sham		
Fawaz et al. (2023) RCT (7) NStart=80 NEnd=80 TPS=Not Reported A vs 0	E: Repetitive Peripheral Magnetic Stimulation + Conventional therapy C: Sham Repetitive Peripheral Magnetic Stimulation + Conventional therapy Duration: 30min/d rPMS + 40 min/d of occupational therapy, 5d/wk, 3wks	E vs C: FMA-UE (+exp) Muscle Cross-sectional area (no stat) FIM (+exp) AROM (no stat) Modified Ashworth scale (+exp)
Ke et al. (2022) RCT (6) NStart=30 NEnd=26 TPS=Acute A vs 0	E: high frequency rPMS + conventional treatment C: sham rPMS + conventional treatment Duration: 30min/d, 10d	E vs C: FMA-UE (+exp) proxima (+exp) wrist (-) hand (+exp) coordination (-) FMA-LE (+exp) MRC; proximal-UE (+exp) distal-UE (-) proximal-LE (+exp) distal-LE (+exp)
Krewer et al. (2014) RCT (8) NStart=63 NEnd=44 TPS=Chronic A vs 0	E: Repetitive peripheral magnetic rpMS 5000 stim at 25Hz stimulation C: Sham stimulation Duration: 20min/d, 2d/wk, 2wk	E vs C: Modified tardieu scale (-) Fugl-Meyer Assessment (-) HAMD
Peripheral Nerve Stimulation combined with other interventions compared to sham or fes or task-specific training		
Conforto et al. (2021) RCT (6) NStart=38 NEnd=25 TPS=Chronic A + B + C vs A/A + B *Also in Table 22 (Neuromuscular Electrical Stimulation (NMES)); Table 4 (Task-Specific Training)*	E: Repetitive peripheral sensory stimulation + functional electrical stimulation + task specific training C: Sham RPSS + FES + TST Duration: 3hrs(RPSS:1.5hrs FES:0.5hrs TST:0.75hrs), 3d/wk, 6wks	E vs C: WMFT (-) Pinch Strength (-) Grasp Strength (-) FMA (-) BI (-) BDI (-) MAI (-) mAS (-) SIS (-) ROM - wrist (-)
Nerve pulsed radiofrequency combined with other interventions compared to steroids		
Kim & Chang (2021) RCT (7) NStart=20 NEnd=20 TPS=Chronic A vs B	E: Pulsed Radiofrequency + rehabilitation therapy C: Intra-articular corticosteroid injection + rehabilitation therapy Duration: rehab: 2.5hr/d, 5d/week, 8wks	E vs C: NRS (+con) ROM (+con)

Also in Table 36 (Steroids)		
Peripheral Nerve Stimulation combined with other interventions compared to conventional therapy		
Sui et al. (2021) RCT (5) NStart=120 NEnd=80 TPS=Subacute A1 vs A2 vs 0 *Also in Table 29 (Repetitive Transcranial Magnetic Stimulation (rTMS))*	E1: Ipsilesional Paired Associated Stimulation (PAS) E2: Contralesional PAS E3: Bilateral PAS C: Conventional Care Duration: 1x/d, 7d/wk, 4wks	E1/E2/E3 vs C: MEP (+exp2) RMT (+exp2) STEF (+exp1,2,3) FMA (+exp1,2,3) mBI (+exp1,2,3) E1 vs E2 vs E3: STEF (+exp3) FMA (+exp3) mBI (+exp3) MEP (+exp3) RMT (+exp3)
Transcutaneous auricular vagus nerve stimulation (tVNS) combined with other interventions compared to sham or robotics		
Chang J.L. et al. (2021) RCT (7) NStart=36 NEnd=34 TPS=Chronic A + B vs A/B *Also in Table 16 (Robotics)*	E: Transcutaneous Auricular Vagus Nerve Stimulation (taVNS) + Robotic Training C: Sham taVNS + Robotic Training Duration: 60min/d, 3d/wk, 3wks	E vs C: FMA-UE (-) MRCS (-) WMFT (-) MTS (+exp) EMG amplitude (+exp)
Peripheral magnetic stimulation compared to conventional therapy		
Fujimura et al. (2024) RCT (6) NStart=50 NEnd=46 TPS=Subacute A vs 0	E: Repetitive peripheral magnetic stimulation (rPMS) + Conventional rehabilitation C: Conventional rehabilitation Duration: 17min/d for 6wks rPMS & 180min/d 7d/wk conventional rehabilitation	E vs C: Acromio-humeral interval (AHI) (+exp) NRS-shoulder pain (-) modified Ashworth Scale shoulder adductors (-) elbow flexors (-) AROM (-) FMA-UE (-) shoulder/elbow/forearm (-) wrist (-) hand (-) coordination/speed (-)
Jiang et al. (2022) RCT (6) NStart=44 NEnd=44 TPS=Acute A vs 0	E: rPMS + conventional physiotherapy C: conventional physiotherapy/OT/NMES Duration: 7d/wk for 2wks rPMS + 60min/d, 7d/wk, 2 wks conventional therapy	E vs C: FMA-UE (+exp) BI (+exp) MAS (no stats), EMG strength-root mean square biceps brachii (+exp) triceps brachii (+exp) flexor digitorum (+exp) extensor digitorum (-) EMG tension-root mean square biceps brachii (-) triceps brachii (+exp) flexor digitorum (-) extensor digitorum (+exp)

Transcutaneous laser therapy combined with other interventions compared to stretching and positioning programs		
Korkmaz et al. (2022) RCT (6) NStart=44 NEnd=41 TPS=Chronic A + B vs A/B *Also in Table 8 (Stretching Programs)*	E: high intensity laser (HILT) + therapeutic exercise program + regular rehab C: therapeutic exercise program + regular rehab Duration: HILT: 2.5-6min/d, 3d/wk, 3wks (9 sessions); therapeutic exercise program: 5d/wk, 3wks (15 sessions)	E vs C: VAS-pain (+exp) PROM shoulder joint flexion (-) abduction (-) external rotation (+exp) SPADI (+exp) pain (+exp) disability (+exp) BRS (+exp) MAS (-) Nottingham Health Profile (+exp) pain (+exp) emotion (+exp) sleep (+exp) social (+exp) physical (+exp) energy (-) FIM (+exp) PTRCT (+exp)
Transcutaneous auricular vagus nerve stimulation (tVNS) compared to sham		
Li et al. (2022b) RCT (9) NStart=60 NEnd=59 TPS=Acute A vs 0	E: Transcutaneous auricular vagus nerve stimulation + conventional rehab C: Sham TA-VNS + conventional rehab Duration: 20min/d, 5d/wk, 4wks	E vs C: WMFT score (+exp) time (+exp) FMA-UE (+exp) FMA-LE (+exp) FMA-sensory (+exp) SIS (-) HADS anxiety (+exp) depression (+exp)
Wu et al. (2020) Pilot RCT (7) NStart=21 NEnd=21 TPS=Subacute A vs 0	E: Transcutaneous Auricular Vagus Nerve Stimulation C: Sham Duration: 30 min/d stimulation + 30 min/d conventional rehabilitation, 15d	E vs C: Fugl-Meyer Assessment (+exp) Wolf Motor Function Test (+exp) Functional Independence Measurement (+exp) Brunnstrom Stage (-)
Peripheral Nerve Stimulation combined with other interventions compared to sham or mental practice		
Brihmat et al. (2023) RCT Crossover (6) NStart=25 NEnd=24 TPS=Chronic A + B + C vs A/A + B *Also in Table 11 (Mental Practice); Table 29 (Repetitive Transcranial Magnetic Stimulation (rTMS))*	E1: Paired associative stimulation (PAS) + Motor imagery (MI) E2: PAS C: Sham PAS + MI Duration: 15min/d, 1d/wk for 3wks - 1wks washout between sessions	E1/E2 vs C: MEPs (-) aROM (-)

Peripheral magnetic stimulation combined with other interventions compared to conventional therapy		
Qin et al. (2023) RCT (5) NStart=61 NEnd=49 TPS=Subacute A + B vs A/B vs 0 *Also in Table 29 (Repetitive Transcranial Magnetic Stimulation (rTMS))*	E1: Low-frequency rTMS (LF-rTMS) + peripheral repetitive magnetic stimulation (rPMS) + routine rehabilitation E2: LF-rTMS + routine rehabilitation C: Routine rehabilitation Duration: 5d/wk for 8wks	E1/E2 vs C: fMRI (+exp1) mAS (+exp1) FMA-UE (+exp1/2) mBI (+exp1/2) E1 vs E2: fMRI (+exp1) mAS (+exp1) FMA-UE (+exp1) mBI (+exp1)
Transcutaneous laser therapy compared to conventional therapy		
Abdelhakiem et al. (2024) RCT (5) NStart=44 NEnd=44 TPS=Chronic A vs 0	E: High intensity laser therapy (HILT) + therapeutic exercises C: Conventional exercise program Duration: E: 3d/wk for 3wks laser therapy (2minx8 locations)+ 3d/wk for 3wks exercise program, C: 3d/wk for 3wks conventional exercises	E vs C: McGill Pain Questionnaire (+exp) University of California Los Angeles (UCLA) functional scale (+exp) hand grip strength (+exp)
Peripheral magnetic stimulation combined with other interventions compared to sham or theta burst stimulation (tbs)		
Chang et al. (2024b) RCT (9) NStart=28 NEnd=28 TPS=Not Reported A + B vs A/B *Also in Table 30 (Theta Burst Stimulation (TBS))*	E: Repetitive peripheral magnetic stimulation (rPMS) + iTBS + rehabilitation C: sham rPMS + iTBS + rehabilitation Duration: 5d/wk for 2wks	E vs C: FMA-UE (-) ARAT (-) gross movement (-) grasp (-) grip (-) pinch (-) FIM self care (-) SIS (-) strength (-) memory and thinking (-) emotion (-) communication (-) ADL (-) mobility (-) hand function (-) participation (-)
Therapeutic ultrasound compared to sham		
Inaba & Piorkowski (1972) RCT (5) NStart=33 NEnd=32 TPS=Subacute A + B vs A/B	E1: Ultrasound + positioning ecercise (ROM exercise and arm poistioning) E2: Sham US + positioning ecercise (ROM exercise and arm poistioning) C: positioning ecercise (ROM exercise and arm poistioning) Duration: 3x/d, for 4wks	E1/E2 vs C: Shoulder range of motion (-)
Sensory stimulation combined with other interventions compared to sham or exoskeleton robotics		
Egger et al. (2024) Pilot RCT (9) NStart=41 NEnd=37 TPS=Subacute	E: Repetitive sensory stimulation + Robot-assisted arm training C: Sham stimulation + Robot-assisted arm training	E vs C: FMA-UE (-) motor (-) sensoric (-) RoM, pain (-)

A + B vs A/B *Also in Table 16 (Robotics)*	Duration: 45-60min/d stimulation + 45min/d robotic training, 4d/wk for 3wks	BBT (-) Stroke Upper Limb Capacity Scale (SULCS) (-) grip strength (-) level of touch threshold-von Frey filaments distal thumb (-) index finger (-) thenar (-) two point discrimination test distal thumb (-) index finger (-) thenar (-)
Transcutaneous auricular vagus nerve stimulation (tVNS) combined with other interventions compared to transcutaneous auricular vagus nerve stimulation (tVNS) or task-specific training		
Badran et al. (2023) Pilot RCT (7) NStart=20 NEnd=16 TPS=Chronic A + B1 vs A + B2 *Also in Table 4 (Task-Specific Training)*	E: EMG paired taVNS + TST C: Active unpaired taVNS + TST Duration: 120min/d(60m electrical stimulation, 60m TST), 3d/wk, 4wks	E vs C: FMA-UE (-) WMFT (-)
Peripheral Nerve Stimulation combined with other interventions compared to sham or conventional therapy		
Rosso et al. (2022) Pilot RCT (7) NStart=28 NEnd=27 TPS=Chronic A + B vs 0 *Also in Table 29 (Repetitive Transcranial Magnetic Stimulation (rTMS))*	E: Cerebello-Motor paired associated stimulation (PAS) + physiotherapy C: Sham + physiotherapy Duration: 120 stimulations/day, 5 days/wk, 1 wk	E vs C: JTT (-) Grip strength (-)
Sensory stimulation compared to conventional therapy		
Chatterjee et al. (2019) Pilot RCT (5) NStart=40 NEnd=40 TPS=Acute A vs 0	E: Repetitive sensory stimulation (RSS glove) + Usual care C: Usual Care Duration: 45min/d, 7d/wk, for 2wks	E vs C: Action Research Arm Test (no stats) Fugl-Meyer Assessment UE (no stats) 9 Hole Peg Test (no stats)
Remote ischemic conditioning compared to sham		
Li et al. (2018b) Pilot RCT (7) NStart=68 NEnd=60 TPS=Acute A vs 0	E: Limb Ischemic Post-Conditioning C: Sham treatment Duration: 5min alternating inflation and deflation, 4cycles/d; 2wks	E vs C: Relative regional CBF (+exp) NIHSS (+exp) mean transit time (blood flow) (+exp) modfied Rankin Scale (+exp) Cerebral infarct volume (+exp)
Transcutaneous auricular vagus nerve stimulation (tVNS) compared to conventional therapy		
Dawson et al. (2016) Pilot RCT (6) NStart=20 NEnd=20 TPS=Chronic	E: Vagus Nerve Stimulation +rehab C: Conventional care Duration: Conventional care: 2hr/d, 3x/wk, 6 wk	E vs C: Fugl-Meyer Assessment Upper extremity (-) Action Research Arm Test (-) Grip Strength (-)

A vs 0		Pinch Strength (-) Stroke Impact Scale (-) Box and Block Test (-) 9-Hole Peg Test (-)
Peripheral Nerve Stimulation compared to conventional therapy		
Wilson et al. (2014) Pilot RCT (6) NStart=25 NEnd=22 TPS=Chronic A vs 0	E: peripheral nerve stimulation C: usual care Duration: 6hr, 1x/d, 3wk stimulatin & 8hr usual care over 4wk	E vs C: Brief Pain Inventory (+exp) health-related quality of life (SF-36v2) (+exp) Fugl-Meyer Motor Assessment (-) isometric shoulder abduction strength (-) pain-free shoulder external rotation range of motion (-) delay in EMG initiation (-) delay in EMG termination (-)
Peripheral Nerve Stimulation combined with other interventions compared to sham or exercise and custom physiotherapy protocols		
DosSantos-Fontes et al. (2013) Pilot RCT (8) NStart=20 NEnd=20 TPS=Chronic A + B vs A/B *Also in Table 3 (Exercise and Strength Training)*	E: Repetitive peripheral nerve sensory stim (RPSS) + Motor Training C: Sham + Motor Training Duration: 2h/d RPSS prior to motor training for 4wk	E vs C: Feasibility: Compliance (+exp) Jebsen taylor hand function test (+exp)
Peripheral Nerve Stimulation combined with other interventions compared to task-specific training		
IkuNo et al. (2012) Pilot RCT (7) NStart=22 NEnd=22 TPS=Subacute A + B vs A/B *Also in Table 4 (Task-Specific Training)*	E: PNES + Task Specific Training C: Task-Specific Training Duration: 60min/d, 6d/wk; 2wk	E vs C: WMFT (-) BBT (-) Pinch strength (-) Grip strength (-)
Cross-Referenced RCTs: Combined or Comparative Interventions Involving Additional Afferent and Peripheral Stimulation Methods (results included in this table's levels of evidence)		
Jiang et al. (2023) RCT (7) NStart=60 NEnd=56 TPS=Acute A + B vs A vs B *Primary listing: Table 30 (Theta Burst Stimulation (TBS))*	E1: iTBS + peripheral magnetic stimulation + conventional rehab E2: iTBS + sham peripheral stimulation + conventional rehab C: peripheral magnetic stimulation + central sham stimulation + conventional rehab Duration: 3min20s/d iTBS + 7min20s/d peripheral stimulation + 40min/d conventional rehab, 5d/wk, 4wks	E1/E2 vs C: FMA-UE (+exp1) MBI (+exp1) ARAT (+exp1) MAS (-) E1 vs E2: FMA-UE (+exp1) MBI (+exp1) ARAT (+exp1) MAS (-) E2 vs C: FMA-UE (+con) MBI (+con) ARAT (+con) MAS (-)

Yague et al. (2023) RCT (8) NStart=19 NEnd=18 TPS=Acute A + B vs A/B *Primary listing: Table 31 (Transcranial Direct Current Stimulation (tDCS))*	E: Bihemispheric tDCS + Repetitive Peripheral Nerve Stimulation + Conventional Therapy C: Sham tDCS + Repetitive Peripheral Nerve Stimulation + Conventional Therapy Duration: tDCS and peripheral nerve stimulation (20min/d, 5 days); Conventional therapy for length of stay until minimum 3 months after discharge starting 5 days after stroke	E vs C: FMA-UE (-) Modified Ashworth Scale (-) MEP (-) Hmax/Mmax (-) N20 amp (-) rMT (-) cSP (-) iSP (-)
de Freitas Zanona A. et al. (2023) RCT (8) NStart=36 NEnd=36 TPS=Subacute A + B + C + D vs A + B + C vs A vs 0 *Primary listing: Table 29 (Repetitive Transcranial Magnetic Stimulation (rTMS))*	E1: rTMS + Sham TENS with Mirror therapy and Nonelectrical somatosensory stimulation E2: Sham rTMS + TENS with Mirror therapy and Nonelectrical somatosensory stimulation E3: rTMS + TENS with Mirror therapy and Nonelectrical somatosensory stimulation C: Sham rTMS + Sham TENS with Mirror therapy and Nonelectrical somatosensory stimulation Duration: 80mins/d (20 mins of rTMS, 15 mins of Nonelectrical somatosensory stimulation, 45 minutes of mirror therapy with TENS); 5d/wk, 2wks	E1 vs E2 vs E3 vs C: MEP amplitude (-) somatosensory evoked potential (-) ASY index (no stat)
Wu X. et al. (2023) RCT (7) NStart=60 NEnd=60 TPS=Subacute A + B vs A vs B vs 0 *Primary listing: Table 29 (Repetitive Transcranial Magnetic Stimulation (rTMS))*	E1: HF-rTMS + cervical nerve root magnetic stimulation E2: HF-rTMS + sham cervical nerve root magnetic stimulation E3: Sham HF-rTMS + cervical nerve root magnetic stimulation C: Sham HF-rTMS + Sham cervical nerve root magnetic stimulation Duration: E1,E2,E3 (1 session/d, 5ds/wk, 3wks); Conventional therapy (60 mins/d, 5ds/wk, 3wks);	E1 vs C: FMA-UE (+exp1) WMFT (+exp1) mBI (+exp1) Brunnstrom Stage of Recovery (-) E1 vs E2: FMA-UE (-) WMFT (+exp1) mBI (-) Brunnstrom Stage of Recovery (-) E1 vs E3: FMA-UE (-) WMFT (+exp1) mBI (+exp1) Brunnstrom Stage of Recovery (-) E2 vs C: FMA-UE (-) WMFT (+exp2) mBI (-) Brunnstrom Stage of Recovery (-) E2 vs E3: FMA-UE (-) WMFT (-) mBI (-) Brunnstrom Stage of Recovery (-) E3 vs C: FMA-UE (-) WMFT (+exp3) mBI (-) Brunnstrom Stage of Recovery (-)

Cordo et al. (2022) RCT (7) NStart=83 NEnd=70 TPS=Subacute A + B vs 0 *Primary listing: Table 16 (Robotics)*	E: Assisted Motion, Biofeedback, and Antagonist Muscle Vibration delivered by a Robotic Device + UL rehabilitation C: Placebo intervention + UL rehabilitation Duration: 30min/d, 2-3d/wk, 6-9wks (18 sessions)	E vs C: FMA-UL (+exp) SIS (-) MAS (-) RLA (-) AROM wrist (-) grasp strength flexor (-) extensor (-) wrist strength flexor (+exp) extensor (-)
Alazab I.M. et al. (2022) RCT (2) NStart=60 NEnd=60 TPS=Subacute A vs B vs 0 *Primary listing: Table 22 (Neuromuscular Electrical Stimulation (NMES))*	E1: Neuromuscular electrical stimulation (NMES) + Conventional therapy E2: Peripheral Pulse Electromagnetic Waves (rPMS) + Conventional therapy C: Conventional therapy Duration: 20min/d, 2d/wk, 8wks	E1 vs E2: Supraspinatus EMG amplitude (+exp2) Deltoid EMG amplitude (+exp2) FMA-UE (-) E1 vs C: Supraspinatus EMG amplitude (+exp) Deltoid EMG amplitude (-) FMA-UE (-) E2 vs C: Supraspinatus EMG amplitude (+exp2) Deltoid EMG amplitude (+exp2) FMA-UE (+exp2)
He et al. (2022) Pilot RCT (8) NStart=40 NEnd=40 TPS=Subacute A vs B *Primary listing: Table 5 (Sensorimotor Training)*	E: Proprioceptive Training (involving passive and active movements with visual feedback) C: Nonspecific sensory stimulation Duration: 30min/d, 5d/wk, 4wks	E vs C: FMA; - UE-M (+exp) UE-S (+exp) BBT (-) TLT (+exp) BI (-)
de Freitas Zanona A. et al. (2022) Pilot RCT (8) NStart=40 NEnd=40 TPS=Subacute A + B + C + D vs A + B + C vs A vs 0 *Primary listing: Table 29 (Repetitive Transcranial Magnetic Stimulation (rTMS))*	E1: rTMS + Sham TENS with Mirror therapy and Nonelectrical somatosensory stimulation E2: Sham rTMS + TENS with Mirror therapy and Nonelectrical somatosensory stimulation E3: rTMS + TENS with Mirror therapy and Nonelectrical somatosensory stimulation C: Sham rTMS + Sham TENS with Mirror therapy and Nonelectrical somatosensory stimulation Duration: 130min/d(20min rTMS, 25min sensory training, 40 min mirror therapy, 45min TENS), 5d/wk, 2wks	E1/E2/E3 vs C: FMA-UE; - Motor (+exp1, +exp3); - Sensory (+exp1, +exp2, +exp3) NSA (-) BBT (-) MAL; - QOM (+exp1, +exp3); - AOM (+exp3) JTT (+exp3) FIM (+exp3) self care (-)
Pundik et al. (2021) RCT Crossover (7) NStart=16 NEnd=16 TPS=Chronic A + B1 vs A + B2 vs A	E1: High-Frequency rTMS (5-Hz) + Peripheral Somatosensory Stimulation (sensory level electrical stimulation + vibratory stimulation) E2: Low-Frequency rTMS (1-Hz) + Peripheral Somatosensory Stimulation C: Sham rTMS + Peripheral Somatosensory Stimulation	E1 vs E2: Two-Point Discrimination (+exp1) Proprioception (-) Somatosensory Evoked Potential (+exp1) E1 vs C: Two-Point Discrimination (+exp1) Proprioception (-)

Primary listing: Table 29 (Repetitive Transcranial Magnetic Stimulation (rTMS))	Duration: single session	Somatosensory Evoked Potential (+exp1) E2 vs C: Two-Point Discrimination (-) Proprioception (-) Somatosensory Evoked Potential (-) vibration perception threshold
Seo et al. (2019) Pilot RCT (9) NStart=12 NEnd=12 TPS=Chronic A + B vs A/B *Primary listing: Table 4 (Task-Specific Training)*	E: task practice therapy with TheraBracelet stimulation C: task practice therapy with sham stimulation Duration: 2hr, 3x/wk, 2wk	E vs C: Box and Block Test: (+exp) Wolf Motor Function Test: (-)
Tarri et al. (2018) RCT (6) NStart=28 NEnd=24 TPS=Subacute A + B vs A/B *Primary listing: Table 29 (Repetitive Transcranial Magnetic Stimulation (rTMS))*	E: Paired associative stimulation (peripheral electrical stimulation to ECR muscle + low frequency (1Hz) rTMS to motor cortex) C: Active peripheral electrical stimulation + Sham cortical stimulation Duration: 30min stim + 2hr conventional/d, 5d	E vs C: Fugl-Meyer Assessment (-) motor evoked potential (MEP) surface area of the ECR muscle (-)
Menezes et al. (2018) RCT Crossover (8) NStart=22 NEnd=20 TPS=Chronic A + B vs A vs B vs 0 *Primary listing: Table 31 (Transcranial Direct Current Stimulation (tDCS))*	E1: Active repetitive peripheral nerve sensory stimulation (RPPS) + sham tDCS E2: Sham RRPS + Anodal tDCS E3: Active RRPS + active tDCS C: Sham RRPS + sham tDCS Duration: 1 (2hrs RPPS, 20min tDCS) /session, 10-15d washout	E1 vs C: Active Wrist Range of Motion (Flexion, Extension): (-) Grip and Pinch Strength: (-) E2 vs C: Active Wrist Range of Motion (Flexion, Extension): (-) Grip and Pinch Strength (-) E3 vs C: Active Wrist Range of Motion (Flexion, Extension): (-) Grip and Pinch Strength: (-) E1 vs E2 vs E3: Active Wrist Range of Motion (Flexion, Extension): (-) Grip and Pinch Strength: (-)
Carrico et al. (2018) RCT (9) NStart=55 NEnd=55 TPS=Chronic A + B vs A/B *Primary listing: Table 4 (Task-Specific Training)*	E: Somatosensory Stimulation (PNS) + Intensive Task-Oriented Training C: Sham Stimulation + Intensive Task-Oriented Training Duration: 2hrs stimulation, 4hrs training, 3x/wk, 6wks	E vs C: Fugl-Meyer Assessment (-) Wolf Motor Function Test (+exp) Action Research Arm Test (+exp) Stroke Impact Scale (-)
Capone et al. (2017) RCT (6) NStart=14 NEnd=12 TPS=Chronic A + B vs A/B *Primary listing: Table 16 (Robotics)*	E: Robot assisted therapy with Transcutaneous stim of vagus nerve tVNS C: Robot assisted therapy with sham tVNS Duration: 1h, 1d/wk for 10d	E vs C: Fugl-Meyer Assessment (+exp) heart rate blood pressure

Wilson et al. (2016) RCT (6) NStart=122 NEnd=109 TPS=Subacute A vs B vs C *Primary listing: Table 22 (Neuromuscular Electrical Stimulation (NMES))*	E1: Cyclic Neuromuscular Electrical Stimulation E2: Electromyographically-triggered Neuromuscular Electrical Stimulatiom E3: Sensory Stimulation Duration: 40 min (2x/d), 5d/wk, 8 wk	E1 vs E2 vs E3: Fugl-Meyer Assessment (-) Modified Arm Motor Ability Task (-)
Carrico et al. (2016a) RCT (7) NStart=21 NEnd=19 TPS=Chronic A + B vs A/B *Primary listing: Table 6 (Constraint-Induced Movement Therapy (CIMT))*	E: Peripheral nerve stimulation + mCIMT C: Sham PNS + mCIMT Duration: 2hrs PNS or sham then 4hrs of mCIMT 5d/wk for 2wks	E vs C: Fugl Meyer Assessment Upper Extremity: (+exp) Wolf Motor Function Test (+exp) Action Research Arm Test: (+exp)
Carrico et al. (2016b) RCT (7) NStart=37 NEnd=36 TPS=Chronic A + B vs A/B *Primary listing: Table 4 (Task-Specific Training)*	E: Peripheral nerve stimulation + task oriented training C: Sham stimulation + task oriented training Duration: 2h/d stimulation/sham, 4h/d task training, 5d/wk, for 2wks	E vs C: Fugl-Meyer Assessment (+exp) Wolf Motor Function Test (+exp) Action Research Arm Test (+exp)
Lee et al. (2015a) RCT (7) NStart=48 NEnd=47 TPS=Chronic A + B vs A/B *Primary listing: Table 10 (Mirror Therapy)*	E1: Mirror therapy + Mesh glove afferent stimulation E2: Mirror therapy E3: Mirror Therapy + Sham Duration: 90min/d, 5d/wk for 4wk	E2 vs C: FMA (-) nottingham sensory assessment (rNSA) (-) Muscle tone ED (-) FCR (-) Muscle stiffness ED (-) FCR (-) BBT affected hand (+con) 10-Meter Walk Test (-) FIM motor (+con) E1 vs C: FMA (-) rNSA (-) Muscle tone ED (-) FCR (+con) Muscle stiffness ED (-) FCR (+con) BBT affected hand (-) 10-Meter Walk Test (-) FIM motor (-) E1 vs E2: FMA (-) rNSA (-) Muscle tone ED (+exp1)

		FCR (-) Muscle stiffness ED (-) FCR (-) BBT affected hand (+exp1) 10-Meter Walk Test (-) FIM motor (+exp1)
Lin et al. (2014b) Pilot RCT (6) NStart=16 NEnd=16 TPS=Chronic A + B vs A/B *Primary listing: Table 10 (Mirror Therapy)*	E: Mirror therapy + Mesh glove C: Mirror therapy Duration: 90min/d, 5d/wk for 4wk	E vs C: Modified Ashworth Scale (-) Box and Block Test (+exp) Functional Independence Measure (-) Action Research Arm Test (+exp)
Moniruzzaman et al. (2010) RCT (4) NStart=45 NEnd=45 TPS=Subacute A vs B *Primary listing: Table 23 (Transcutaneous Electrical Nerve Stimulation (TENS))*	E1: Non invasive TENS + conventional treatment (NSAID + Exercise+ ADL instructions) E2: Ultrasound therapy + conventional treatment (NSAID + Exercise+ ADL instructions) Duration: 45min/d, 3d/wk, 5wk	E1 vs E2: Range of Motion (+exp1) Muscle strength (+exp1) Lattinen Index pain (-)
Boonsong et al. (2009) RCT (6) NStart=10 NEnd=10 TPS=Subacute A vs B *Primary listing: Table 35 (Nerve Block)*	E1: Suprascapular nerve block E2: Ultrasound Duration: 2 sessions SSNB & 5d/wk ultrasound, 4wks	E1 vs E2: Passive range of motion of flexion (-) abduction (-) VAS score of pain (+exp1)
Chae et al. (2009) RCT (7) NStart=26 NEnd=20 TPS=Chronic A vs B *Primary listing: Table 22 (Neuromuscular Electrical Stimulation (NMES))*	E: Motor electrical stimulation involving cyclic (NMES) and EMG C: Percutaneous Sensory electrical stimulation Duration: 1 hr/d, 7d/wk for 6 wks	E vs C: Fugl-Meyer Motor Assessment (-) Arm Motor Ability Test (-) EMG activation (-)
Liu et al. (2009b) Pilot RCT (4) NStart=9 NEnd=9 TPS=Chronic A + B vs A/B *Primary listing: Table 16 (Robotics)*	E: Sensory-enhanced robot-aided motor training (SERMT) C: Robot-aided motor training (RMT) Duration: 3x/wk for 6wk	E vs C: Motor status (-): Shoulder/elbow (-) wrist/hand (-)
Fischer et al. (2007) Pilot RCT (4) NStart=15 NEnd=15 TPS=Chronic A + B vs A + C vs A	E1: Cable orthosis + Virtual Reality E2: Pneumatic orthosis + Virtual Reality C: Virtual Reality Duration: 60min/d, 3d/wk, for 6wks	E1/E2 vs C: WMFT (-) BBT (-) FMA-UE (-) Rancho los amigos functional test (-) grip strength (-) Spasticity with hand manipulatory system (-)

Primary listing: Table 9 (Orthotics and Taping)		Isometric flexion (-) Isometric extension (-) Peak extension velocity (-) Extension ROM (-)

Abbreviations and table notes: C=control group; D=days; E=experimental group; H=hours; Min=minutes; RCT=randomized controlled trial; TPS=time post stroke category (Acute: less than 30 days, Subacute: more than 1 month but less than 6 months, Chronic: over 6 months); Wk=weeks.

+exp indicates a statistically significant between groups difference at α=0.05 in favour of the experimental group

+exp1/+exp2/+exp3 indicates a statistically significant between groups difference at α=0.05 in favour of the first, second or third experimental group

+con indicates a statistically significant between groups difference at α=0.05 in favour of the control group

- indicates no statistically significant between groups differences at α=0.05

1. Body Functions and Structures

MOTOR FUNCTION			
LoE	**Conclusion Statement**	**RCTs**	**References**
1b	Functional Magnetic Stimulation (applied peripherally) may produce greater improvements in motor function than Low-Frequency repetitive transcranial magnetic stimulation.	1	Chen et al. (2020a)
2	Repetitive Sensory Stimulation may not have a difference in efficacy when compared to Sham Repetitive Sensory Stimulation for improving motor function.	1	Kattenstroth et al. (2018)
1b	High-dose electrical somatosensory stimulation with task oriented training may not have a difference in efficacy when compared to Sham (Low dose) with task oriented training for improving motor function.	1	Ghaziani et al. (2018)
1a	Peripheral Nerve Stimulation may not have a difference in efficacy when compared to sham for improving motor function.	3	Pan et al. (2018b); Klaiput et al. (2009); Celnik et al. (2007)
1b	Somatosensory (peripheral nerve) stimulation with task specific training may produce greater improvements in motor function than Sham stimulation with task specific training.	1	Fleming et al. (2015)
1b	Repetitive task exercise with sensory amplitude electrical stimulation (SES) may not have a difference in efficacy when compared to repetitive task exercise with Sham stimulation for improving motor function.	1	Sullivan et al. (2012)
2	Intermittent pneumatic compression may produce greater improvements in motor function than conventional therapy.	1	Kabbash S.I. et al. (2022)
2	Paretic hand peripheral nerve (somatosensory) stimulation may produce greater improvements in motor function than No stimulation.	1	Wu et al. (2006)
2	Vibratory Somatosensory Stimulation may produce greater improvements in motor function than No Stimulation.	1	Sim et al. (2015)
2	Vibratory Somatosensory Stimulation may produce greater improvements in motor function than Light Touch Somatosensory Stimulation (Brush) or Rough Touch Somatosensory Stimulation (Sand Paper).	1	Sim et al. (2015)
2	Intermittent pneumatic compression with conventional physiotherapy may produce greater improvements in motor function than Sham short wave therapy with conventional physiotherapy.	1	Cambier et al. (2003)
1a	Non-electrical somatosensory stimulation may produce greater improvements in motor function than conventional therapy.	3	Parikh et al. (2022); Derakhshanfar et al. (2020); Hunter et al. (2011)
1a	Peripheral magnetic stimulation may produce greater improvements in motor function than sham.	3	Fawaz et al. (2023); Ke et al. (2022); Krewer et al. (2014)

1b	Repetitive peripheral sensory stimulation with functional electrical stimulation and task specific training may not have a difference in efficacy when compared to Sham RPSS with functional electrical stimulation and TST for improving motor function.	1	Conforto et al. (2021)
2	Ipsilesional Paired Associated Stimulation (PAS) may produce greater improvements in motor function than Conventional Care.	1	Sui et al. (2021)
2	Ipsilesional Paired Associated Stimulation (PAS) may result in lesser improvements in motor function when compared to Contralesional PAS or Bilateral PAS.	1	Sui et al. (2021)
1b	Transcutaneous Auricular Vagus Nerve Stimulation with Robotic Training may not have a difference in efficacy when compared to Sham transcutaneous auricular vagus nerve stimulation with Robotic Training for improving motor function.	1	Chang J.L. et al. (2021)
1a	There is conflicting evidence about the effect of Peripheral magnetic stimulation when compared to conventional therapy for improving motor function.	2	Fujimura et al. (2024); Jiang et al. (2022)
1b	Transcutaneous auricular vagus nerve stimulation with conventional rehab may produce greater improvements in motor function than Sham TA-VNS with conventional rehab.	1	Li et al. (2022b)
2	Low-frequency repetitive transcranial magnetic stimulation with peripheral repetitive magnetic stimulation (rPMS) and rehabilitation may produce greater improvements in motor function than rehabilitation.	1	Qin et al. (2023)
2	Low-frequency repetitive transcranial magnetic stimulation with peripheral repetitive magnetic stimulation (rPMS) and rehabilitation may produce greater improvements in motor function than low-frequency repetitive transcranial magnetic stimulation with rehabilitation.	1	Qin et al. (2023)
2	High intensity laser therapy (HILT) with therapeutic exercises may produce greater improvements in motor function than Conventional exercise program.	1	Abdelhakiem et al. (2024)
1b	Repetitive peripheral magnetic stimulation (rPMS) with intermittent theta burst stimulation and rehabilitation may not have a difference in efficacy when compared to sham rPMS with intermittent theta burst stimulation and rehabilitation for improving motor function.	1	Chang et al. (2024b)
1b	Cyclic Neuromuscular Electrical Stimulation may not have a difference in efficacy when compared to Electromyographically-triggered Neuromuscular Electrical Stimulatiom or Sensory Stimulation for improving motor function.	1	Wilson et al. (2016)
1b	Paired associative stimulation may not have a difference in efficacy when compared to Active peripheral electrical stimulation with Sham cortical stimulation for improving motor function.	1	Tarri et al. (2018)
1b	Mirror therapy with Mesh glove afferent stimulation may not have a difference in efficacy when compared to Mirror therapy or Mirror Therapy with Sham for improving motor function.	1	Lee et al. (2015a)
1b	Mirror therapy with Mesh glove afferent stimulation may not have a difference in efficacy when compared to Mirror therapy for improving motor function.	1	Lee et al. (2015a)
1b	Motor electrical stimulation involving cyclic (neuromuscular electrical stimulation) and electromyography may not have a difference in efficacy when compared to Percutaneous Sensory electrical stimulation for improving motor function.	1	Chae et al. (2009)
1b	Robot assisted therapy with Transcutaneous stim of vagus nerve tVNS may produce greater improvements in motor function than Robot assisted therapy with sham tVNS.	1	Capone et al. (2017)

1b	Peripheral nerve stimulation with modified constraint-induced movement therapy may produce greater improvements in motor function than Sham peripheral nerve stimulation with modified constraint-induced movement therapy.	1	Carrico et al. (2016a)
1b	Peripheral nerve stimulation with task oriented training may produce greater improvements in motor function than Sham stimulation with task oriented training.	1	Carrico et al. (2016b)
1b	Somatosensory Stimulation (peripheral nerve stimulation) with Intensive Task-Oriented Training may produce greater improvements in motor function than Sham Stimulation with Intensive Task-Oriented Training.	1	Carrico et al. (2018)
1b	Assisted Motion, Biofeedback, and Antagonist Muscle Vibration delivered by a Robotic Device with UL rehabilitation may produce greater improvements in motor function than Placebo intervention with UL rehabilitation.	1	Cordo et al. (2022)
1b	There is conflicting evidence about the effect of Intermittent theta burst stimulation with peripheral magnetic stimulation and conventional rehab when compared to peripheral magnetic stimulation with central sham stimulation and conventional rehab for improving motor function.	1	Jiang et al. (2023)
1b	Intermittent theta burst stimulation with peripheral magnetic stimulation and conventional rehab may produce greater improvements in motor function than intermittent theta burst stimulation with sham peripheral stimulation and conventional rehab.	1	Jiang et al. (2023)
1b	Bihemispheric transcranial direct current stimulation with Repetitive Peripheral Nerve Stimulation and Conventional Therapy may not have a difference in efficacy when compared to Sham transcranial direct current stimulation with Repetitive Peripheral Nerve Stimulation and Conventional Therapy for improving motor function.	1	Yague et al. (2023)
1b	High-frequency repetitive transcranial magnetic stimulation with cervical nerve root magnetic stimulation may produce greater improvements in motor function than Sham high-frequency repetitive transcranial magnetic stimulation with Sham cervical nerve root magnetic stimulation.	1	Wu X. et al. (2023)
1b	There is conflicting evidence about the effect of High-frequency repetitive transcranial magnetic stimulation with cervical nerve root magnetic stimulation when compared to high-frequency repetitive transcranial magnetic stimulation with sham cervical nerve root magnetic stimulation for improving motor function.	1	Wu X. et al. (2023)
1b	There is conflicting evidence about the effect of High-frequency repetitive transcranial magnetic stimulation with cervical nerve root magnetic stimulation when compared to Sham high-frequency repetitive transcranial magnetic stimulation with cervical nerve root magnetic stimulation for improving motor function.	1	Wu X. et al. (2023)
1b	High-frequency repetitive transcranial magnetic stimulation with sham cervical nerve root magnetic stimulation may not have a difference in efficacy when compared to Sham high-frequency repetitive transcranial magnetic stimulation with cervical nerve root magnetic stimulation for improving motor function.	1	Wu X. et al. (2023)
2	There is conflicting evidence about the effect of Neuromuscular electrical stimulation with Conventional therapy when compared to Conventional therapy for improving motor function.	1	Alazab I.M. et al. (2022)
2	Neuromuscular electrical stimulation with Conventional therapy may not have a difference in efficacy when compared to Peripheral Pulse Electromagnetic Waves (rPMS) with Conventional therapy for improving motor function.	1	Alazab I.M. et al. (2022)

1b	Repetitive peripheral nerve stimulation with anodal tDCS may not have a difference in efficacy when compared to repetitive peripheral nerve stimulation with sham tDCS for improving motor function.	1	Sattler et al. (2015)
1b	Repetitive sensory stimulation with Robot-assisted arm training may not have a difference in efficacy when compared to Sham stimulation with Robot-assisted arm training for improving motor function.	1	Egger et al. (2024)
1b	Paired associative stimulation (rTMS with rPMS) and physiotherapy may not have a difference in efficacy when compared to rTMS with physiotherapy for improving motor function.	1	Liang et al. (2024)
1b	EMG paired taVNS with TST may not have a difference in efficacy when compared to Active unpaired taVNS with TST for improving motor function.	1	Badran et al. (2023)
1b	Cerebello-Motor paired associated stimulation (PAS) with physiotherapy may not have a difference in efficacy when compared to Sham with physiotherapy for improving motor function.	1	Rosso et al. (2022)
1b	Transcutaneous auricular vagus nerve stimulation (tVNS) may produce greater improvements in motor function than sham.	1	Wu et al. (2020)
1b	Vagus Nerve Stimulation with rehab may not have a difference in efficacy when compared to Conventional care for improving motor function.	1	Dawson et al. (2016)
1b	Peripheral nerve stimulation may not have a difference in efficacy when compared to usual care for improving motor function.	1	Wilson et al. (2014)
1b	Repetitive peripheral nerve sensory stim (RPSS) with Motor Training may produce greater improvements in motor function than Sham with Motor Training.	1	DosSantos-Fontes et al. (2013)
1b	PNES with Task Specific Training may not have a difference in efficacy when compared to Task-Specific Training for improving motor function.	1	IkuNo et al. (2012)
1b	Peripheral Nerve Stimulation combined with other interventions may not have a difference in efficacy when compared to sham or task-specific training for improving motor function.	1	McDonnell et al. (2007)
1b	Proprioceptive Training (involving passive and active movements with visual feedback) may produce greater improvements in motor function than Nonspecific sensory stimulation.	1	He et al. (2022)
1b	There is conflicting evidence about the effect of rTMS with Sham TENS with Mirror therapy and Nonelectrical somatosensory stimulation when compared to Sham rTMS with Sham TENS with Mirror therapy and Nonelectrical somatosensory stimulation for improving motor function.	1	de Freitas Zanona A. et al. (2022)
1b	There is conflicting evidence about the effect of Sham rTMS with TENS with Mirror therapy and Nonelectrical somatosensory stimulation when compared to Sham rTMS with Sham TENS with Mirror therapy and Nonelectrical somatosensory stimulation for improving motor function.	1	de Freitas Zanona A. et al. (2022)
1b	RTMS with TENS with Mirror therapy and Nonelectrical somatosensory stimulation may produce greater improvements in motor function than Sham rTMS with Sham TENS with Mirror therapy and Nonelectrical somatosensory stimulation.	1	de Freitas Zanona A. et al. (2022)
1b	Task practice therapy with TheraBracelet stimulation may not have a difference in efficacy when compared to task practice therapy with sham stimulation for improving motor function.	1	Seo et al. (2019)
1b	Mirror therapy with Mesh glove may produce greater improvements in motor function than Mirror therapy.	1	Lin et al. (2014b)

2	Sensory-enhanced robot-aided motor training (SERMT) may not have a difference in efficacy when compared to Robot-aided motor training (RMT) for improving motor function.	1	Liu et al. (2009b)
2	Cable orthosis with Virtual Reality may not have a difference in efficacy when compared to Virtual Reality for improving motor function.	1	Fischer et al. (2007)
2	Pneumatic orthosis with Virtual Reality may not have a difference in efficacy when compared to Virtual Reality for improving motor function.	1	Fischer et al. (2007)

STROKE SEVERITY			
LoE	**Conclusion Statement**	**RCTs**	**References**
1b	High-dose electrical somatosensory stimulation with task oriented training may not have a difference in efficacy when compared to Sham (Low dose) with task oriented training for improving stroke severity.	1	Ghaziani et al. (2018)
1b	High intensity laser (HILT) with therapeutic exercise program and regular rehab may produce greater improvements in stroke severity than therapeutic exercise program with regular rehab.	1	Korkmaz et al. (2022)
1b	High-frequency repetitive transcranial magnetic stimulation with cervical nerve root magnetic stimulation may not have a difference in efficacy when compared to Sham high-frequency repetitive transcranial magnetic stimulation with Sham cervical nerve root magnetic stimulation for improving stroke severity.	1	Wu X. et al. (2023)
1b	High-frequency repetitive transcranial magnetic stimulation with cervical nerve root magnetic stimulation may not have a difference in efficacy when compared to high-frequency repetitive transcranial magnetic stimulation with sham cervical nerve root magnetic stimulation for improving stroke severity.	1	Wu X. et al. (2023)
1b	High-frequency repetitive transcranial magnetic stimulation with cervical nerve root magnetic stimulation may not have a difference in efficacy when compared to Sham high-frequency repetitive transcranial magnetic stimulation with cervical nerve root magnetic stimulation for improving stroke severity.	1	Wu X. et al. (2023)
1b	High-frequency repetitive transcranial magnetic stimulation with sham cervical nerve root magnetic stimulation may not have a difference in efficacy when compared to Sham high-frequency repetitive transcranial magnetic stimulation with cervical nerve root magnetic stimulation for improving stroke severity.	1	Wu X. et al. (2023)
1b	Transcutaneous auricular vagus nerve stimulation (tVNS) may not have a difference in efficacy when compared to sham for improving stroke severity.	1	Wu et al. (2020)
1b	Limb Ischemic Post-Conditioning may produce greater improvements in stroke severity than Sham treatment.	1	Li et al. (2018b)

MUSCLE STRENGTH			
LoE	**Conclusion Statement**	**RCTs**	**References**
2	Repetitive Sensory Stimulation may produce greater improvements in muscle strength than Sham Repetitive Sensory Stimulation.	1	Kattenstroth et al. (2018)
1b	High-dose electrical somatosensory stimulation with task oriented training may not have a difference in efficacy when compared to Sham (Low dose) with task oriented training for improving muscle strength.	1	Ghaziani et al. (2018)

1a	Peripheral Nerve Stimulation may result in lesser improvements in muscle strength when compared to sham.	3	Olczak & Truszczynska-Baszak (2022); Liu et al. (2017); Klaiput et al. (2009)
1b	Non-electrical somatosensory stimulation may produce greater improvements in muscle strength than sham.	1	Seo et al. (2020)
1b	Intermittent pneumatic compression may not have a difference in efficacy when compared to conventional therapy for improving muscle strength.	1	Roper et al. (1999)
2	Vibratory Somatosensory Stimulation may produce greater improvements in muscle strength than No Stimulation.	1	Sim et al. (2015)
2	Vibratory Somatosensory Stimulation may produce greater improvements in muscle strength than Light Touch Somatosensory Stimulation (Brush) or Rough Touch Somatosensory Stimulation (Sand Paper).	1	Sim et al. (2015)
1b	Repetitive peripheral sensory stimulation with functional electrical stimulation and task specific training may not have a difference in efficacy when compared to Sham RPSS with functional electrical stimulation and TST for improving muscle strength.	1	Conforto et al. (2021)
1b	Transcutaneous Auricular Vagus Nerve Stimulation with Robotic Training may not have a difference in efficacy when compared to Sham transcutaneous auricular vagus nerve stimulation with Robotic Training for improving muscle strength.	1	Chang J.L. et al. (2021)
2	High intensity laser therapy (HILT) with therapeutic exercises may produce greater improvements in muscle strength than Conventional exercise program.	1	Abdelhakiem et al. (2024)
2	Non invasive transcutaneous electrical nerve stimulation with conventional treatment (NSAID, Exercise and activities of daily living instructions) may produce greater improvements in muscle strength than Ultrasound therapy with conventional treatment (NSAID, Exercise and activities of daily living instructions).	1	Moniruzzaman et al. (2010)
1b	Active repetitive peripheral nerve sensory stimulation (RPPS) with sham transcranial direct current stimulation may not have a difference in efficacy when compared to Sham RRPS with sham transcranial direct current stimulation for improving muscle strength.	1	Menezes et al. (2018)
1b	Active repetitive peripheral nerve sensory stimulation (RPPS) with sham transcranial direct current stimulation may not have a difference in efficacy when compared to Sham RRPS with Anodal transcranial direct current stimulation or Active RRPS and active transcranial direct current stimulation for improving muscle strength.	1	Menezes et al. (2018)
1b	Repetitive peripheral nerve stimulation with anodal tDCS may not have a difference in efficacy when compared to repetitive peripheral nerve stimulation with sham tDCS for improving muscle strength.	1	Sattler et al. (2015)
1b	High-frequency repetitive peripheral magnetic stimulation with conventional treatment may produce greater improvements in muscle strength than sham stimulation with conventional treatment.	1	Ke et al. (2022)
1b	Repetitive sensory stimulation with Robot-assisted arm training may not have a difference in efficacy when compared to Sham stimulation with Robot-assisted arm training for improving muscle strength.	1	Egger et al. (2024)
1b	Cerebello-Motor paired associated stimulation (PAS) with physiotherapy may not have a difference in efficacy when compared to Sham with physiotherapy for improving muscle strength.	1	Rosso et al. (2022)
1b	Non-electrical somatosensory stimulation may not have a difference in efficacy when compared to conventional therapy for improving muscle strength.	2	Choi et al. (2017); Hunter et al. (2011)

1b	Vagus Nerve Stimulation with rehab may not have a difference in efficacy when compared to Conventional care for improving muscle strength.	1	Dawson et al. (2016)
1b	Peripheral nerve stimulation may not have a difference in efficacy when compared to usual care for improving muscle strength.	1	Wilson et al. (2014)
1b	PNES with Task Specific Training may not have a difference in efficacy when compared to Task-Specific Training for improving muscle strength.	1	IkuNo et al. (2012)
1b	There is conflicting evidence about the effect of Peripheral Nerve Stimulation combined with other interventions when compared to sham or task-specific training for improving muscle strength.	1	McDonnell et al. (2007)
2	Cable orthosis with Virtual Reality may not have a difference in efficacy when compared to Virtual Reality for improving muscle strength.	1	Fischer et al. (2007)
2	Pneumatic orthosis with Virtual Reality may not have a difference in efficacy when compared to Virtual Reality for improving muscle strength.	1	Fischer et al. (2007)
1b	Medial nerve (somatosensory) stimulation may produce greater improvements in muscle strength than Sham stimulation.	1	Conforto et al. (2002)
1b	Assisted Motion, Biofeedback, and Antagonist Muscle Vibration delivered by a Robotic Device with UL rehabilitation may not have a difference in efficacy when compared to Placebo intervention with UL rehabilitation for improving muscle strength.	1	Cordo et al. (2022)

SPASTICITY			
LoE	**Conclusion Statement**	**RCTs**	**References**
1b	There is conflicting evidence about the effect of Non-electrical somatosensory stimulation when compared to sham for improving spasticity.	2	Seim et al. (2021); Seo et al. (2020)
2	Intermittent pneumatic compression with conventional physiotherapy may not have a difference in efficacy when compared to Sham short wave therapy with conventional physiotherapy for improving spasticity.	1	Cambier et al. (2003)
1a	Non-electrical somatosensory stimulation may produce greater improvements in spasticity than conventional therapy.	2	Parikh et al. (2022); Derakhshanfar et al. (2020)
1a	There is conflicting evidence about the effect of Peripheral magnetic stimulation when compared to sham for improving spasticity.	2	Fawaz et al. (2023); Krewer et al. (2014)
1b	Repetitive peripheral sensory stimulation with functional electrical stimulation and task specific training may not have a difference in efficacy when compared to Sham RPSS with functional electrical stimulation and TST for improving spasticity.	1	Conforto et al. (2021)
1b	Transcutaneous Auricular Vagus Nerve Stimulation with Robotic Training may produce greater improvements in spasticity than Sham transcutaneous auricular vagus nerve stimulation with Robotic Training.	1	Chang J.L. et al. (2021)
1a	Peripheral magnetic stimulation may not have a difference in efficacy when compared to conventional therapy for improving spasticity.	2	Fujimura et al. (2024); Jiang et al. (2022)
1b	High intensity laser (HILT) with therapeutic exercise program and regular rehab may not have a difference in efficacy when compared to therapeutic exercise program with regular rehab for improving spasticity.	1	Korkmaz et al. (2022)

2	Low-frequency repetitive transcranial magnetic stimulation with peripheral repetitive magnetic stimulation (rPMS) and rehabilitation may produce greater improvements in spasticity than rehabilitation.	1	Qin et al. (2023)
2	Low-frequency repetitive transcranial magnetic stimulation with peripheral repetitive magnetic stimulation (rPMS) and rehabilitation may produce greater improvements in spasticity than low-frequency repetitive transcranial magnetic stimulation with rehabilitation.	1	Qin et al. (2023)
1b	Mirror therapy with Mesh glove afferent stimulation may not have a difference in efficacy when compared to Mirror therapy or Mirror Therapy with Sham for improving spasticity.	1	Lee et al. (2015a)
1b	Mirror therapy with Mesh glove afferent stimulation may not have a difference in efficacy when compared to Mirror therapy for improving spasticity.	1	Lee et al. (2015a)
1b	Assisted Motion, Biofeedback, and Antagonist Muscle Vibration delivered by a Robotic Device with UL rehabilitation may not have a difference in efficacy when compared to Placebo intervention with UL rehabilitation for improving spasticity.	1	Cordo et al. (2022)
1b	Intermittent theta burst stimulation with peripheral magnetic stimulation and conventional rehab may not have a difference in efficacy when compared to peripheral magnetic stimulation with central sham stimulation and conventional rehab for improving spasticity.	1	Jiang et al. (2023)
1b	Intermittent theta burst stimulation with peripheral magnetic stimulation and conventional rehab may not have a difference in efficacy when compared to intermittent theta burst stimulation with sham peripheral stimulation and conventional rehab for improving spasticity.	1	Jiang et al. (2023)
1b	Bihemispheric transcranial direct current stimulation with Repetitive Peripheral Nerve Stimulation and Conventional Therapy may not have a difference in efficacy when compared to Sham transcranial direct current stimulation with Repetitive Peripheral Nerve Stimulation and Conventional Therapy for improving spasticity.	1	Yague et al. (2023)
1b	Mirror therapy with Mesh glove may not have a difference in efficacy when compared to Mirror therapy for improving spasticity.	1	Lin et al. (2014b)
2	Cable orthosis with Virtual Reality may not have a difference in efficacy when compared to Virtual Reality for improving spasticity.	1	Fischer et al. (2007)
2	Pneumatic orthosis with Virtual Reality may not have a difference in efficacy when compared to Virtual Reality for improving spasticity.	1	Fischer et al. (2007)

RANGE OF MOTION			
LoE	**Conclusion Statement**	**RCTs**	**References**
1b	Suprascapular nerve pulsed radiofrequency may produce greater improvements in range of motion than Suprascapular Nerve Block with lidocain.	1	Alanbay et al. (2020)
1b	Peripheral Nerve Stimulation may result in lesser improvements in range of motion when compared to sham.	1	Olczak & Truszczynska-Baszak (2022)
1b	Repetitive peripheral sensory stimulation with functional electrical stimulation and task specific training may not have a difference in efficacy when compared to Sham RPSS with functional electrical stimulation and TST for improving range of motion.	1	Conforto et al. (2021)
1b	Pulsed Radiofrequency with rehabilitation therapy may result in lesser improvements in range of motion when compared to Intra-articular corticosteroid injection with rehabilitation therapy.	1	Kim & Chang (2021)

1b	Peripheral magnetic stimulation may not have a difference in efficacy when compared to conventional therapy for improving range of motion.	1	Fujimura et al. (2024)
1b	High intensity laser (HILT) with therapeutic exercise program and regular rehab may not have a difference in efficacy when compared to therapeutic exercise program with regular rehab for improving range of motion.	1	Korkmaz et al. (2022)
1b	Paired associative stimulation (PAS) with Motor imagery may not have a difference in efficacy when compared to Sham PAS with motor imagery for improving range of motion.	1	Brihmat et al. (2023)
1b	Suprascapular nerve block may not have a difference in efficacy when compared to Ultrasound for improving range of motion.	1	Boonsong et al. (2009)
2	Non invasive transcutaneous electrical nerve stimulation with conventional treatment (NSAID, Exercise and activities of daily living instructions) may produce greater improvements in range of motion than Ultrasound therapy with conventional treatment (NSAID, Exercise and activities of daily living instructions).	1	Moniruzzaman et al. (2010)
1b	Active repetitive peripheral nerve sensory stimulation (RPPS) with sham transcranial direct current stimulation may not have a difference in efficacy when compared to Sham RRPS with sham transcranial direct current stimulation for improving range of motion.	1	Menezes et al. (2018)
1b	Active repetitive peripheral nerve sensory stimulation (RPPS) with sham transcranial direct current stimulation may not have a difference in efficacy when compared to Sham RRPS with Anodal transcranial direct current stimulation or Active RRPS and active transcranial direct current stimulation for improving range of motion.	1	Menezes et al. (2018)
1b	Assisted Motion, Biofeedback, and Antagonist Muscle Vibration delivered by a Robotic Device with UL rehabilitation may not have a difference in efficacy when compared to Placebo intervention with UL rehabilitation for improving range of motion.	1	Cordo et al. (2022)
2	Therapeutic ultrasound may not have a difference in efficacy when compared to sham for improving range of motion.	1	Inaba & Piorkowski (1972)
1b	Peripheral nerve stimulation may not have a difference in efficacy when compared to usual care for improving range of motion.	1	Wilson et al. (2014)
2	Cable orthosis with Virtual Reality may not have a difference in efficacy when compared to Virtual Reality for improving range of motion.	1	Fischer et al. (2007)
2	Pneumatic orthosis with Virtual Reality may not have a difference in efficacy when compared to Virtual Reality for improving range of motion.	1	Fischer et al. (2007)

PROPRIOCEPTION			
LoE	**Conclusion Statement**	**RCTs**	**References**
2	Repetitive Sensory Stimulation may not have a difference in efficacy when compared to Sham Repetitive Sensory Stimulation for improving proprioception.	1	Kattenstroth et al. (2018)
1b	High-dose electrical somatosensory stimulation with task oriented training may not have a difference in efficacy when compared to Sham (Low dose) with task oriented training for improving proprioception.	1	Ghaziani et al. (2018)
1b	There is conflicting evidence about the effect of Non-electrical somatosensory stimulation when compared to sham for improving proprioception.	3	Alwhaibi et al. (2022); Seim et al. (2021); Seo et al. (2020)

2	Intermittent pneumatic compression with conventional physiotherapy may produce greater improvements in proprioception than Sham short wave therapy with conventional physiotherapy.	1	Cambier et al. (2003)
1b	Mirror therapy with Mesh glove afferent stimulation may not have a difference in efficacy when compared to Mirror therapy or Mirror Therapy with Sham for improving proprioception.	1	Lee et al. (2015a)
1b	Mirror therapy with Mesh glove afferent stimulation may not have a difference in efficacy when compared to Mirror therapy for improving proprioception.	1	Lee et al. (2015a)
1b	High-Frequency repetitive transcranial magnetic stimulation with Peripheral Somatosensory Stimulation (sensory level electrical stimulation and vibratory stimulation) may not have a difference in efficacy when compared to Sham repetitive transcranial magnetic stimulation with Peripheral Somatosensory Stimulation for improving proprioception.	1	Pundik et al. (2021)
1b	There is conflicting evidence about the effect of High-Frequency repetitive transcranial magnetic stimulation with Peripheral Somatosensory Stimulation (sensory level electrical stimulation and vibratory stimulation) when compared to Low-Frequency repetitive transcranial magnetic stimulation with Peripheral Somatosensory Stimulation for improving proprioception.	1	Pundik et al. (2021)
1b	Repetitive sensory stimulation with Robot-assisted arm training may not have a difference in efficacy when compared to Sham stimulation with Robot-assisted arm training for improving proprioception.	1	Egger et al. (2024)
1b	Proprioceptive Training (involving passive and active movements with visual feedback) may produce greater improvements in proprioception than Nonspecific sensory stimulation.	1	He et al. (2022)
1b	RTMS with Sham TENS with Mirror therapy and Nonelectrical somatosensory stimulation may not have a difference in efficacy when compared to Sham rTMS with Sham TENS with Mirror therapy and Nonelectrical somatosensory stimulation for improving proprioception.	1	de Freitas Zanona A. et al. (2022)
1b	Sham rTMS with TENS with Mirror therapy and Nonelectrical somatosensory stimulation may not have a difference in efficacy when compared to Sham rTMS with Sham TENS with Mirror therapy and Nonelectrical somatosensory stimulation for improving proprioception.	1	de Freitas Zanona A. et al. (2022)
1b	RTMS with TENS with Mirror therapy and Nonelectrical somatosensory stimulation may not have a difference in efficacy when compared to Sham rTMS with Sham TENS with Mirror therapy and Nonelectrical somatosensory stimulation for improving proprioception.	1	de Freitas Zanona A. et al. (2022)
1b	Repetitive task exercise with sensory amplitude electrical stimulation (SES) may not have a difference in efficacy when compared to repetitive task exercise with Sham stimulation for improving proprioception.	1	Sullivan et al. (2012)
1b	Generalized somatosensory discrimination training may produce greater improvements in proprioception than Repeated exposure to sensory stimuli.	1	Carey et al. (2011)

2. Activities

ACTIVITIES OF DAILY LIVING			
LoE	**Conclusion Statement**	**RCTs**	**References**
1b	LASER therapy may not have a difference in efficacy when compared to Interferential current treatment for improving performance of activities of daily living.	1	Jan et al. (2017)
1b	Functional Magnetic Stimulation (applied peripherally) may produce greater improvements in performance of activities of daily living than Low-Frequency repetitive transcranial magnetic stimulation.	1	Chen et al. (2020a)
1b	Somatosensory (peripheral nerve) stimulation with task specific training may not have a difference in efficacy when compared to Sham stimulation with task specific training for improving performance of activities of daily living.	1	Fleming et al. (2015)
1b	Repetitive task exercise with sensory amplitude electrical stimulation (SES) may not have a difference in efficacy when compared to repetitive task exercise with Sham stimulation for improving performance of activities of daily living.	1	Sullivan et al. (2012)
1b	Non-electrical somatosensory stimulation may produce greater improvements in performance of activities of daily living than conventional therapy.	1	Derakhshanfar et al. (2020)
1a	Peripheral magnetic stimulation may produce greater improvements in performance of activities of daily living than sham.	2	Fawaz et al. (2023); Krewer et al. (2014)
1b	Repetitive peripheral sensory stimulation with functional electrical stimulation and task specific training may not have a difference in efficacy when compared to Sham RPSS with functional electrical stimulation and TST for improving performance of activities of daily living.	1	Conforto et al. (2021)
2	Ipsilesional Paired Associated Stimulation (PAS) may produce greater improvements in performance of activities of daily living than Conventional Care.	1	Sui et al. (2021)
2	Ipsilesional Paired Associated Stimulation (PAS) may result in lesser improvements in performance of activities of daily living when compared to Contralesional PAS or Bilateral PAS.	1	Sui et al. (2021)
1b	Peripheral magnetic stimulation may produce greater improvements in performance of activities of daily living than conventional therapy.	1	Jiang et al. (2022)
1b	High intensity laser (HILT) with therapeutic exercise program and regular rehab may produce greater improvements in performance of activities of daily living than therapeutic exercise program with regular rehab.	1	Korkmaz et al. (2022)
2	Low-frequency repetitive transcranial magnetic stimulation with peripheral repetitive magnetic stimulation (rPMS) and rehabilitation may produce greater improvements in performance of activities of daily living than rehabilitation.	1	Qin et al. (2023)
2	Low-frequency repetitive transcranial magnetic stimulation with peripheral repetitive magnetic stimulation (rPMS) and rehabilitation may produce greater improvements in performance of activities of daily living than low-frequency repetitive transcranial magnetic stimulation with rehabilitation.	1	Qin et al. (2023)
1b	Repetitive peripheral magnetic stimulation (rPMS) with intermittent theta burst stimulation and rehabilitation may not have a difference in efficacy when compared to sham rPMS with intermittent theta burst stimulation and rehabilitation for improving performance of activities of daily living.	1	Chang et al. (2024b)

1b	Cyclic Neuromuscular Electrical Stimulation may not have a difference in efficacy when compared to Electromyographically-triggered Neuromuscular Electrical Stimulatiom or Sensory Stimulation for improving performance of activities of daily living.	1	Wilson et al. (2016)
1b	Mirror therapy with Mesh glove afferent stimulation may result in lesser improvements in performance of activities of daily living when compared to Mirror therapy or Mirror Therapy with Sham.	1	Lee et al. (2015a)
1b	Mirror therapy with Mesh glove afferent stimulation may produce greater improvements in performance of activities of daily living than Mirror therapy.	1	Lee et al. (2015a)
1b	Motor electrical stimulation involving cyclic (neuromuscular electrical stimulation) and electromyography may not have a difference in efficacy when compared to Percutaneous Sensory electrical stimulation for improving performance of activities of daily living.	1	Chae et al. (2009)
1b	There is conflicting evidence about the effect of Intermittent theta burst stimulation with peripheral magnetic stimulation and conventional rehab when compared to peripheral magnetic stimulation with central sham stimulation and conventional rehab for improving performance of activities of daily living.	1	Jiang et al. (2023)
1b	Intermittent theta burst stimulation with peripheral magnetic stimulation and conventional rehab may produce greater improvements in performance of activities of daily living than intermittent theta burst stimulation with sham peripheral stimulation and conventional rehab.	1	Jiang et al. (2023)
1b	High-frequency repetitive transcranial magnetic stimulation with cervical nerve root magnetic stimulation may not have a difference in efficacy when compared to Sham high-frequency repetitive transcranial magnetic stimulation with Sham cervical nerve root magnetic stimulation for improving performance of activities of daily living.	1	Wu X. et al. (2023)
1b	High-frequency repetitive transcranial magnetic stimulation with cervical nerve root magnetic stimulation may not have a difference in efficacy when compared to high-frequency repetitive transcranial magnetic stimulation with sham cervical nerve root magnetic stimulation for improving performance of activities of daily living.	1	Wu X. et al. (2023)
1b	High-frequency repetitive transcranial magnetic stimulation with cervical nerve root magnetic stimulation may produce greater improvements in performance of activities of daily living than Sham high-frequency repetitive transcranial magnetic stimulation with cervical nerve root magnetic stimulation.	1	Wu X. et al. (2023)
1b	High-frequency repetitive transcranial magnetic stimulation with sham cervical nerve root magnetic stimulation may not have a difference in efficacy when compared to Sham high-frequency repetitive transcranial magnetic stimulation with cervical nerve root magnetic stimulation for improving performance of activities of daily living.	1	Wu X. et al. (2023)
1b	Suprascapular nerve pulsed radiofrequency may produce greater improvements in performance of activities of daily living than Suprascapular Nerve Block with lidocain.	1	Alanbay et al. (2020)
1b	Paired associative stimulation (rTMS with rPMS) and physiotherapy may not have a difference in efficacy when compared to rTMS with physiotherapy for improving performance of activities of daily living.	1	Liang et al. (2024)
1b	Transcutaneous auricular vagus nerve stimulation (tVNS) may produce greater improvements in performance of activities of daily living than sham.	1	Wu et al. (2020)

1b	Peripheral Nerve Stimulation combined with other interventions may not have a difference in efficacy when compared to sham or task-specific training for improving performance of activities of daily living.	1	McDonnell et al. (2007)
1b	Proprioceptive Training (involving passive and active movements with visual feedback) may not have a difference in efficacy when compared to Nonspecific sensory stimulation for improving performance of activities of daily living.	1	He et al. (2022)
1b	RTMS with Sham TENS with Mirror therapy and Nonelectrical somatosensory stimulation may not have a difference in efficacy when compared to Sham rTMS with Sham TENS with Mirror therapy and Nonelectrical somatosensory stimulation for improving performance of activities of daily living.	1	de Freitas Zanona A. et al. (2022)
1b	Sham rTMS with TENS with Mirror therapy and Nonelectrical somatosensory stimulation may not have a difference in efficacy when compared to Sham rTMS with Sham TENS with Mirror therapy and Nonelectrical somatosensory stimulation for improving performance of activities of daily living.	1	de Freitas Zanona A. et al. (2022)
1b	RTMS with TENS with Mirror therapy and Nonelectrical somatosensory stimulation may produce greater improvements in performance of activities of daily living than Sham rTMS with Sham TENS with Mirror therapy and Nonelectrical somatosensory stimulation.	1	de Freitas Zanona A. et al. (2022)
1b	Mirror therapy with Mesh glove may not have a difference in efficacy when compared to Mirror therapy for improving performance of activities of daily living.	1	Lin et al. (2014b)

DEXTERITY			
LoE	**Conclusion Statement**	**RCTs**	**References**
2	There is conflicting evidence about the effect of Repetitive Sensory Stimulation when compared to Sham Repetitive Sensory Stimulation for improving dexterity.	1	Kattenstroth et al. (2018)
1b	High-dose electrical somatosensory stimulation with task oriented training may not have a difference in efficacy when compared to Sham (Low dose) with task oriented training for improving dexterity.	1	Ghaziani et al. (2018)
1b	Peripheral Nerve Stimulation may produce greater improvements in dexterity than sham.	1	Liu et al. (2017)
1b	There is conflicting evidence about the effect of Non-electrical somatosensory stimulation when compared to sham for improving dexterity.	2	Alwhaibi et al. (2022); Seo et al. (2020)
2	Vibratory Somatosensory Stimulation may produce greater improvements in dexterity than No Stimulation.	1	Sim et al. (2015)
2	Vibratory Somatosensory Stimulation may not have a difference in efficacy when compared to Light Touch Somatosensory Stimulation (Brush) or Rough Touch Somatosensory Stimulation (Sand Paper) for improving dexterity.	1	Sim et al. (2015)
1b	Mirror therapy with Mesh glove afferent stimulation may result in lesser improvements in dexterity when compared to Mirror therapy or Mirror Therapy with Sham.	1	Lee et al. (2015a)
1b	Mirror therapy with Mesh glove afferent stimulation may produce greater improvements in dexterity than Mirror therapy.	1	Lee et al. (2015a)
1b	Repetitive peripheral nerve stimulation with anodal tDCS may not have a difference in efficacy when compared to repetitive peripheral nerve stimulation with sham tDCS for improving dexterity.	1	Sattler et al. (2015)

1b	Repetitive sensory stimulation with Robot-assisted arm training may not have a difference in efficacy when compared to Sham stimulation with Robot-assisted arm training for improving dexterity.	1	Egger et al. (2024)
2	Non-electrical somatosensory stimulation may produce greater improvements in dexterity than conventional therapy.	1	Choi et al. (2017)
1b	Vagus Nerve Stimulation with rehab may not have a difference in efficacy when compared to Conventional care for improving dexterity.	1	Dawson et al. (2016)
1b	PNES with Task Specific Training may not have a difference in efficacy when compared to Task-Specific Training for improving dexterity.	1	IkuNo et al. (2012)
1b	Proprioceptive Training (involving passive and active movements with visual feedback) may not have a difference in efficacy when compared to Nonspecific sensory stimulation for improving dexterity.	1	He et al. (2022)
1b	RTMS with Sham TENS with Mirror therapy and Nonelectrical somatosensory stimulation may not have a difference in efficacy when compared to Sham rTMS with Sham TENS with Mirror therapy and Nonelectrical somatosensory stimulation for improving dexterity.	1	de Freitas Zanona A. et al. (2022)
1b	Sham rTMS with TENS with Mirror therapy and Nonelectrical somatosensory stimulation may not have a difference in efficacy when compared to Sham rTMS with Sham TENS with Mirror therapy and Nonelectrical somatosensory stimulation for improving dexterity.	1	de Freitas Zanona A. et al. (2022)
1b	RTMS with TENS with Mirror therapy and Nonelectrical somatosensory stimulation may not have a difference in efficacy when compared to Sham rTMS with Sham TENS with Mirror therapy and Nonelectrical somatosensory stimulation for improving dexterity.	1	de Freitas Zanona A. et al. (2022)
1b	Task practice therapy with TheraBracelet stimulation may produce greater improvements in dexterity than task practice therapy with sham stimulation.	1	Seo et al. (2019)
1b	Mirror therapy with Mesh glove may produce greater improvements in dexterity than Mirror therapy.	1	Lin et al. (2014b)
2	Cable orthosis with Virtual Reality may not have a difference in efficacy when compared to Virtual Reality for improving dexterity.	1	Fischer et al. (2007)
2	Pneumatic orthosis with Virtual Reality may not have a difference in efficacy when compared to Virtual Reality for improving dexterity.	1	Fischer et al. (2007)

Key Points

- Functional Magnetic Stimulation (applied peripherally) may be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Low-Frequency repetitive transcranial magnetic stimulation.
- Repetitive Sensory Stimulation may be beneficial for improving muscle strength, but not motor function and proprioception, after stroke when compared to Sham Repetitive Sensory Stimulation; the literature is mixed regarding dexterity.
- High-dose electrical somatosensory stimulation with task oriented training may not be beneficial for improving motor function, dexterity, proprioception, stroke severity, and muscle strength after stroke when compared to Sham (Low dose) with task oriented training.
- Peripheral Nerve Stimulation may be beneficial for improving dexterity, but not motor function, after stroke when compared to sham.
- Peripheral Nerve Stimulation may be less beneficial than sham for improving range of motion and muscle strength after stroke.
- Somatosensory (peripheral nerve) stimulation with task specific training may be beneficial for improving motor function, but not performance of activities of daily living, after stroke when compared to Sham stimulation with task specific training.

- Repetitive task exercise with sensory amplitude electrical stimulation (SES) may not be beneficial for improving motor function, proprioception, and performance of activities of daily living after stroke when compared to repetitive task exercise with Sham stimulation.
- Intermittent pneumatic compression may be beneficial for improving motor function, but not muscle strength, after stroke when compared to conventional therapy.
- Paretic hand peripheral nerve (somatosensory) stimulation may be beneficial for improving motor function after stroke when compared to No stimulation.
- Vibratory Somatosensory Stimulation may be beneficial for improving motor function, dexterity, and muscle strength after stroke when compared to No Stimulation.
- Vibratory Somatosensory Stimulation may be beneficial for improving motor function and muscle strength, but not dexterity, after stroke when compared to Light Touch Somatosensory Stimulation (Brush) or Rough Touch Somatosensory Stimulation (Sand Paper).
- Intermittent pneumatic compression with conventional physiotherapy may be beneficial for improving motor function and proprioception, but not spasticity, after stroke when compared to Sham short wave therapy with conventional physiotherapy.
- Non-electrical somatosensory stimulation may be beneficial for improving motor function, spasticity, performance of activities of daily living, and dexterity, but not muscle strength, after stroke when compared to conventional therapy.
- Peripheral magnetic stimulation may be beneficial for improving motor function and performance of activities of daily living after stroke when compared to sham; the literature is mixed regarding spasticity.
- Repetitive peripheral sensory stimulation with functional electrical stimulation and task specific training may not be beneficial for improving motor function, performance of activities of daily living, spasticity, range of motion, and muscle strength after stroke when compared to Sham RPSS with functional electrical stimulation and TST.
- Ipsilesional Paired Associated Stimulation (PAS) may be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Conventional Care.
- Ipsilesional Paired Associated Stimulation (PAS) may be less beneficial than Contralesional PAS or Bilateral PAS for improving motor function and performance of activities of daily living after stroke.
- Transcutaneous Auricular Vagus Nerve Stimulation with Robotic Training may be beneficial for improving spasticity, but not motor function and muscle strength, after stroke when compared to Sham transcutaneous auricular vagus nerve stimulation with Robotic Training.
- Peripheral magnetic stimulation may be beneficial for improving performance of activities of daily living, but not spasticity and range of motion, after stroke when compared to conventional therapy; the literature is mixed regarding motor function.
- Transcutaneous auricular vagus nerve stimulation with conventional rehab may be beneficial for improving motor function after stroke when compared to Sham TA-VNS with conventional rehab.
- Low-frequency repetitive transcranial magnetic stimulation with peripheral repetitive magnetic stimulation (rPMS) and rehabilitation may be beneficial for improving motor function, performance of activities of daily living, and spasticity after stroke when compared to rehabilitation.
- Low-frequency repetitive transcranial magnetic stimulation with peripheral repetitive magnetic stimulation (rPMS) and rehabilitation may be beneficial for improving motor function, performance of activities of daily living, and spasticity after stroke when compared to low-frequency repetitive transcranial magnetic stimulation with rehabilitation.
- High intensity laser therapy (HILT) with therapeutic exercises may be beneficial for improving motor function and muscle strength after stroke when compared to Conventional exercise program.
- Repetitive peripheral magnetic stimulation (rPMS) with intermittent theta burst stimulation and rehabilitation may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to sham rPMS with intermittent theta burst stimulation and rehabilitation.
- Cyclic Neuromuscular Electrical Stimulation may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Electromyographically-triggered Neuromuscular Electrical Stimulatiom or Sensory Stimulation.

- Paired associative stimulation may not be beneficial for improving motor function after stroke when compared to Active peripheral electrical stimulation with Sham cortical stimulation.
- Mirror therapy with Mesh glove afferent stimulation may not be beneficial for improving motor function, spasticity, and proprioception after stroke when compared to Mirror therapy or Mirror Therapy with Sham.
- Mirror therapy with Mesh glove afferent stimulation may be less beneficial than Mirror therapy or Mirror Therapy with Sham for improving dexterity and performance of activities of daily living after stroke.
- Mirror therapy with Mesh glove afferent stimulation may be beneficial for improving dexterity and performance of activities of daily living, but not motor function, spasticity, and proprioception, after stroke when compared to Mirror therapy.
- Motor electrical stimulation involving cyclic (neuromuscular electrical stimulation) and electromyography may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Percutaneous Sensory electrical stimulation.
- Robot assisted therapy with Transcutaneous stim of vagus nerve tVNS may be beneficial for improving motor function after stroke when compared to Robot assisted therapy with sham tVNS.
- Peripheral nerve stimulation with modified constraint-induced movement therapy may be beneficial for improving motor function after stroke when compared to Sham peripheral nerve stimulation with modified constraint-induced movement therapy.
- Peripheral nerve stimulation with task oriented training may be beneficial for improving motor function after stroke when compared to Sham stimulation with task oriented training.
- Somatosensory Stimulation (peripheral nerve stimulation) with Intensive Task-Oriented Training may be beneficial for improving motor function after stroke when compared to Sham Stimulation with Intensive Task-Oriented Training.
- Assisted Motion, Biofeedback, and Antagonist Muscle Vibration delivered by a Robotic Device with UL rehabilitation may be beneficial for improving motor function, but not muscle strength, spasticity, and range of motion, after stroke when compared to Placebo intervention with UL rehabilitation.
- Intermittent theta burst stimulation with peripheral magnetic stimulation and conventional rehab may not be beneficial for improving spasticity after stroke when compared to peripheral magnetic stimulation with central sham stimulation and conventional rehab; the literature is mixed regarding motor function and performance of activities of daily living.
- Intermittent theta burst stimulation with peripheral magnetic stimulation and conventional rehab may be beneficial for improving motor function and performance of activities of daily living, but not spasticity, after stroke when compared to intermittent theta burst stimulation with sham peripheral stimulation and conventional rehab.
- Bihemispheric transcranial direct current stimulation with Repetitive Peripheral Nerve Stimulation and Conventional Therapy may not be beneficial for improving motor function and spasticity after stroke when compared to Sham transcranial direct current stimulation with Repetitive Peripheral Nerve Stimulation and Conventional Therapy.
- High-frequency repetitive transcranial magnetic stimulation with cervical nerve root magnetic stimulation may be beneficial for improving motor function, but not performance of activities of daily living and stroke severity, after stroke when compared to Sham high-frequency repetitive transcranial magnetic stimulation with Sham cervical nerve root magnetic stimulation.
- High-frequency repetitive transcranial magnetic stimulation with cervical nerve root magnetic stimulation may not be beneficial for improving performance of activities of daily living and stroke severity after stroke when compared to high-frequency repetitive transcranial magnetic stimulation with sham cervical nerve root magnetic stimulation; the literature is mixed regarding motor function.
- High-frequency repetitive transcranial magnetic stimulation with cervical nerve root magnetic stimulation may be beneficial for improving performance of activities of daily living, but not stroke severity, after stroke when compared to Sham high-frequency repetitive transcranial magnetic stimulation with cervical nerve root magnetic stimulation; the literature is mixed regarding motor function.
- High-frequency repetitive transcranial magnetic stimulation with sham cervical nerve root magnetic stimulation may not be beneficial for improving motor function, performance of activities of daily living, and stroke severity after stroke when compared to Sham high-frequency repetitive transcranial magnetic stimulation with cervical nerve root magnetic stimulation.

- The literature is mixed regarding the effect of Neuromuscular electrical stimulation with Conventional therapy on improvement of motor function after stroke when compared to Conventional therapy.
- Neuromuscular electrical stimulation with Conventional therapy may not be beneficial for improving motor function after stroke when compared to Peripheral Pulse Electromagnetic Waves (rPMS) with Conventional therapy.
- Repetitive peripheral nerve stimulation with anodal tDCS may not be beneficial for improving motor function, muscle strength, and dexterity after stroke when compared to repetitive peripheral nerve stimulation with sham tDCS.
- Non-electrical somatosensory stimulation may be beneficial for improving muscle strength after stroke when compared to sham; the literature is mixed regarding spasticity, proprioception, and dexterity.
- LASER therapy may not be beneficial for improving performance of activities of daily living after stroke when compared to Interferential current treatment.
- High intensity laser (HILT) with therapeutic exercise program and regular rehab may be beneficial for improving performance of activities of daily living and stroke severity, but not spasticity and range of motion, after stroke when compared to therapeutic exercise program with regular rehab.
- Suprascapular nerve pulsed radiofrequency may be beneficial for improving performance of activities of daily living and range of motion after stroke when compared to Suprascapular Nerve Block with lidocain.
- Pulsed Radiofrequency with rehabilitation therapy may be less beneficial than Intra-articular corticosteroid injection with rehabilitation therapy for improving range of motion after stroke.
- Paired associative stimulation (PAS) with Motor imagery may not be beneficial for improving range of motion after stroke when compared to Sham PAS with motor imagery.
- Suprascapular nerve block may not be beneficial for improving range of motion after stroke when compared to Ultrasound.
- Non invasive transcutaneous electrical nerve stimulation with conventional treatment (NSAID, Exercise and activities of daily living instructions) may be beneficial for improving range of motion and muscle strength after stroke when compared to Ultrasound therapy with conventional treatment (NSAID, Exercise and activities of daily living instructions).
- Active repetitive peripheral nerve sensory stimulation (RPPS) with sham transcranial direct current stimulation may not be beneficial for improving range of motion and muscle strength after stroke when compared to Sham RRPS with sham transcranial direct current stimulation.
- Active repetitive peripheral nerve sensory stimulation (RPPS) with sham transcranial direct current stimulation may not be beneficial for improving range of motion and muscle strength after stroke when compared to Sham RRPS with Anodal transcranial direct current stimulation or Active RRPS and active transcranial direct current stimulation.
- Therapeutic ultrasound may not be beneficial for improving range of motion after stroke when compared to sham.
- High-Frequency repetitive transcranial magnetic stimulation with Peripheral Somatosensory Stimulation (sensory level electrical stimulation and vibratory stimulation) may not be beneficial for improving proprioception after stroke when compared to Sham repetitive transcranial magnetic stimulation with Peripheral Somatosensory Stimulation.
- The literature is mixed regarding the effect of High-Frequency repetitive transcranial magnetic stimulation with Peripheral Somatosensory Stimulation (sensory level electrical stimulation and vibratory stimulation) on improvement of proprioception after stroke when compared to Low-Frequency repetitive transcranial magnetic stimulation with Peripheral Somatosensory Stimulation.
- High-frequency repetitive peripheral magnetic stimulation with conventional treatment may be beneficial for improving muscle strength after stroke when compared to sham stimulation with conventional treatment.
- Repetitive sensory stimulation with Robot-assisted arm training may not be beneficial for improving motor function, muscle strength, proprioception, and dexterity after stroke when compared to Sham stimulation with Robot-assisted arm training.
- Paired associative stimulation (rTMS with rPMS) and physiotherapy may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to rTMS with physiotherapy.

- EMG paired taVNS with TST may not be beneficial for improving motor function after stroke when compared to Active unpaired taVNS with TST.
- Cerebello-Motor paired associated stimulation (PAS) with physiotherapy may not be beneficial for improving motor function and muscle strength after stroke when compared to Sham with physiotherapy.
- Limb Ischemic Post-Conditioning may be beneficial for improving stroke severity after stroke when compared to Sham treatment.
- Vagus Nerve Stimulation with rehab may not be beneficial for improving motor function, muscle strength, and dexterity after stroke when compared to Conventional care.
- Peripheral nerve stimulation may not be beneficial for improving motor function, muscle strength, and range of motion after stroke when compared to usual care.
- Repetitive peripheral nerve sensory stim (RPSS) with Motor Training may be beneficial for improving motor function after stroke when compared to Sham with Motor Training.
- PNES with Task Specific Training may not be beneficial for improving motor function, muscle strength, and dexterity after stroke when compared to Task-Specific Training.
- Transcutaneous auricular vagus nerve stimulation (tVNS) may be beneficial for improving motor function and performance of activities of daily living, but not stroke severity, after stroke when compared to sham.
- Peripheral Nerve Stimulation combined with other interventions may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to sham or task-specific training; the literature is mixed regarding muscle strength.
- Proprioceptive Training (involving passive and active movements with visual feedback) may be beneficial for improving motor function and proprioception, but not performance of activities of daily living and dexterity, after stroke when compared to Nonspecific sensory stimulation.
- RTMS with Sham TENS with Mirror therapy and Nonelectrical somatosensory stimulation may not be beneficial for improving proprioception, performance of activities of daily living, and dexterity after stroke when compared to Sham rTMS with Sham TENS with Mirror therapy and Nonelectrical somatosensory stimulation; the literature is mixed regarding motor function.
- Sham rTMS with TENS with Mirror therapy and Nonelectrical somatosensory stimulation may not be beneficial for improving proprioception, performance of activities of daily living, and dexterity after stroke when compared to Sham rTMS with Sham TENS with Mirror therapy and Nonelectrical somatosensory stimulation; the literature is mixed regarding motor function.
- RTMS with TENS with Mirror therapy and Nonelectrical somatosensory stimulation may be beneficial for improving motor function and performance of activities of daily living, but not proprioception and dexterity, after stroke when compared to Sham rTMS with Sham TENS with Mirror therapy and Nonelectrical somatosensory stimulation.
- Task practice therapy with TheraBracelet stimulation may be beneficial for improving dexterity, but not motor function, after stroke when compared to task practice therapy with sham stimulation.
- Mirror therapy with Mesh glove may be beneficial for improving motor function and dexterity, but not spasticity and performance of activities of daily living, after stroke when compared to Mirror therapy.
- Sensory-enhanced robot-aided motor training (SERMT) may not be beneficial for improving motor function after stroke when compared to Robot-aided motor training (RMT).
- Cable orthosis with Virtual Reality may not be beneficial for improving motor function, muscle strength, spasticity, range of motion, and dexterity after stroke when compared to Virtual Reality.
- Pneumatic orthosis with Virtual Reality may not be beneficial for improving motor function, muscle strength, spasticity, range of motion, and dexterity after stroke when compared to Virtual Reality.
- Generalized somatosensory discrimination training may be beneficial for improving proprioception after stroke when compared to Repeated exposure to sensory stimuli.
- Medial nerve (somatosensory) stimulation may be beneficial for improving muscle strength after stroke when compared to Sham stimulation.

Summary of Key Points: Additional Afferent and Peripheral Stimulation Methods

Intervention	Control(s)	Function domain(s)	Effect

Functional Magnetic Stimulation (applied peripherally)	Low-Frequency repetitive transcranial magnetic stimulation	Motor function, performance of activities of daily living	+
Repetitive Sensory Stimulation	Sham Repetitive Sensory Stimulation	Muscle strength	+
Repetitive Sensory Stimulation	Sham Repetitive Sensory Stimulation	Motor function, proprioception	−
Repetitive Sensory Stimulation	Sham Repetitive Sensory Stimulation	Dexterity	=
High-dose electrical somatosensory stimulation with task oriented training	Sham (Low dose) with task oriented training	Motor function, dexterity, proprioception, stroke severity, muscle strength	−
Peripheral Nerve Stimulation	sham	Dexterity	+
Peripheral Nerve Stimulation	sham	Motor function, range of motion, muscle strength	−
Somatosensory (peripheral nerve) stimulation with task specific training	Sham stimulation with task specific training	Motor function	+
Somatosensory (peripheral nerve) stimulation with task specific training	Sham stimulation with task specific training	Performance of activities of daily living	−
Repetitive task exercise with sensory amplitude electrical stimulation (SES)	repetitive task exercise with Sham stimulation	Motor function, proprioception, performance of activities of daily living	−
Intermittent pneumatic compression	conventional therapy	Motor function	+
Intermittent pneumatic compression	conventional therapy	Muscle strength	−
Paretic hand peripheral nerve (somatosensory) stimulation	No stimulation	Motor function	+
Vibratory Somatosensory Stimulation	No Stimulation	Motor function, dexterity, muscle strength	+
Vibratory Somatosensory Stimulation	Light Touch Somatosensory Stimulation (Brush) or Rough Touch Somatosensory Stimulation (Sand Paper)	Motor function, muscle strength	+
Vibratory Somatosensory Stimulation	Light Touch Somatosensory Stimulation (Brush) or Rough Touch Somatosensory Stimulation (Sand Paper)	Dexterity	−
Intermittent pneumatic compression with conventional physiotherapy	Sham short wave therapy with conventional physiotherapy	Motor function, proprioception	+
Intermittent pneumatic compression with conventional physiotherapy	Sham short wave therapy with conventional physiotherapy	Spasticity	−
Non-electrical somatosensory stimulation	conventional therapy	Motor function, spasticity, performance of activities of daily living, dexterity	+
Non-electrical somatosensory stimulation	conventional therapy	Muscle strength	−
Peripheral magnetic stimulation	sham	Motor function, performance of activities of daily living	+
Peripheral magnetic stimulation	sham	Spasticity	=

Repetitive peripheral sensory stimulation with functional electrical stimulation and task specific training	Sham RPSS with functional electrical stimulation and TST	Motor function, performance of activities of daily living, spasticity, range of motion, muscle strength	–
Ipsilesional Paired Associated Stimulation (PAS)	Conventional Care	Motor function, performance of activities of daily living	+
Ipsilesional Paired Associated Stimulation (PAS)	Contralesional PAS or Bilateral PAS	Motor function, performance of activities of daily living	–
Transcutaneous Auricular Vagus Nerve Stimulation with Robotic Training	Sham transcutaneous auricular vagus nerve stimulation with Robotic Training	Spasticity	+
Transcutaneous Auricular Vagus Nerve Stimulation with Robotic Training	Sham transcutaneous auricular vagus nerve stimulation with Robotic Training	Motor function, muscle strength	–
Peripheral magnetic stimulation	conventional therapy	Performance of activities of daily living	+
Peripheral magnetic stimulation	conventional therapy	Spasticity, range of motion	–
Peripheral magnetic stimulation	conventional therapy	Motor function	=
Transcutaneous auricular vagus nerve stimulation with conventional rehab	Sham TA-VNS with conventional rehab	Motor function	+
Low-frequency repetitive transcranial magnetic stimulation with peripheral repetitive magnetic stimulation (rPMS) and rehabilitation	rehabilitation	Motor function, performance of activities of daily living, spasticity	+
Low-frequency repetitive transcranial magnetic stimulation with peripheral repetitive magnetic stimulation (rPMS) and rehabilitation	low-frequency repetitive transcranial magnetic stimulation with rehabilitation	Motor function, performance of activities of daily living, spasticity	+
High intensity laser therapy (HILT) with therapeutic exercises	Conventional exercise program	Motor function, muscle strength	+
Repetitive peripheral magnetic stimulation (rPMS) with intermittent theta burst stimulation and rehabilitation	sham rPMS with intermittent theta burst stimulation and rehabilitation	Motor function, performance of activities of daily living	–
Cyclic Neuromuscular Electrical Stimulation	Electromyographically-triggered Neuromuscular Electrical Stimulatiom or Sensory Stimulation	Motor function, performance of activities of daily living	–
Paired associative stimulation	Active peripheral electrical stimulation with Sham cortical stimulation	Motor function	–
Mirror therapy with Mesh glove afferent stimulation	Mirror therapy or Mirror Therapy with Sham	Motor function, dexterity, performance of activities of daily living, spasticity, proprioception	–
Mirror therapy with Mesh glove afferent stimulation	Mirror therapy	Dexterity, performance of activities of daily living	+
Mirror therapy with Mesh glove afferent stimulation	Mirror therapy	Motor function, spasticity, proprioception	–
Motor electrical stimulation involving cyclic (neuromuscular electrical stimulation) and electromyography	Percutaneous Sensory electrical stimulation	Motor function, performance of activities of daily living	–

Robot assisted therapy with Transcutaneous stim of vagus nerve tVNS	Robot assisted therapy with sham tVNS	Motor function	+
Peripheral nerve stimulation with modified constraint-induced movement therapy	Sham peripheral nerve stimulation with modified constraint-induced movement therapy	Motor function	+
Peripheral nerve stimulation with task oriented training	Sham stimulation with task oriented training	Motor function	+
Somatosensory Stimulation (peripheral nerve stimulation) with Intensive Task-Oriented Training	Sham Stimulation with Intensive Task-Oriented Training	Motor function	+
Assisted Motion, Biofeedback, and Antagonist Muscle Vibration delivered by a Robotic Device with UL rehabilitation	Placebo intervention with UL rehabilitation	Motor function	+
Assisted Motion, Biofeedback, and Antagonist Muscle Vibration delivered by a Robotic Device with UL rehabilitation	Placebo intervention with UL rehabilitation	Muscle strength, spasticity, range of motion	–
Intermittent theta burst stimulation with peripheral magnetic stimulation and conventional rehab	peripheral magnetic stimulation with central sham stimulation and conventional rehab	Spasticity	–
Intermittent theta burst stimulation with peripheral magnetic stimulation and conventional rehab	peripheral magnetic stimulation with central sham stimulation and conventional rehab	Motor function, performance of activities of daily living	=
Intermittent theta burst stimulation with peripheral magnetic stimulation and conventional rehab	intermittent theta burst stimulation with sham peripheral stimulation and conventional rehab	Motor function, performance of activities of daily living	+
Intermittent theta burst stimulation with peripheral magnetic stimulation and conventional rehab	intermittent theta burst stimulation with sham peripheral stimulation and conventional rehab	Spasticity	–
Bihemispheric transcranial direct current stimulation with Repetitive Peripheral Nerve Stimulation and Conventional Therapy	Sham transcranial direct current stimulation with Repetitive Peripheral Nerve Stimulation and Conventional Therapy	Motor function, spasticity	–
High-frequency repetitive transcranial magnetic stimulation with cervical nerve root magnetic stimulation	Sham high-frequency repetitive transcranial magnetic stimulation with Sham cervical nerve root magnetic stimulation	Motor function	+
High-frequency repetitive transcranial magnetic stimulation with cervical nerve root magnetic stimulation	Sham high-frequency repetitive transcranial magnetic stimulation with Sham cervical nerve root magnetic stimulation	Performance of activities of daily living, stroke severity	–
High-frequency repetitive transcranial magnetic stimulation with cervical nerve root magnetic stimulation	high-frequency repetitive transcranial magnetic stimulation with sham cervical nerve root magnetic stimulation	Performance of activities of daily living, stroke severity	–
High-frequency repetitive transcranial magnetic stimulation with cervical nerve root magnetic stimulation	high-frequency repetitive transcranial magnetic stimulation with sham cervical nerve root magnetic stimulation	Motor function	=
High-frequency repetitive transcranial magnetic stimulation with cervical nerve root magnetic stimulation	Sham high-frequency repetitive transcranial magnetic stimulation	Performance of activities of daily living	+

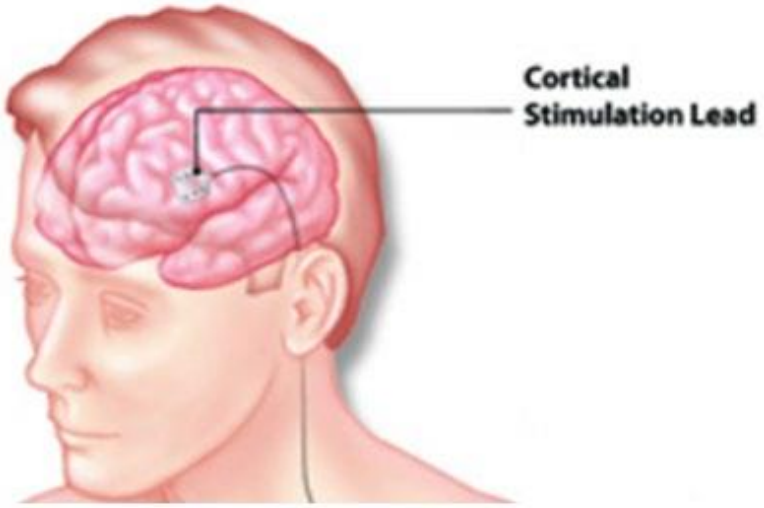
	with cervical nerve root magnetic stimulation		
High-frequency repetitive transcranial magnetic stimulation with cervical nerve root magnetic stimulation	Sham high-frequency repetitive transcranial magnetic stimulation with cervical nerve root magnetic stimulation	Stroke severity	−
High-frequency repetitive transcranial magnetic stimulation with cervical nerve root magnetic stimulation	Sham high-frequency repetitive transcranial magnetic stimulation with cervical nerve root magnetic stimulation	Motor function	=
High-frequency repetitive transcranial magnetic stimulation with sham cervical nerve root magnetic stimulation	Sham high-frequency repetitive transcranial magnetic stimulation with cervical nerve root magnetic stimulation	Motor function, performance of activities of daily living, stroke severity	−
Neuromuscular electrical stimulation with Conventional therapy	Conventional therapy	Motor function	=
Neuromuscular electrical stimulation with Conventional therapy	Peripheral Pulse Electromagnetic Waves (rPMS) with Conventional therapy	Motor function	−
Non-electrical somatosensory stimulation	sham	Muscle strength	+
Non-electrical somatosensory stimulation	sham	Spasticity, proprioception, dexterity	=
Repetitive peripheral nerve stimulation with anodal tDCS	repetitive peripheral nerve stimulation with sham tDCS	Motor function, muscle strength, dexterity	−
High intensity laser (HILT) with therapeutic exercise program and regular rehab	therapeutic exercise program with regular rehab	Performance of activities of daily living, stroke severity	+
High intensity laser (HILT) with therapeutic exercise program and regular rehab	therapeutic exercise program with regular rehab	Spasticity, range of motion	−
Suprascapular nerve pulsed radiofrequency	Suprascapular Nerve Block with lidocain	Performance of activities of daily living, range of motion	+
Pulsed Radiofrequency with rehabilitation therapy	Intra-articular corticosteroid injection with rehabilitation therapy	Range of motion	−
Paired associative stimulation (PAS) with Motor imagery	Sham PAS with motor imagery	Range of motion	−
Suprascapular nerve block	Ultrasound	Range of motion	−
Non invasive transcutaneous electrical nerve stimulation with conventional treatment (NSAID, Exercise and activities of daily living instructions)	Ultrasound therapy with conventional treatment (NSAID, Exercise and activities of daily living instructions)	Range of motion, muscle strength	+
Active repetitive peripheral nerve sensory stimulation (RPPS) with sham transcranial direct current stimulation	Sham RRPS with sham transcranial direct current stimulation	Range of motion, muscle strength	−
Active repetitive peripheral nerve sensory stimulation (RPPS) with sham transcranial direct current stimulation	Sham RRPS with Anodal transcranial direct current stimulation or Active RRPS and active transcranial direct current stimulation	Range of motion, muscle strength	−
Therapeutic ultrasound	sham	Range of motion	−

High-Frequency repetitive transcranial magnetic stimulation with Peripheral Somatosensory Stimulation (sensory level electrical stimulation and vibratory stimulation)	Sham repetitive transcranial magnetic stimulation with Peripheral Somatosensory Stimulation	Proprioception	–
High-Frequency repetitive transcranial magnetic stimulation with Peripheral Somatosensory Stimulation (sensory level electrical stimulation and vibratory stimulation)	Low-Frequency repetitive transcranial magnetic stimulation with Peripheral Somatosensory Stimulation	Proprioception	=
High-frequency repetitive peripheral magnetic stimulation with conventional treatment	sham stimulation with conventional treatment	Muscle strength	+
Repetitive sensory stimulation with Robot-assisted arm training	Sham stimulation with Robot-assisted arm training	Motor function, muscle strength, proprioception, dexterity	–
Paired associative stimulation (rTMS with rPMS) and physiotherapy	rTMS with physiotherapy	Motor function, performance of activities of daily living	–
EMG paired taVNS with TST	Active unpaired taVNS with TST	Motor function	–
Cerebello-Motor paired associated stimulation (PAS) with physiotherapy	Sham with physiotherapy	Motor function, muscle strength	–
Limb Ischemic Post-Conditioning	Sham treatment	Stroke severity	+
Vagus Nerve Stimulation with rehab	Conventional care	Motor function, muscle strength, dexterity	–
Peripheral nerve stimulation	usual care	Motor function, muscle strength, range of motion	–
Repetitive peripheral nerve sensory stim (RPSS) with Motor Training	Sham with Motor Training	Motor function	+
PNES with Task Specific Training	Task-Specific Training	Motor function, muscle strength, dexterity	–
Transcutaneous auricular vagus nerve stimulation (tVNS)	sham	Motor function, performance of activities of daily living	+
Transcutaneous auricular vagus nerve stimulation (tVNS)	sham	Stroke severity	–
Peripheral Nerve Stimulation combined with other interventions	sham or task-specific training	Motor function, performance of activities of daily living	–
Peripheral Nerve Stimulation combined with other interventions	sham or task-specific training	Muscle strength	=
Proprioceptive Training (involving passive and active movements with visual feedback)	Nonspecific sensory stimulation	Motor function, proprioception	+
Proprioceptive Training (involving passive and active movements with visual feedback)	Nonspecific sensory stimulation	Performance of activities of daily living, dexterity	–
RTMS with Sham TENS with Mirror therapy and Nonelectrical somatosensory stimulation	Sham rTMS with Sham TENS with Mirror therapy and Nonelectrical somatosensory stimulation	Proprioception, performance of activities of daily living, dexterity	–
RTMS with Sham TENS with Mirror therapy and Nonelectrical somatosensory stimulation	Sham rTMS with Sham TENS with Mirror therapy and Nonelectrical somatosensory stimulation	Motor function	=

Sham rTMS with TENS with Mirror therapy and Nonelectrical somatosensory stimulation	Sham rTMS with Sham TENS with Mirror therapy and Nonelectrical somatosensory stimulation	Proprioception, performance of activities of daily living, dexterity	–
Sham rTMS with TENS with Mirror therapy and Nonelectrical somatosensory stimulation	Sham rTMS with Sham TENS with Mirror therapy and Nonelectrical somatosensory stimulation	Motor function	=
RTMS with TENS with Mirror therapy and Nonelectrical somatosensory stimulation	Sham rTMS with Sham TENS with Mirror therapy and Nonelectrical somatosensory stimulation	Motor function, performance of activities of daily living	+
RTMS with TENS with Mirror therapy and Nonelectrical somatosensory stimulation	Sham rTMS with Sham TENS with Mirror therapy and Nonelectrical somatosensory stimulation	Proprioception, dexterity	–
Task practice therapy with TheraBracelet stimulation	task practice therapy with sham stimulation	Dexterity	+
Task practice therapy with TheraBracelet stimulation	task practice therapy with sham stimulation	Motor function	–
Mirror therapy with Mesh glove	Mirror therapy	Motor function, dexterity	+
Mirror therapy with Mesh glove	Mirror therapy	Spasticity, performance of activities of daily living	–
Sensory-enhanced robot-aided motor training (SERMT)	Robot-aided motor training (RMT)	Motor function	–
Cable orthosis with Virtual Reality	Virtual Reality	Motor function, muscle strength, spasticity, range of motion, dexterity	–
Pneumatic orthosis with Virtual Reality	Virtual Reality	Motor function, muscle strength, spasticity, range of motion, dexterity	–
Generalized somatosensory discrimination training	Repeated exposure to sensory stimuli	Proprioception	+
Medial nerve (somatosensory) stimulation	Sham stimulation	Muscle strength	+
LASER therapy	Interferential current treatment	Performance of activities of daily living	–

Invasive Central Nervous System Stimulation

Invasive Cortical and Nerve Electrode Implant Stimulation



Adapted from: https://www.medgadget.com/2008/01/brain_stimulation_device_for_stroke_victims_fails_clinical_trial.html

A total of seven RCTs were found that evaluated invasive cortical and nerve electrode implant stimulation for upper extremity motor rehabilitation. One RCT compared invasive cortical and nerve electrode implant stimulation combined with other interventions with task-specific training (Levy et al. (2016)). Two RCTs compared invasive cortical and nerve electrode implant stimulation with sham (Dawson et al. (2021); Kimberley et al. (2018)). Four RCTs compared invasive cortical and nerve electrode implant stimulation with conventional therapy (Li R. et al. (2022); Levy et al. (2008); Brown et al. (2006); Salter et al. (2004)).

The methodological details and results of all seven RCTs are presented in Table 28.

Table 28. RCTs Evaluating Invasive Cortical and Nerve Electrode Implant Stimulation for Upper Extremity Motor Rehabilitation

Authors (Year) **Study Design (PEDro Score)** **Sample Size start** **Sample Size end** **Time post stroke category** **Study design**	**Interventions** **Duration: Session length, frequency per week for total number of weeks**	**Outcome Measures** **Result (direction of effect)**
Invasive cortical and nerve electrode implant stimulation combined with other interventions compared to task-specific training		
Levy et al. (2016) RCT (6) NStart=164 NEnd=147 TPS=Chronic A + B vs A/B *Also in Table 4 (Task-Specific Training)*	E: Electrical Epidural Motor Cortex Stimulation (EECS) + Task specific Training C: Task-specific training Duration: 6wks	E vs C: Arm Motor Ability Test (-) FMAUE (-)
Invasive cortical and nerve electrode implant stimulation compared to sham		
Dawson et al. (2021) RCT (8) NStart=108 NEnd=106	E: Vagus Nerve Stimulation + conventional physiotherapy C: Sham VNS + conventional physiotherapy	E vs C: FMA-UE (+exp) WMFT (+exp) MAL (-)

TPS=Chronic A vs 0	Duration: In-clinic portion:90min, 3d/wk, 6wks; Post clinic portion: 30m/everyday	SIS (-) SS-QOL (-) EQ-5D (-) BDI (-)
Kimberley et al. (2018) RCT Crossover (9) NStart=17 NEnd=16 TPS=Chronic A vs 0	E: Active vagus nerve stimulation (VNS) + rehabilitation C: Sham VNS + rehabilitation Duration: 3x/wk for 6 wks in clinic rehab + 90d at home therapy, then crossover and repeat	E vs C: Fugl-Meyer Assessment Upper Extremity (-) Wolf Motor Function Test Functional: (+exp) Time: (-) Box and Block Test: (-) Nine Hole Peg Test (-) Stroke Impact Scale: (-) Motor Activity Log: (-)
Invasive cortical and nerve electrode implant stimulation compared to conventional therapy		
Li R. et al. (2022) RCT (6) NStart=63 NEnd=63 TPS=Subacute A vs 0	E: Invasive median nerve stimulation + conventional rehab C: conventional rehab Duration: 20min/d 1d/wk for 4wks stimulation & 30-40min/d 5-6d/wk for 4wks conventional therapy	E vs C: FMA-UE (+exp) FTHUE (+exp) Hand Function Ranking Scale (+exp) Brunnstrom (+exp) BI (+exp)
Levy et al. (2008) Pilot RCT (4) NStart=24 NEnd=24 TPS=Chronic A vs 0	E: Motor cortex stimulation + conventional rehabilitation C: Conventional Rehabilitation Duration: 2.5h/d, 6wk rehabilitation therapy	E vs C: Arm Motor Ability Test (-) FMAUE (+exp)
Brown et al. (2006) Pilot RCT (5) NStart=10 NEnd=8 TPS=Chronic A vs 0	E: Motor Cortex stimulation + Conventional care C: Conventional care Duration: 1.5hr session/d, 5d/wk, 3wks	E vs C: Upper extremity FMA (+exp) SIS (+exp) Arm Motor Ability Test
Salter et al. (2004) RCT Crossover (1) NStart=15 NEnd=8 TPS=Acute A vs 0	E: Theraputic Electrical Stimulation implant (injectable microstimulator) C: Conventional Therapy Duration: 10-30min/session, 3sessions/d, 6-12weeks-	E vs C: Shoulder Subluxation reversal (No stats) shoulder AROM (no stat) shoulder PROM (no stat) arm pain-VAS (no stat), shoulder strength (no stst) arm muscle thickness (no stat)

Abbreviations and table notes: C=control group; D=days; E=experimental group; H=hours; Min=minutes; RCT=randomized controlled trial; TPS=time post stroke category (Acute: less than 30 days, Subacute: more than 1 month but less than 6 months, Chronic: over 6 months); Wk=weeks.

+exp indicates a statistically significant between groups difference at α=0.05 in favour of the experimental group

+exp1/+exp2/+exp3 indicates a statistically significant between groups difference at α=0.05 in favour of the first, second or third experimental group

+con indicates a statistically significant between groups difference at α=0.05 in favour of the control group

- indicates no statistically significant between groups differences at α=0.05

1. Body Functions and Structures

MOTOR FUNCTION			
LoE	**Conclusion Statement**	**RCTs**	**References**
1b	Electrical Epidural Motor Cortex Stimulation (EECS) with Task specific Training may not have a difference in efficacy when compared to Task-specific training for improving motor function.	1	Levy et al. (2016)
1a	There is conflicting evidence about the effect of Invasive cortical and nerve electrode implant stimulation when compared to sham for improving motor function.	2	Dawson et al. (2021); Kimberley et al. (2018)
1b	Invasive cortical and nerve electrode implant stimulation may produce greater improvements in motor function than conventional therapy.	3	Li R. et al. (2022); Levy et al. (2008); Brown et al. (2006)

STROKE SEVERITY			
LoE	**Conclusion Statement**	**RCTs**	**References**
1b	Invasive cortical and nerve electrode implant stimulation may produce greater improvements in stroke severity than conventional therapy.	1	Li R. et al. (2022)

2. Activities

ACTIVITIES OF DAILY LIVING			
LoE	**Conclusion Statement**	**RCTs**	**References**
1b	Electrical Epidural Motor Cortex Stimulation (EECS) with Task specific Training may not have a difference in efficacy when compared to Task-specific training for improving performance of activities of daily living.	1	Levy et al. (2016)
1a	Invasive cortical and nerve electrode implant stimulation may not have a difference in efficacy when compared to sham for improving performance of activities of daily living.	2	Dawson et al. (2021); Kimberley et al. (2018)
1b	There is conflicting evidence about the effect of Invasive cortical and nerve electrode implant stimulation when compared to conventional therapy for improving performance of activities of daily living.	2	Li R. et al. (2022); Levy et al. (2008)

DEXTERITY			
LoE	**Conclusion Statement**	**RCTs**	**References**
1b	Invasive cortical and nerve electrode implant stimulation may not have a difference in efficacy when compared to sham for improving dexterity.	1	Kimberley et al. (2018)

Key Points

- Electrical Epidural Motor Cortex Stimulation (EECS) with Task specific Training may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Task-specific training.
- Invasive cortical and nerve electrode implant stimulation may not be beneficial for improving performance of activities of daily living and dexterity after stroke when compared to sham; the literature is mixed regarding motor function.

- Invasive cortical and nerve electrode implant stimulation may be beneficial for improving motor function and stroke severity after stroke when compared to conventional therapy; the literature is mixed regarding performance of activities of daily living.

Summary of Key Points: Invasive Cortical and Nerve Electrode Implant Stimulation

Intervention	Control(s)	Function domain(s)	Effect
Electrical Epidural Motor Cortex Stimulation (EECS) with Task specific Training	Task-specific training	Motor function, performance of activities of daily living	–
Invasive cortical and nerve electrode implant stimulation	sham	Performance of activities of daily living, dexterity	–
Invasive cortical and nerve electrode implant stimulation	sham	Motor function	=
Invasive cortical and nerve electrode implant stimulation	conventional therapy	Motor function, stroke severity	+
Invasive cortical and nerve electrode implant stimulation	conventional therapy	Performance of activities of daily living	=

Non-Invasive Brain Stimulation

Repetitive Transcranial Magnetic Stimulation (rTMS)



Adapted from: https://www.rtmscentre.co.uk/rtms-treatment-in-the-uk/

A total of 101 RCTs were found that evaluated repetitive transcranial magnetic stimulation (rTMS) for upper extremity motor rehabilitation. 21 RCTs compared low-frequency rTMS with sham (Qian et al. (2024); Gottlieb et al. (2021); Revill et al. (2020); Sharma et al. (2020); Meng & Song (2017); Du et al. (2016); Lüdemann-Podubecká et al. (2016); Blesneag et al. (2015); Lüdemann-Podubecká et al. (2015); Matsuura et al. (2015); Mello et al. (2015); BarrosGalvao et al. (2014); Wang et al. (2014a); Etoh et al. (2013); Avenanti et al. (2012); Seniow et al. (2012); Khedr et al. (2010); Khedr et al. (2009a); Liepert et al. (2007); Mansur et al. (2005); Takeuchi et al. (2005)). Eighteen RCTs compared RTMS with sham (Aydin et al. (2024); Zhao L. et al. (2024); Sengul et al. (2023); Wang et al. (2023d); Wang et al. (2022); Chen et al. (2021c); Chen et al. (2021d); Chiu et al. (2020); Du et al. (2019); Chervyakov et al. (2018); Long et al. (2018); Guan et al. (2017); Sankarasubramanian et al. (2017); Sasaki et al. (2013); Emara et al. (2010); Khedr et al. (2010b); Khedr et al. (2009b); Fregni et al. (2006)). Six RCTs compared high-frequency rTMS with sham (Valovicová et al. (2024); Ibrahim et al. (2020); Ke et al. (2020); Choi et al. (2018); Gu et al. (2017); Hosomi et al. (2016)). Two RCTs compared low-frequency rTMS combined with other interventions with task-specific training or sham (Higgins et al. (2015); Takeuchi et al. (2008)). One RCT compared low-frequency rTMS combined with other interventions with sham or peripheral nerve stimulation (Tarri et al.

(2018)). Two RCTs compared high-frequency rTMS combined with other interventions with high-frequency rtms (Kim & Yim et al. (2018); Cho et al. (2017)). Three RCTs evaluated low-frequency rTMS combined with other interventions (Miu et al. (2020); Sung et al. (2013); Takeuchi et al. (2012)). Six RCTs compared low-frequency rTMS combined with other interventions with sham or task-specific training (Edwards et al. (2023); Luk et al. (2022); Kim et al. (2020a); Harvey et al. (2018); Rose et al. (2014); Vongvaivanichakul et al. (2014)). One RCT compared low-frequency rTMS combined with other interventions with low-frequency rtms (Noh et al. (2019)). Two RCTs compared low-frequency rTMS combined with other interventions with conventional therapy (Kim et al. (2020c); Tosun et al. (2017)). One RCT compared low-frequency rTMS combined with other interventions with acupuncture (Zhao et al. (2018)). Six RCTs compared low-frequency rTMS combined with other interventions with sham (Pipatsrisawat et al. (2022); Meng et al. (2020); BoninPinto et al. (2019); Li et al. (2016b); Wang et al. (2014b); Pomeroy et al. (2007)). Two RCTs compared low-frequency rTMS with conventional therapy (Lv Y. et al. (2023); El-Tamawy et al. (2019)). One RCT evaluated high-frequency rTMS combined with other interventions (Kwon et al. (2014)). One RCT compared RTMS combined with other interventions with sensory stimulation or sham (Pundik et al. (2021)). One RCT compared high-frequency rTMS combined with other interventions with cimt or sham (Malcolm et al. (2007)). One RCT compared RTMS combined with other interventions with rtms or sham (Kwon et al. (2016)). Two RCTs compared RTMS combined with other interventions with sham or task-specific training (Abdelkader et al. (2024); Chang et al. (2012)). One RCT compared low-frequency rTMS combined with other interventions with sham or brunnstrom movement therapy (Ozkeskin et al. (2017)). Six RCTs compared different approaches to rtms (Cha, HG et al. (2024); Mahmoud W. et al. (2024); Gao et al. (2023); Cassidy et al. (2015); Sasaki et al. (2014); Takeuchi et al. (2009)). Two RCTs compared RTMS with conventional therapy (Petruseviciene et al. (2023); Askin et al. (2017)). One RCT compared low-frequency rTMS combined with other interventions with cimt (Abo et al. (2014)). One RCT compared low-frequency rTMS combined with other interventions with sham or virtual reality training (Zheng et al. (2015)). One RCT compared high-frequency rTMS with conventional therapy (Haghighi F.M. et al. (2021)). One RCT compared high-frequency rTMS combined with other interventions with high-frequency rtms or strength training (Yang Y. et al. (2021)). One RCT compared low-frequency rTMS combined with other interventions with fes (Yang et al. (2022b)). Two RCTs compared high-frequency rTMS combined with other interventions with sham or motor relearning programmes (Lee et al. (2024a); Shim & Lee (2023)). One RCT compared high-frequency rTMS combined with other interventions with conventional therapy (Rezaei et al. (2023)). Three RCTs compared high-frequency rTMS combined with other interventions with sham (Wu X. et al. (2023); de Freitas Zanona A. et al. (2023); de Freitas Zanona A. et al. (2022)). One RCT compared RTMS combined with other interventions with tdcs or sham (D'Agata et al. (2016)). One RCT compared high-frequency rTMS combined with other interventions with sham or task-specific training (Kim et al. (2014b)). One RCT compared low-frequency rTMS combined with other interventions with sham or exercise and custom physiotherapy protocols (Conforto et al. (2012)). One RCT compared paired associative stimulation (ccPAS) with sham (Xing et al. (2024)).

In addition, 15 RCTs in which repetitive transcranial magnetic stimulation (rTMS) formed part of a combined or comparative intervention are cross-referenced at the end of Table 29; their primary listings appear in other tables.

The methodological details and results of all 101 RCTs are presented in Table 29.

Table 29. RCTs Evaluating Repetitive Transcranial Magnetic Stimulation (rTMS) for Upper Extremity Motor Rehabilitation

Authors (Year) **Study Design (PEDro Score)** **Sample Size start** **Sample Size end** **Time post stroke category** **Study design**	**Interventions** **Duration: Session length, frequency per week for total number of weeks**	**Outcome Measures** **Result (direction of effect)**
Low-frequency rTMS compared to sham		
Qian et al. (2024) RCT (7) NStart=88 NEnd=81 TPS=Subacute A vs 0	E: rTMS + conventional rehab C: Sham rTMS + conventional rehab Duration: 1hr/d(20min rTMS, 40min conventional), 5d/wk, 4wks	C2 vs C1: NIHSS (-) FMA-UE (-) SAFE (-) BI (-) MEP rMT unaffected (-)

		MEP amplitude unaffected (-) CMCT unaffected (-) rMT affected (-) MEP amplitude affected (-) CMCT affected (-) IHA (-) E2 vs C2: NIHSS (+exp2) FMA-UE (+exp2) SAFE (-) BI (-) MEP rMT unaffected (+exp2) MEP amplitude unaffected (+exp2) CMCT unaffected (+exp2) rMT affected (+exp2) MEP amplitude affected (+exp2) CMCT affected (+exp2) IHA (+exp2) E1 vs C1: NIHSS (-) FMA-UE (-) SAFE (-) BI (-) MEP rMT unaffected (-) MEP amplitude unaffected (-) CMCT unaffected (-) rMT affected (-) MEP amplitude affected (-) CMCT affected (-) IHA (-) E2 vs E1: NIHSS (+exp2) FMA-UE (+exp2) SAFE (+exp2) BI (+exp2) MEP rMT unaffected (-) MEP amplitude unaffected (-) CMCT unaffected (-) rMT affected (-) MEP amplitude affected (-) CMCT affected (-) IHA (-)
Gottlieb et al. (2021) RCT (6) NStart=35 NEnd=28 TPS=Subacute A vs 0	E: Low frequency (Inhibitory) rTMS+ standard rehab (including passive electrical estimulation) C: sham rTMS+ standard rehab (including passive electrical estimulation) Duration: rTMS + 40min rehab, 5d/wk, 2wks	E vs C: Modified Ashworth Scale (-) FMA-UE (-) resting-state fMRI - functional connectivity (-)
Revill et al. (2020)	E: Low-Frequency rTMS (hebbian type)	E vs C:

RCT (7) NStart=22 NEnd=20 TPS=Chronic A vs 0	C: Sham Stimulation Duration: 30min training, 5d	Jebsen-Taylor Hand Function Test (-) Motor Activity Log (-) fMRI BOLD signal
Sharma et al. (2020) RCT (9) NStart=100 NEnd=96 TPS=Acute A vs 0	E: Low Frequency rTMS + conventional physical therapy C: Sham rTMS + conventional physical therapy Duration: 10 sessions/2wks + 45min/d physical therapy	E vs C: Modified Barthel (-) National Institute of Stroke Scale (-) Modified Rankin Scale (-) FMA-UE (-) LE (-) Hamilton Depression Scale (-)
Meng & Song (2017) RCT (5) NStart=20 NEnd=20 TPS=Subacute A vs 0	E: Low Frequency (1Hz) Repetitive Transcranial Magnetic Stimulation to unaffected hemisphere C: Sham Repetitive Transcranial Magnetic Stimulation Duration: 30 min/d, 7d/wk for 2wk	E vs C: National Institute of Health Stroke Scale (+exp) Barthel Index (+exp) Fugl-Meyer Assessment (+exp)
Du et al. (2016) RCT (8) NStart=69 NEnd=55 TPS=Acute A1 vs A2 vs 0	E1: 3Hz rTMS + Standard PT E2: 1Hz rTMS + Standard PT C: Sham rTMS + Standard PT Duration: 30min/d, 5d/wk for 1wk; 1hr/d of PT	E1/E2 vs C: FMA Medical research council NIHSS BI modified Rankin scale Resting motor threshold MEP amplitude, latency
Lüdemann-Podubecká et al. (2016) RCT Crossover (9) NStart=10 NEnd=10 TPS=Subacute A vs 0	E: Low frequency (1Hz) rTMS C: Sham rTMS Duration: 1x15min, 48hr washout	E vs C: JTHFT Affected hand (+exp) Non-affected hand (-) BBT Affected hand (+exp) Non-affected hand (-) Resting motor threshold (-) MEP amplitude (-) Cortical silent period (-) Ipsilateral silent period (-)
Blesneag et al. (2015) RCT (5) NStart=16 NEnd=16 TPS=Acute A vs 0	E: Low frequency rTMS C: Sham condition Duration: 20min/d, 5d/wk, 2wks	E vs C: Fugl-Meyer Assessment Upper Extremity: (-) rMT parameters (-) RP parameters (-) AM parameter (-) Amax parameter (-)
Lüdemann-Podubecká et al. (2015) RCT (8) NStart=40 NEnd=33 TPS=Subacute A vs 0	E: Low frequency (1Hz) rTMS + standard motor training C: Sham rTMS + standard motor training Duration: 15min/d for 15ds rTMS/sham & 30 min/d for 15ds task-oriented training	E vs C: WMFT (+exp) Finger tapping (-) Motor evaluation scale for upper extremity (+exp) MEP
Matsuura et al. (2015)	E: Low frequency rTMS	E vs C:

RCT (7) NStart=20 NEnd=20 TPS=Acute A vs 0	C: Sham Duration: 20min/d, 5 consecutive days	Fugl-Meyer Assessment Upper Extremity (+exp) Purdue Pegboard Test: (+exp) Grip Strength: (-) Movement-related cortical potential (-)
Mello et al. (2015) Pilot RCT (6) NStart=34 NEnd=18 TPS=Acute A vs 0	E: Low-Frequency rTMS C: Sham Stimulation Duration: 25min, 5x/wk, 2wks	E vs C: Intracortical Facilitation (+exp) Resting Motor Threshold (-) Intracortical Inhibition (-)
BarrosGalvao et al. (2014) RCT (8) NStart=20 NEnd=18 TPS=Chronic A vs 0	E: Low frequency rTMS + conventional physiotherapy C: Sham + conventional physiotherapy Duration: rTMS: 1 session/day, 3d/wk, 10 sessions; Conventional therapy: 30 mins/d, 3 ds/wk, 10ds	E vs C: Modified Ashworth scale (+exp) FMA-UE (-) FIM (-) passive RoM (-) Stroke specific quality of life (SSQOL) (-) magnetic stimulator output (+exp) spinal excitability (Hmax,Mmax ratio)
Wang et al. (2014a) RCT (7) NStart=44 NEnd=44 TPS=Chronic A1 vs A2 vs 0	E1: Low frequency (1Hz) rTMS applied to primary motor cortex + conventional rehab E2: Low frequency (1Hz) rTMS applied to premotor area + conventional rehab C: Sham rTMS+ conventional rehab Duration: rTMS: 20min/d, 10 consecutive days; physical therapy (1 h daily, 3 times per wk) and occupational therapy (1 h daily, 2 times per wk)	E1/ E2 vs C: Wolf Motor Function Test (+exp1, +exp2) Fugl-Meyer Assessment (+exp1, +exp2) Medical Research Council Scale (+exp1, +exp) E1 vs E2: Wolf Motor Function Test (+exp1) Fugl-Meyer Assessment (+exp1) Medical Research Council Scale (+exp1)
Etoh et al. (2013) RCT Crossover (6) NStart=18 NEnd=18 TPS=Chronic A vs 0	E1: Motor rTMS C: Sham rTMS Duration: 1x/d/, 5d/wk for 2 wks rTMS or sham followed by 1x/d, 5d/wk for 2 wks rTMS or sham	E1 vs C: FMA (+exp) ARAT (+exp) MAS (-) STEF (+exp) F-mean to the M-response amplitude (F/M ratio) affected (-) unaffected (+exp)
Avenanti et al. (2012) RCT (8) NStart=30 NEnd=30 TPS=Chronic A1 vs A2 vs 0	E1: rTMS pre-exercise + conventional physiotherapy E2: rTMS post-exercise + conventional physiotherapy C1: Sham rTMS pre-exercise + conventional physiotherapy C2: Sham rTMS post-exercise + conventional physiotherapy Duration: 1Hz 1x/d, 10d	E1 vs E2 vs C1 vs C2: Jebsen-Taylor Hand Function Test (no stat) Nine Hole Peg Test (no stat) Box and Block Test (no stat) Grip Strength power (no stat) key (no stat) Tip pinch force (no stat) EMG Measures (no stat) resting motor threshold (no stat)
Seniow et al. (2012) RCT (8) NStart=40 NEnd=33	E: low frequency rTMS + physiotherapy (usual for their rehab center) C: sham rTMS + physiotherapy Duration: 75min/d, 5d/wk for 3wk	E vs C: Wolf Motor Function Test functional ability scale (-) time (-)

TPS=Subacute A vs 0		Fugl-Meyer Assessment (-) National Institutes of Health Stroke Scale (-)
Khedr et al. (2010a) RCT (6) NStart=22 NEnd=20 TPS=Subacute A vs 0	E: Repetitive transcranial magnetic stimulation (3Hz) + Conventional therapy C: Sham rTMS + Conventional therapy Duration: 10min/d, 5d rTMS or sham	E vs C: Lateral medullary infarction patients Dysphagia Grade (+exp) Barthel Index (+exp) NIHSS (-) Handgrip Strength (-) Brainstem Infarction Patients Dysphagia Grade (+exp) Barthel Index (-) NIHSS (-) Handgrip Strenght (-)
Khedr et al. (2009a) RCT (8) NStart=36 NEnd=36 TPS=Acute A1 vs A2 vs 0	E1: 1Hz rTMS E2: 3Hz rTMS C: Sham rTMS Duration: 15 mins/d, 5ds/wk, 1wk	E1+ E2 vs C: Grip strength MRCS (+exp1,+exp2) Keyboard tapping (+exp1, +exp2) Purdue Pegboard task (+exp1,+exp2) Barthel Index (+exp1) NIHSS (+exp1,+exp2) Active motor threshold (no between group) MEP amplitude (no between group) E1 vs E2: Grip strength MRCS (-) Purdue Pegboard task (+exp1) Barthel Index (-) NIHSS (+exp1) keyboard tapping (+exp1) Active motor threshold (no between group) MEP amplitude (no between group)
Liepert et al. (2007) RCT Crossover (6) NStart=12 NEnd=12 TPS=Acute A vs 0	E: low 1Hz rTMS C: Sham Duration: 1x3hr period, 30min washout	E vs C: Grip strength (+exp) 9HPT (-)
Mansur et al. (2005) RCT Crossover (3) NStart=10 NEnd=8 TPS=Not Reported A vs 0	E: Low frequency (1Hz) rTMS C: Sham rTMS Duration: 3 sessions, 1hr washout	E vs C: Finger tapping test (-) Perdue Pegboard test (+exp) Simple reaction time-hand (+exp) Four-choice reaction time-hand (+exp)
Takeuchi et al. (2005) RCT (6) NStart=20 NEnd=20 TPS=Chronic A vs 0	E: Low Frequency (1Hz) rTMS C: Sham rTMS Duration: 25min/d, 3d/wk for 5wk	E vs C: Pinch force (-) Acceleration (+exp) Amplitude of MEPs (+exp) Transcallosal inhibition duration (+exp) Resting motor threshold (+exp)
RTMS compared to sham		
Aydin et al. (2024)	E: rTMS + Conventional rehabilitation	E vs C:

RCT (6) NStart=22 NEnd=18 TPS=Subacute A vs 0	C: Sham rTMS + Conventional rehabilitation Duration: 20min/d, 5d/wk for 3wks	NRS-pain (-) Brief Pain Inventory (+exp) Quick DASH (-) Hospital Depression Anxiety Scale depression (+exp) anxiety (+exp) PROM (-) resting motor threshold (-)
Zhao L. et al. (2024) RCT (7) NStart=54 NEnd=48 TPS=Acute A1 vs A2 vs 0	E1: rTMS - M1 area + routine rehab E2: rTMS - SMA + routin rehab C: Sham rTMS + routin rehab Duration: 20min/d, 5d/wk, 4wks	E1/E2 vs C: FMA - UE (+exp2) FMA - LE (+exp2) BBS (+exp2) E1 vs E2: FMA - UE (-) FMA - LE (-) BBS (+exp2)
Wang et al. (2023d) RCT (6) NStart=240 NEnd=240 TPS=Acute A1 vs A2 vs 0	E1: Low-frequency rTMS + routine rehabilitation E2: High-frequency rTMS + routine rehabilitation C: Sham rTMS + routine rehabilitation Duration: E1: 40min/d, 6d/wk for 3wks rTMS + 120min/d 6d/wk for 3wks rehabilitation, E2: 15min/d, 6d/wk for 3wks rTMS + 120min/d 6d/wk for 3wks rehabilitation, C: 15min/d, 6d/wk for 3wks rTMS + 120min/d 6d/wk for 3wks rehabilitation	E1/E2 vs C: NIHSS (+exp1/2) mRS (+exp1/2) FMA-UE (+exp1/2) FMA-LE (+exp1/2) BBS (+exp1/2) mBI (+exp1/2) MEP latency (+exp1/2) E1 vs E2: NIHSS (+exp1) mRS (+exp1) FMA-UE (+exp1) FMA-LE (+exp1) BBS (-) mBI (+exp1) MEP latency (+exp1)
Sengul et al. (2023) Pilot RCT (9) NStart=37 NEnd=37 TPS=Chronic A1 vs A2 vs 0	E1: Low frequency rTMS E2: High frequency rTMS C: Sham rTMS Duration: 30min, single session	E1 vs E2 vs C: MAS (-) MEP amplitude (-)
Wang et al. (2022) RCT (7) NStart=60 NEnd=58 TPS=Subacute A1 vs A2 vs 0	E1: HF-rTMS + conventional care E2: LF-rTMS + conventional care C: Sham rTMS + conventional care Duration: 18 min/d rTMS + 25min 2x/d for 21d routine rehabilitation	E1 vs E2 vs C: High CSTI E1/E2 vs C: FMA-UE (+exp2) WMFT (+exp2) MBI (+exp2) E1 vs E2: FMA-UE (+exp2) WMFT (+exp2) MBI (+exp2) Low CSTI: E1/E2 v C: FMA-UE (+exp1) WMFT (+exp1) MBI (+exp1)

		E1 vs E2: FMA-UE (+exp1) WMFT (+exp1) MBI (+exp1)
Chen et al. (2021c) RCT (7) NStart=48 NEnd=44 TPS=Acute A vs 0	E: rTMS + Routine PT C: Sham rTMS + Routine PT Duration: 30min/d, 5d/wk, 4wks	E vs C: FMA (+exp) BI (+exp) mRS (+exp) MMSE (+exp)
Chen et al. (2021d) RCT (8) NStart=128 NEnd=100 TPS=Acute A1 vs A2 vs 0	E1: rTMS (1Hz-10Hz) + Standard Physiotherapy E2: rTMS (10Hz) + Sham + Standard Physiotherapy E3: rTMS (1Hz) + Sham + Standard Physiotherapy C: Sham + Standard Physiotherapy Duration: rTMS/Sham 1 session, 30min/d, 5d/wk for 4wk Standard Physiotherapy	E1/E2/E3 vs C: National Institutes of Health Stroke Scale (NIHSS) (+exp1) modified Rankin Scale (mRS) (+exp1) Fugl-Meyer Assessment Upper Extremity (FMA-UL) (+exp1) Mini Mental State Examination (MMSE) (-) 24-Item Hamilton Depression Rating Scale (HAMD) (-) BI (+exp1) MEP (+exp1) resting motor threshold (+exp1)
Chiu et al. (2020) RCT (7) NStart=31 NEnd=29 TPS=Chronic A vs 0	E: Transcranial Rotating Permanent Magnetic Stimulation (Dual rTMS) C: Sham Stimulation Duration: 40min, 5x/wk, 4wks	E vs C: Fugl-Meyer Assessment (-) Action Research Arm Test (-) Grip Strength (-) Pinch Strength (-) Timed Up and Go Test (-) National Institutes of Health Stroke Scale (-) fMRI measures
Du et al. (2019) RCT Crossover (9) NStart=60 NEnd=53 TPS=Acute A1 vs A2 vs 0	E1: High-frequency rTMS (10Hz) + conventional therapy E2: Low-frequency (1Hz) rTMS + conventional therapy C: Sham rTMS Duration: High frequency rTMS: 2 mins/d, 5d/wk, 1wk rTMS; Low frequency rTMS: 20 mins/d; 5ds/wks, 1wk; Conventional therapy: 60min/d, 5ds/wk;	E1 vs C: FMA (+exp1) modified Rankin Scale (+exp1) Resting motor threshold affected hemisphere (+exp1) unaffected hemisphere (+exp1) MEP latency affected hemisphere (-) unaffected hemisphere (-) MEP amplitude affected hemisphere (-) unaffected hemisphere (-) Corticomotor conduction time affected hemisphere (+exp1) unaffected hemisphere (-) rTMS-induced changes in fMRI activation within the motor cortex during movement of the affected hand ipsilateral M1 (-) contralesional M1 (+exp1) SMA (+exp1) E2 vs C: FMA (+exp2)

		modified Rankin Scale (+exp2) Resting motor threshold affected hemisphere (+exp2) unaffected hemisphere (-) MEP latency affected hemisphere (-) unaffected hemisphere (-) MEP amplitude affected hemisphere (-) unaffected hemisphere (-) Corticomotor conduction time affected hemisphere (+exp2) unaffected hemisphere (-) rTMS-induced changes in fMRI activation within the motor cortex during movement of the affected hand ipsilateral M1 (-) contralesional M1 (+exp2) SMA (-) E1 vs E2: FMA (no stat) modified Rankin Scale (no stat) Resting motor threshold affected hemisphere (no stat) unaffected hemisphere (no stat) MEP latency affected hemisphere (no stat) unaffected hemisphere (no stat) MEP amplitude affected hemisphere (no stat) unaffected hemisphere (no stat) Corticomotor conduction time affected hemisphere (no stat) unaffected hemisphere (no stat) rTMS-induced changes in fMRI activation within the motor cortex during movement of the affected hand ipsilateral M1 (+exp2) contralesional M1 (+exp2) SMA (+exp2)
Chervyakov et al. (2018) RCT (6) NStart=64 NEnd=42 TPS=Chronic A1 vs A2 vs 0	E1: rTMS low-frequency of unaffected hemisphere E2: High-frequency rTMS stimulation of the affected hemisphere E3: Sequential combination of rTMS low and high stimulation C: Sham Stimulation Duration: 10session/5d/wk, 2wk	E1/E2/E3 vs C: Fugl-Meyer Assessment (+exp1 +exp2 +exp3) modified Ashworth scale (+exp1 +exp2) Barthel index (+exp1 +exp2)
Long et al. (2018) RCT (8) NStart=62 NEnd=62 TPS=Acute A1 vs A2 vs 0	E1: Low Frequency Combined with High Frequency Repetitive Transcranial Magnetic Stimulation E2: Low Frequency Repetitive Transcranial Magnetic Stimulation C: Sham Repetitive Transcranial Magnetic Stimulation	E1/E2 vs C: Fugl-Meyer Assessment (+exp1/2) Wolf Motor Function Test (+exp1) E1 vs E2: Fugl-Meyer Assessment (-) Wolf Motor Function Test (+exp1)

	Duration: 15d	
Guan et al. (2017) RCT (6) NStart=42 NEnd=27 TPS=Acute A vs 0	E: rTMS C: Sham Duration: 10d	E vs C: NIHSS (+exp) BI (+exp) FMA (+exp) mRS (-) resting motor threshold (-)
Sankarasubramanian et al. (2017) RCT Crossover (5) NStart=15 NEnd=15 TPS=Chronic A1 vs A2 vs 0	E1: inhibitory rTMS (1Hz) of contralesional M1 E2: Facilitatory rTMS (5Hz)of contralesional Pmd E3: Facilitatory rTMS (5Hz) of contralesional M1 in severely affected patients E4: Facilitatory rTMS (5Hz) of ipsilesional PMd C: Sham rTMS Stimulation Duration: 10-25min/condition, 1wk washout	E1 vs E2 vs E3 vs E4 vs C: Reaching Time (No stats) MEP amplitude (no stat) ipsilateral silent period (no stat)
Sasaki et al. (2013) RCT (6) NStart=29 NEnd=29 TPS=Acute A1 vs A2 vs 0	E1: high-frequency rTMS E2: low-frequency rTMS C: Sham stimulation Duration: 10min/ d, 1x/d, 5d	E1/ E2 vs C: Grip Strength (+exp1) Tapping Frequency (+exp1) E1 vs E2: Grip Strength (-) Tapping Frequency (-)
Emara et al. (2010) Pilot RCT (7) NStart=60 NEnd=60 TPS=Subacute A1 vs A2 vs 0	E1: High frequency (5Hz) rTMS E2: Low frequency (1Hz) rTMS C: Sham Duration: 30min/d, 5d/wk for 4wk	E1/E2 vs C: E2 v C/E1: Finger Tapping Test (+exp2) Activities Index (+exp2) Modified Rankin Scale (+exp2)
Khedr et al. (2010b) RCT (7) NStart=48 NEnd=48 TPS=Acute A1 vs A2 vs 0	E1: 3Hz rTMS E2: 10Hz rTMS C: Sham Duration: 30min/d, 3d/wk for 4wk	E1/E2 vs C: Grip strength (+exp, +exp2) NIHSS (+exp, +exp2) Modified Rankin Scale (+exp, +exp2) Shoulder Abduction (+exp, +exp2) E1 vs E2: Grip strength (-) NIHSS (-) Modified Rankin Scale (-) Shoulder Abduction (-)
Khedr et al. (2009b) RCT (5) NStart=26 NEnd=16 TPS=Acute A vs 0	E: rTMS (300 pulses at intensity of 120% hand motor threshold) C: Sham rTMS Duration: 50 mins/d, 3ds/wk, 8 wks	E vs C: Hand Grip Strength (-) Barthel Index (-) Dysphagic Outcome and Severity scale (+exp)
Fregni et al. (2006) RCT (7) NStart=15 NEnd=15 TPS=Chronic	E: Active rTMS C: Sham rTMS Duration: 20min/session, 5 sessions	E vs C: Jebsen taylor hand function test (-) simple reaction time (-) choice reaction time (-) purdue pegboard test (-) interaction of timexgroup

A vs 0		No main effects Mini-Mental State Examination (-) Stroop test (-) Digit span forward and backward (-)
High-frequency rTMS compared to sham		
Valovicová et al. (2024) RCT (8) NStart=26 NEnd=26 TPS=Acute A vs 0	E: HF-rTMS + Conventional therapy C: Sham rTMS + Conventional therapy Duration: 1 session/day, 5 days	E vs C: NIHSS (+exp) FMA-UE (+exp) FMA-LE (-) Modified Ashworth scale (-) Motor Assessment Scale (-) BI (+exp) FIM (+exp) MEP-Upper Extremity amplitude (-) Latency (-) Central motor conduction time (-) MEP-Lower amplitude (-) Latency (-) Central motor conduction time (-)
Ibrahim et al. (2020) RCT (6) NStart=40 NEnd=40 TPS=Subacute A vs 0	E: High frequency rTMS at 5 Hz on cPMd + conventional rehab C: Sham rTMS+ conventional rehab Duration: 400ms stimulation, 10 sessions total	E vs C: Fugl-Meyer Assessment Upper Extremity (+exp) Proximal (+exp) Distal (-) Medical Research Scale (+exp) Proximal (+exp) Distal (-)
Ke et al. (2020) RCT (7) NStart=48 NEnd=40 TPS=Acute A1 vs A2 vs 0	E1: High-Frequency rTMS (20 Hz) + Short Inter-Train Intervals (8s) E2: High-Frequency rTMS (20 Hz) + Long Inter-Train Intervals (28s) C: Sham rTMS Duration: E1: 5min/d; 5d/wk, 2wks; E2: 15min/d, 5d/wk, 2wks	E1/E2 vs C: Brunnstrom Recovery Stages (+exp1, +exp2) FMA-UE (+exp1, +exp2) Barthel Index (+exp1, +exp2) MEP amplitude (+exp1, +exp2) E1 vs E2: Brunnstrom Recovery Stages (-) FMA-UE (-) Barthel Index (-) MEP amplitude (-)
Choi et al. (2018) RCT (7) NStart=24 NEnd=24 TPS=Chronic A vs 0	E: High frequqency (10Hz) rTMS + Standard movement therapy C: Sham stimulation + Standard movement therapy Duration: 10sessions/d, 5d/wk for 2 wk	E vs C: Numeric Rating Scale (+exp) PROM (-) MI (-) mBRS (-)
Gu et al. (2017) RCT (9) NStart=24 NEnd=24 TPS=Chronic A vs 0	E: HF-rTMS C: Sham Duration: rTMS 5x/wk, 2wk + movement therapy 6d/wk	E vs C: BDI (+exp) HAM-D17(+exp) MI (-) mBRS (-) FAC (-)

Hosomi et al. (2016) RCT (8) NStart=41 NEnd=39 TPS=Subacute A vs 0	E: 5-Hz rTMS + Regular rehabilitation C: Sham stimulation + Regular rehabilitation Duration: 1 session/d, 5d/wk, for 2wks rTMS	E vs C: Brunnstrom Stages arm (-) hand (+exp) lower limb (-) FMA (-) Handgrip strength score (-) NIHSS (-) FIM (-) finger tapping (no stat)
Low-frequency rTMS combined with other interventions compared to task-specific training or sham		
Higgins et al. (2015) Pilot RCT (6) NStart=11 NEnd=9 TPS=Chronic A + B vs A/B *Also in Table 4 (Task-Specific Training)*	E: 1 Hz rTMS + task oriented exercise C: Sham rTMS + task oriented exercise Duration: E: 90min task-oriented training + rTMS , 2x/wk, 4wks; C: 90min task-oriented training + sham rTMS, 2x/wk, 4wks	E vs C: WMFT (-) Grip/Pinch strength BBT (-) SIS Motor activity Log (-) MEP amplitude (+exp)
Takeuchi et al. (2008) RCT (6) NStart=20 NEnd=20 TPS=Chronic A + B vs A/B *Also in Table 4 (Task-Specific Training)*	E: Low frequency (1Hz) rTMS + pinch motor training (a metronome-paced pinch of their index finger and thumb of the affected hand as fast as possible) C: pinch motor training + sham rTMS Duration: 25min stimulation + 15min training, 1x	E vs C: Pinch force (+exp) Acceleration (+exp) MEP amplitude (-) Resting motor threshold (-) Intracortical inhibition (-)
Low-frequency rTMS combined with other interventions compared to sham or peripheral nerve stimulation		
Tarri et al. (2018) RCT (6) NStart=28 NEnd=24 TPS=Subacute A + B vs A/B *Also in Table 27 (Additional Afferent and Peripheral Stimulation Methods)*	E: Paired associative stimulation (peripheral electrical stimulation to ECR muscle + low frequency (1Hz) rTMS to motor cortex) C: Active peripheral electrical stimulation + Sham cortical stimulation Duration: 30min stim + 2hr conventional/d, 5d	E vs C: Fugl-Meyer Assessment (-) motor evoked potential (MEP) surface area of the ECR muscle (-)
High-frequency rTMS combined with other interventions compared to high-frequency rtms		
Kim & Yim et al. (2018) RCT (5) NStart=24 NEnd=20 TPS=Subacute A + B vs A/B *Also in Table 10 (Mirror Therapy)*	E: High-frequency rTMS + Task-oriented mirror therapy (TOMT) C: High-frequency rTMS Duration: 15min/d 5d/wk, 2wks 20Hz hf-rTMS + 20min/d, 5d/wk, 2wks TOMT	E vs C: Hand Grip Strength (-) Pinch Grip (+exp) Box and Block test (+exp) cortical excitability threshold percent (-) Latency (-) amplitude (-)
Cho et al. (2017) RCT (6) NStart=30 NEnd=30 TPS=Acute A + B vs A/B *Also in Table 31 (Transcranial Direct Current Stimulation (tDCS))*	E: High frequency rTMS + cathodal tDCS C: High frequency rTMS Duration: 20min tDCS + 20min rTMS, 5x/wk for 2wks	E vs C: FMA (+exp)

Low-frequency rTMS combined with other interventions compared to control		
Miu et al. (2020) RCT (8) NStart=51 NEnd=48 TPS=Acute A vs B *Also in Table 31 (Transcranial Direct Current Stimulation (tDCS))*	E1: rTMS (1 Hz) E2: Dual tDCS (1.5 mA) Duration: 20min/d, 3d/wk, 2wks	E1 vs E2: Motor Assessment Scale (-) Fugl-Meyer Assessment-Arm (-) Nine-Hole Peg Test (-) Modified Barthel Index (-) Handgrip Strength (-)
Sung et al. (2013) RCT (7) NStart=54 NEnd=54 TPS=Chronic A + B vs A vs B vs 0 *Also in Table 30 (Theta Burst Stimulation (TBS))*	E1: Low frequency (1Hz) rTMS + iTBS E2: Sham rTMS + iTBS E3: Low frequency (1Hz) rTMS + sham iTBS C: Sham rTMS + sham Itbs Duration: 45min, 5d/wk, 4wk	E1/E2/E3 vs C: Wolf Motor Function test (+exp1, +exp2, +exp3) Fugl-Meyer Assessment (+exp1, +exp2, +exp3) Medical Research Council Scale (+exp1, +exp2, +exp3) Functional Independence Measure (-) Finger tapping (+exp1, +exp2, +exp3) Reaction time (+exp1, +exp2, +exp3) E1 vs E2/E3: Wolf Motor Function test (+exp1) Fugl-Meyer Assessment (+exp1) Medical Research Council Scale (+exp1) Functional Independence Measure (-) Finger tapping (+exp1) Reaction time (+exp1) E2 vs E3: Wolf Motor Function test (-) Fugl-Meyer Assessment (+exp3) Medical Research Council Scale (+exp3) Functional Independence Measure (-) Finger tapping (-) Reaction time (-)
Takeuchi et al. (2012) RCT (6) NStart=27 NEnd=20 TPS=Chronic A + B vs A vs B *Also in Table 31 (Transcranial Direct Current Stimulation (tDCS))*	E1: Low Frequency rTMS E2: ANodal tDCS E3: Low Frequency rTMS + ANodal tDCS Duration: 20min, single session, 7 day follow up	E1 vs E2 vs E3: Pinch Force paretic hand (+exp3) nonparetic hand (-) Bimanual coordination (+exp3) MEP amplitude (+exp3) Resting motor threshold contralesional (-) ipsilesional (+exp) Transcallosal inhibition (+exp3) Acceleration of both hands. (acceleration & bimanual coordination were evaluated by using the packaged analysis software of the finger-tapping system)
Low-frequency rTMS combined with other interventions compared to sham or task-specific training		
Edwards et al. (2023) RCT (8) NStart=60 NEnd=50 TPS=Chronic A + B vs A/B	E: rTMS + TST C: Sham rTMS +TST Duration: 75min/d(15min rTMS, 60min TST), 3d/wk, 6wks	E vs C: FMA-UE (-) ARAT (-) NIHSS (-) EQ-5D (-)

Also in Table 4 (Task-Specific Training)		
Luk et al. (2022) RCT (8) NStart=24 NEnd=22 TPS=Subacute A + B vs A/B *Also in Table 4 (Task-Specific Training)*	E: low-frequency rTMS + motor task practice C: sham rTMS + motor task practice Duration: stim +30min motor task practice/d, 5d/wk, 2wks (10 practice sessions); continued 2d/wk, 10wks	E vs C: FMA (+exp) MEP; paretic hand (+exp) nonparetic hand (-) IHA (+exp) grip strength (-) ARAT (+exp) 9HPT (-) BBT (+exp) reaction time (-) SIS (-)
Kim et al. (2020a) RCT (8) NStart=77 NEnd=73 TPS=Acute A + B vs A/B *Also in Table 4 (Task-Specific Training)*	E: rTMS + Task Based occupational Therapy C: Sham rTMS + Task Based Occupational Therapy Duration: 30min/d, 7d/wk, 10d rTMS or Sham, 30min/d, 7d/wk, 10d Task-Based OT	E vs C: Box and Block Test (-) Fugl-meyer Assessment (-) Finger Tapping Test (-) Brunnstrom Stage Arm (-) Hand (-) Hand Grip strength (-) Pinch Grip strength (-) Grip strength Lateral Prehension (-) grip strength Three Jaw Chuck (-) Modified Ashworth Scale Elbow flexor (-) Wrist flexor (-) Finger Flexor (-) Korean Modified Barthel index (-)
Harvey et al. (2018) RCT (7) NStart=199 NEnd=169 TPS=Chronic A + B vs A/B *Also in Table 4 (Task-Specific Training)*	E: Low frequency rTMS + Motor Training C: Sham rTMS + Motor Training Duration: 1Hr, 3x/wk, 6wk therapy (15min of stimulation/sham before)	E vs C: ARAT (-) FMA-UE (-) WMFT (-)
Rose et al. (2014) RCT (6) NStart=22 NEnd=20 TPS=Chronic A + B vs A/B *Also in Table 4 (Task-Specific Training)*	E: Functional task practice + rTMS C: Functional task practice + Sham rTMS Duration: 20min rTMS + 60min functional task	E vs C: Wolf Motor Function Test time (-) Functional Assessment Scale (-) Fugl-Meyer assessment- upper extremity (-) grip force (-) Lateral Pinch (-) Palmer Pinch (-) Three Jaw Chuck (-) Action Research Arm Test (-) Modified Ashworth Scale (-) Motor Activity Log AOU (-) HW (-) Late Life Function and Disability Index (-) ROM shoulder (-)

		elbow (-) wrist (-) Trunk displacement (-) Max resultant velocity (-) Movement time (-) Short intracortical inhibition MEP (+exp) 50% stimulation intensity (+exp)
Vongvaivanichakul et al. (2014) RCT (5) NStart=14 NEnd=14 TPS=Chronic A + B vs A/B *Also in Table 4 (Task-Specific Training)*	E: Low frequency r-TMS + reach-to-grasp (RTG) training C: Sham stimulation + reach-to-grasp (RTG) training Duration: 20min stimulation & 7min x 6 sessions RTG	E vs C: wolf motor function test (+exp) movement time of RTG actions (+exp) maximum aperture (-), MEP amplitude
Low-frequency rTMS combined with other interventions compared to low-frequency rtms		
Noh et al. (2019) RCT (6) NStart=22 NEnd=22 TPS=Acute A + B vs A/B *Also in Table 12 (Action Observation)*	E: Low frequency rTMS + Action Observation C: Low frequency rTMS Duration: Action observation: 20 mins, 10ds consecutive; LF-rTMS: 20 mins, 10ds consecutive	E vs C: Brunstomm Recovery Stages (-) Fugl-Meyer Assessment (-) Manual Function Test (-) Grip Power Test (-) MEP-rMT (+exp) MEP Latency (-) MEP amplitude (-)
Low-frequency rTMS combined with other interventions compared to conventional therapy		
Kim et al. (2020c) Pilot RCT (6) NStart=60 NEnd=42 TPS=Acute A + B vs A vs B vs 0 *Also in Table 44 (Acupuncture)*	E1: Scalp acupuncture (SA) E2: Repetitive transcranial magnetic stimulation (rTMS) E3: SAEM-CS- SA and electromagnetic convergence stimulation (SA and LF-rTMS simultaneously) C: Conventional therapy Duration: CSRT 30min, 2x/d, 5d/wk, 30 sessions/3wks & SA or rTMS or SAEM-CS 20min, 1x/d, 15 sessions/3wks	E1 vs C: Fugl-Meyer Upper Extremity (-), FMA Lower Extremity Fugl-Meyer Total (-) Modified Barthel Index (-) Functional Independence Measure (-) EQ-5D (-) E2 vs C: Fugl-Meyer Upper Extremity (+exp2) Fugl-Meyer Total (+exp2) Modified Barthel Index (+exp2) Functional Independence Measure (+exp2) EQ-5D (-) E3 vs C: Fugl-Meyer Upper Extremity (-) Fugl-Meyer Total (-) Modified Barthel Index (-) Functional Independence Measure (-) EQ-5D (-) E1 vs E3: Fugl-Meyer Upper Extremity (-) Fugl-Meyer Total (-) Modified Barthel Index (-) Functional Independence Measure (-) EQ-5D (-) E2 vs E3: Fugl-Meyer Upper Extremity (+exp2) Fugl-Meyer Total (+exp2)

		Modified Barthel Index (+exp2) Functional Independence Measure (+exp2) EQ-5D (-) E1 vs E2: Fugl-Meyer Upper Extremity (-) Fugl-Meyer Total (-) Modified Barthel Index (+exp2) Functional Independence Measure (+exp2) EQ-5D (-) NIHSS Modified rankin scale MMSE MEP Grip Strength ASHA-Noms
Tosun et al. (2017) RCT (6) NStart=25 NEnd=25 TPS=Subacute A + B vs A/B vs 0 *Also in Table 22 (Neuromuscular Electrical Stimulation (NMES))*	E1: low frequency rTMS E2: low frequency rTMS + NMES C: Standard Physical therapy Duration: 5d/wk, 4wk PT and NMES; 20 mins/d, 5d/wk, 2wk rTMS	E1/E2 vs C: Brunnstrom Recovery Stages (-) Fugl-Meyer Assessment-UE (-) Motricity Index-UE (-) Modified Ashworth Scale (-) Barthel Index (-) fMRI parameters (-)
Low-frequency rTMS combined with other interventions compared to acupuncture		
Zhao et al. (2018) RCT (5) NStart=28 NEnd=17 TPS=Subacute A + B vs A/B *Also in Table 44 (Acupuncture)*	E: Low frequency rTMS + scalp acupuncture C: Scalp Acupuncture Duration: 1x/d, 2wk	E vs C: Fugl Meyer Upper Extremity: (+exp) Modified Barthel Index: (+exp) diffusor tensor imaging
Low-frequency rTMS combined with other interventions compared to sham		
Pipatsrisawat et al. (2022) Pilot RCT (9) NStart=10 NEnd=10 TPS=Subacute A + B vs 0 *Also in Table 31 (Transcranial Direct Current Stimulation (tDCS))*	E: active rTMS + cathodal tDCS C: sham rTMS + sham cathodal tDCS Duration: 20min rTMS+ 20min tDCS+ 45min OT (single session)	E vs C: FMA-UE (+exp) WMFT-FAS (-) WMFT-TIME (-)
Meng et al. (2020) RCT (8) NStart=28 NEnd=28 TPS=Subacute A + B vs A/B vs 0 *Also in Table 30 (Theta Burst Stimulation (TBS))*	E1: Low frequency rTMS + intermittent Theta Burst Stimulation E2: Low frequency rTMS + sham TBS C: Sham + sham Duration: 5x/wk, 2wks	E1 vs C: Fugl-Meyers Assessment Upper Extremity: (+exp1) Barthel Index: (+exp1) Cortical Excitability Abductor Pollicis Brevis (+exp) Extensor Digitorum Communis (+exp) Biceps Brachii (+exp) E2 vs C: Fugl-Meyers Assessment Upper Extremity: (-)

		Barthel Index: (-) Cortical Excitability Abductor Pollicis Brevis (-) Extensor Digitorum Communis (-) Biceps Brachii (-) E1 vs E2: Fugl-Meyers Assessment Upper Extremity: (+exp1) Barthel Index: (+exp1) Cortical Excitability Abductor Pollicis Brevis (-) Extensor Digitorum Communis (+exp) Biceps Brachii (+exp)
BoninPinto et al. (2019) RCT (9) NStart=27 NEnd=23 TPS=Chronic A + B vs A/B vs 0 *Also in Table 40 (Antidepressants)*	E1: Active rTMS + fluoxetine E2: Sham rTMS + fluoxetine C: Sham rTMS + placebo fluoxetine Duration: 20min/d rTMS, 5d/wk, 2wks followed by 1d/wk, 8wks	E1 vs E2: FMA scale (-) Jebsen Taylor hand function (+exp1) MEP amplitude (-) Intracortical facilitation (+exp1) intracortical inhibition (+exp1) E1 vs C: FMA scale (-) Jebsen Taylor hand function (+exp1) MEP amplitude (+exp1) Intracortical facilitation (-) intracortical inhibition (+exp2) E2 vs C: FMA scale (+con) Jebsen Taylor hand function (+con) MEP amplitude (-) Intracortical inhibition (+exp2) intracortical facilitation (+exp2)
Li et al. (2016b) RCT (5) NStart=153 NEnd=127 TPS=Subacute A1 vs A2 vs 0	E1: Low frequency (1Hz) rTMS E2: High frequency (10Hz) rTMS C: Sham Duration: 40min/d, 5d/wk for 2wk	E1 vs C: Fugl-Meyer Assessment (+exp) Wolf Motor Function Test (-) MEPs central motor conduction time CMCT
Wang et al. (2014b) RCT (9) NStart=48 NEnd=48 TPS=Subacute A + B1 vs A + B2 vs 0 *Also in Table 30 (Theta Burst Stimulation (TBS))*	E1: 10 Sessions (10min) Low Frequency rTMS (1Hz) before 10 Sessions (190s) Intermittent Theta Burst Stimulation E2: 10 Sessions (190s) Intermittent Theta Burst Stimulation before 10 Sessions (10min) Low Frequency rTMS (1Hz) C: Sham rTMS/iTBS Duration: 1x/d 5x/wk, 4wks (2wks one condition followed by 2 weeks the other)	E1/E2 vs C: Fugl-Meyer Assessment (+exp1) Wolf Motor Function Test (+exp1,+exp2) Medical Research Council Proximal (+exp1,+exp2) Distal (+exp1) E1 vs E: Fugl-Meyer Assessment (+exp1) Wolf Motor Function Test (+exp1) Medical Research Council Proximal (-) Distal (-)
Pomeroy et al. (2007) Pilot RCT (6) NStart=27 NEnd=24	E1: Real rTMS+ Real VMC E2: Real rTMS+Placebo VMC E3: Placebo rTMA+ real VMC C: Placebo rTMS + Placebo VMC	E1/E2/E3 vs C: ARAT Flexion/extension torque MEP in bicep/tricep

TPS=Acute A + B vs A vs B vs 0 *Also in Table 3 (Exercise and Strength Training)*	Duration: VMC 5min	Peak torque for elbow Peak flex for elbow
Low-frequency rTMS compared to conventional therapy		
Lv Y. et al. (2023) RCT (6) NStart=72 NEnd=72 TPS=Acute A1 vs A2 vs 0	E1: 10 sessions rTMS + conventional therapy E2: 20 sessions rTMS + conventional therapy E3: 30 sessions rTMS + conventional therapy C: Conventional therapy Duration: 50mins/d (20 mins rTMS, 30 mins conventional therapy), 5ds/wk, 2-6wks (E1 = 2wks, E2 = 4 wks, E3 = 6 wks)	E1 vs C: FMA-UE 10 sessions later (+exp1) 20 sessions later (-) 30 sessions later (-) WMFT 10 sessions later (+exp1) 20 sessions later (-) 30 sessions later (-) MEP amplitude (-) Resting-State fMRI (-) E2 vs C: FMA-UE 10 sessions later (+exp2) 20 sessions later (+exp2) 30 sessions later (+exp2) WMFT 10 sessions later (+exp2) 20 sessions later (+exp2) 30 sessions later (+exp2) MEP amplitude (+exp2) Resting-State fMRI (+exp2) E3 vs C: FMA-UE 10 sessions later (+exp3) 20 sessions later (+exp3) 30 sessions later (+exp3) WMFT 10 sessions later (+exp3) 20 sessions later (+exp3) 30 sessions later (+exp3) MEP amplitude (-) Resting-State fMRI (-) E1 vs E3: FMA-UE 10 sessions later (-) 20 sessions later (+exp3) 30 sessions later (+exp3) WMFT 10 sessions later (-) 20 sessions later (+exp3) 30 sessions later (+exp3) MEP amplitude (-) Resting-State fMRI (-) E2 vs E3: FMA-UE 10 sessions later (-) 20 sessions later (-) 30 sessions later (-)

		WMFT 10 sessions later (-) 20 sessions later (-) 30 sessions later (-) MEP amplitude (-) Resting-State fMRI (-)
El-Tamawy et al. (2019) RCT (4) NStart=40 NEnd=40 TPS=Subacute A vs 0	E: Low frequency rTMS + Conventional physiotherapy C: Conventional Physiotherapy Duration: 20min/d, 5d/wk for 2wks	E vs C: FMA-UE (+exp) Hand grip dynamometer (+exp) Active motor threshold
High-frequency rTMS combined with other interventions compared to control		
Kwon et al. (2014) RCT Crossover (5) NStart=14 NEnd=14 TPS=Chronic A + B1 vs A + B2 *Also in Table 1 (Neurodevelopmental Techniques)*	E1: Interleaved combination method (ICM) rTMS + motor training E2: Preconditioned combination method (PCM) rTMS + motor training Duration: 20 min/session, 2 sessions total; 1 session per condition (washout period 48 hours)	E1 vs E2: Purdue Pegboard Test: (-) Nine-Hole Peg Test: (-) Movement Time (Sequential Finger Motor Task) (-) Movement Accuracy (Sequential Finger Motor Task) (-) MEP amplitude
RTMS combined with other interventions compared to sensory stimulation or sham		
Pundik et al. (2021) RCT Crossover (7) NStart=16 NEnd=16 TPS=Chronic A + B1 vs A + B2 vs A *Also in Table 27 (Additional Afferent and Peripheral Stimulation Methods)*	E1: High-Frequency rTMS (5-Hz) + Peripheral Somatosensory Stimulation (sensory level electrical stimulation + vibratory stimulation) E2: Low-Frequency rTMS (1-Hz) + Peripheral Somatosensory Stimulation C: Sham rTMS + Peripheral Somatosensory Stimulation Duration: single session	E1 vs E2: Two-Point Discrimination (+exp1) Proprioception (-) Somatosensory Evoked Potential (+exp1) E1 vs C: Two-Point Discrimination (+exp1) Proprioception (-) Somatosensory Evoked Potential (+exp1) E2 vs C: Two-Point Discrimination (-) Proprioception (-) Somatosensory Evoked Potential (-) vibration perception threshold
High-frequency rTMS combined with other interventions compared to cimt or sham		
Malcolm et al. (2007) RCT (7) NStart=20 NEnd=19 TPS=Chronic A + B vs A/B *Also in Table 6 (Constraint-Induced Movement Therapy (CIMT))*	E: High frequency rTMS + CIMT C: Sham rTMS + CIMT Duration: 40min/d, 6d/wk for 5wk	E vs C: WMFT (-) MAL (-) box and blocks test motor threshold
RTMS combined with other interventions compared to rtms or sham		
Kwon et al. (2016) RCT Crossover (6) NStart=20 NEnd=20 TPS=Chronic A + B1 vs A + B2 vs A	E1: Simultaneous cathodal tDCS + 10hz rTMS E2: Simultaneous anodal tDCS + 10hz rTMS; E3 Preconditioning cathodal tCDS + 10hz rTMS E4: Preconditioning anodal tDCS + 10hz rTMS	E1 vs E2 vs E3 vs E4 vs C: Sequential Finger Motor Task: Movement time (+exp1) Movement accuracy MEP amplitude and latency

Also in Table 31 (Transcranial Direct Current Stimulation (tDCS))	C: rTMS 10Hz + Sham tDCS Duration: 20min/session; 24hr between sessions	
RTMS combined with other interventions compared to sham or task-specific training		
Abdelkader et al. (2024) RCT (10) NStart=55 NEnd=55 TPS=Subacute A + B1 vs A + B2 vs A *Also in Table 4 (Task-Specific Training)*	E1: Bilateral rTMS + Task-oriented therapy E2: Excitatory rTMS + Sham inhibitory rTMS + Task-oriented therapy E3: Inhibitory rTMS + Sham excitatory + Task-oriented therapy C: Sham bilateral rTMS + Task-oriented therapy Duration: rTMS (1 session/d, 5ds, 1wk); Task-oriented physiotherapy (1 session/d, 3 ds/wk, 5wks)	E1 vs C: FMA (+exp1) WMFT (+exp1) Modified Ashworth Scale (-) E1 vs E2: FMA (-) WMFT (-) Modified Ashworth Scale (-) E1 vs E3: FMA (-) WMFT (-) Modified Ashworth Scale (-) E2 vs C: FMA (+exp2) WMFT (+exp2) Modified Ashworth Scale (-) E2 vs E3: FMA (-) WMFT (-) Modified Ashworth Scale (-) E3 vs C: FMA (+exp3) WMFT (+exp3) Modified Ashworth Scale (-)
Chang et al. (2012) RCT (4) NStart=21 NEnd=17 TPS=Chronic A + B vs A/B *Also in Table 4 (Task-Specific Training)*	E: High Frequency (10Hz) rTMS + Motor Task Training C: Sham rTMS + Motor Task Training Duration: 20min, 5x/wk, 2wks	E vs C: Movement Time on Task (-) Accuracy on Task (+exp) Jebsen Hand Function Test (-) Writing (-) Card Turning (-) Picking Up Small Object (-) Simulated Feeding (+exp) Stacking Checkers (-) Lifting Lightweight Object (-) Lifting Heavy Object (-) fMRI (No stats)
Low-frequency rTMS combined with other interventions compared to sham or brunnstrom movement therapy		
Ozkeskin et al. (2017) RCT (8) NStart=21 NEnd=21 TPS=Chronic A + B vs A/B *Also in Table 1 (Neurodevelopmental Techniques)*	E: Low frequency (1Hz) Repetitive Transcranial Magnetic Stimulation to unaffected hemisphere + Brunnstrom movement therapy C: Sham Repetitive Transcranial Magnetic Stimulation + Brunnstrom movement therapy Duration: 90 min/d, 5d/wk for 2wk	E vs C: Brunnstrom Recovery Stages (-) Finger Touch Localization (-) Modified Ashworth Scale (-) Wrist Proprioceptive Evaluations (+exp)
Different approaches to rtms compared against one another		
Cha, HG et al. (2024) RCT (8)	E: 10hz HFrTMS C: 1Hz LFrTMS	E vs C: MBI (-)

NStart=25 NEnd=25 TPS=Acute A1 vs A2	Duration: 5d/wk, 10wks	FMA-UE (-) MFT (-)
Mahmoud W. et al. (2024) Pilot RCT (8) NStart=30 NEnd=28 TPS=Chronic A1 vs A2	E: EEG-triggered rTMS + conventional rehabilitation C: Low-frequency rTMS + conventional rehabilitation Duration: 20min/d, 3d/wk, 4wks	E vs C: FMA - UE (-) WMFT Time (-) Fucntion (-) Modified Ashworth Scale (-) Grip Strenght (-) Stretch reflex torque (by dynamometer) (-) Motor activity log (-)
Gao et al. (2023) RCT (7) NStart=10 NEnd=10 TPS=Chronic A1 vs A2	E: High-frequency rTMS (delivered to active brain region) C: Low-frequency rTMS (delivered to the contralesional primary motor cortex) Duration: 30min/d, 5d/wk for 4 wks	E vs C: Motor Status Scale (-) FMA-UE (-) ARAT (-) AROM (-)
Cassidy et al. (2015) RCT Crossover (8) NStart=11 NEnd=10 TPS=Chronic A1 vs A2 vs 0	E1: High frequency (6Hz) priming rTMS + 1 Hz active E2: Low frequency (1Hz) priming rTMS + 1 Hz active C: Sham (6Hz) priming rTMS + 1Hz active Duration: 1hr/d, 3d/wk for 5wk	E1/E2 vs C: Box and Block Test (-) cortical excitability parameters from EMG
Sasaki et al. (2014) Pilot RCT (8) NStart=58 NEnd=58 TPS=Acute A1 vs A2	E1: Unilateral High-frequency repetitive transcranial magnetic stimulation (HF-rTMS) E2: Bilateral application of HF- and LF-rTMS (BL-rTMS) Duration: 1x/d, 5d	E1 vs E2: Brunnstrom Recovery Stage upper-limb (+exp2) hand fingers (+exp2) Grip strength (-) Tapping frequency (-)
Takeuchi et al. (2009) RCT (8) NStart=30 NEnd=30 TPS=Chronic A1 vs A2	E1: Bilateral rTMS (1-10Hz) E2: Unaffected side rTMS (1Hz) E3: Affected side rTMS (10Hz) Duration: 50 stimuli, 20x	E1 vs E2 vs E3: Pinch force (-) Acceleration (+exp1) MEP amplitude intracortical inhibition resting motor threshold
RTMS compared to conventional therapy		
Petruseviciene et al. (2023) RCT (7) NStart=35 NEnd=35 TPS=Acute A1 vs A2 vs 0	E1: Low-frequency rTMS over contralesional hemisphere + Routine rehabilitation E2: High-frequency rTMS over ipsilesional hemisphere + Routine rehabilitation C: Routine rehabilitation Duration: 10 sessions over 2wks	E1/E2 vs C: hand grip strength unaffected UE (+exp2) affected UE (-) FIM (-)
Askin et al. (2017) RCT (7) NStart=40 NEnd=40 TPS=Chronic	E: Low frequency (1Hz) Repetitive Transcranial Magnetic Stimulation to unaffected hemisphere C: Conventional Physical Therapy Duration: 1 Hr/d, 5d/wk, 2wk	E vs C: Box and Block Test affected hand (-) Non-affected hand (+exp) Functional Independence Measure (+exp)

A vs 0		Brunnstrom Recovery Stages (-) Fugl-Meyer Assessment (+exp) Modified Ashworth Scale proximal (-) distal (+exp) hand (+exp) Mini mental Status Examination (+exp) Functional Ambulation Scale (-)
Low-frequency rTMS combined with other interventions compared to cimt		
Abo et al. (2014) RCT (6) NStart=66 NEnd=66 TPS=Chronic A vs B *Also in Table 6 (Constraint-Induced Movement Therapy (CIMT))*	E: Low frequency (1Hz) rTMS + OT training C: CIMT Duration: 20min rTMS & 120min OT/session, 2x/d, 22 session; 6Hr/session, 1x/d, 11 session CIMT	E vs C: Fugl-Meyer Assessment (+exp) Wolf Motor Function Test (+exp)
Low-frequency rTMS combined with other interventions compared to sham or virtual reality training		
Zheng et al. (2015) RCT (6) NStart=112 NEnd=108 TPS=Acute A + B vs A/B *Also in Table 17 (Virtual Reality)*	E: Low frequency rTMS + VR C: Sham rTMS + VR Duration: 45min/d, 6d/wk, 4wk	E vs C: Fugl-Meyer Assessment (+exp) Wolf Motor Function Test (+exp) Modified Barthel Index (-) SF-36 Physical Functioning (+exp) Role-Limitations (-) Bodily Pain (-) General Health (+exp) Vitality (-) Social Functioning (-) Role Limitation (-) Mental Health (-)
High-frequency rTMS compared to conventional therapy		
Haghighi F.M. et al. (2021) RCT (7) NStart=20 NEnd=20 TPS=Subacute A vs 0	E: High Frequency rTMS + Rehabilitation Program C: Rehabilitation Program Duration: 20min, 3d/wk, 10 sessions rTMS,	E vs C: FMA-UL (-) BBT (+exp) Grip strength (+exp) Pinch strength (-)
High-frequency rTMS combined with other interventions compared to high-frequency rtms or strength training		
Yang Y. et al. (2021) RCT (5) NStart=44 NEnd=39 TPS=Subacute A + B vs A vs B *Also in Table 3 (Exercise and Strength Training)*	E: High frequency rTMS + grip training + conventional rehab C1: rTMS + conventional rehab C2: Grip training + conventional rehab Duration: E: 7min(2m rTMS, 5m grip training)/d, 5d/wk, 2wks; C1: 2m/d, 5d/wk, 2wks; C2: 5m/d, 5d/wk, 2wks; Conventional rehab: 120m/d, 5d/wk, 2wks	E vs C1: JTHFT total (-) without writing task (-) motor coordination (-) speed of movement (-) grip force scaling (-) FMA-UE (+exp) Grip strength (-) mBI (-) iMEP latency (-) E vs C2:

		JTHFT total (+exp) without writing task (+exp) motor coordination (+exp) speed of movement (+exp) grip force scaling (+exp) FMA-UE (+exp) Grip strength (-) mBI (-) iMEP latency (-) C1 vs C2: JTHFT total (-) without writing task (-) motor coordination (-) speed of movement (-) grip force scaling (-) FMA-UE (-) Grip strength (-) mBI (-) iMEP latency (-)
Low-frequency rTMS combined with other interventions compared to fes		
Yang et al. (2022b) RCT (6) NStart=60 NEnd=60 TPS=Subacute A + B vs A vs B *Also in Table 22 (Neuromuscular Electrical Stimulation (NMES))*	E1: Low-frequency rTMS + FES + conventional rehab E2: Low-frequency rTMS + conventional rehab C: FES + conventional rehab Duration: E1: 60min routine + 20min FES + 30min rTMS, E2: 60min routine + 30min rTMS, C: 60min routine + 20min FES, 6d/wk for 4wks	E1/E2 vs C: FMA (+exp1) TAM (+exp1) TMS-MEP incubation/latent period (-) amplitude (+exp1) E1 vs E2: TMS-MEP (no stat) FMA (+exp1) TAM (+exp1)
High-frequency rTMS combined with other interventions compared to sham or motor relearning programmes		
Lee et al. (2024a) RCT (7) NStart=28 NEnd=20 TPS=Acute A + B vs A/B *Also in Table 1 (Neurodevelopmental Techniques)*	E: HF-rTMS + Motor training + Conventional therapy C: Sham rTMS + Motor training + Conventional Therapy Duration: 30 mins/d (20 mins of rTMS/sham rTMS and 10 mins of motor therapy), 5ds/wk, 2wks	E vs C: FMA Upper extremity (-) Lower extremity (-) Total (-) BBT (-)
Shim & Lee (2023) RCT (6) NStart=33 NEnd=30 TPS=Subacute A + B vs A/B *Also in Table 1 (Neurodevelopmental Techniques)*	E: High-frequency rTMS + Motor Learning C: Sham rTMS +Motor Learning Duration: 20min/d, 3d/wk, 4wks	E vs C: FMA-UE (-) BBT (-) Muscle strength measured by dynamometer (+exp) Korean Modified Barthel Index (-)
High-frequency rTMS combined with other interventions compared to conventional therapy		
Rezaei et al. (2023) RCT (6)	E1: HF-rTMS + Conventional Therapy	E1/E2/E3 vs C: FMA (+exp2/3)

NStart=40 NEnd=40 TPS=Subacute A + B vs A vs B vs 0 *Also in Table 3 (Exercise and Strength Training)*	E2: Contralateral limb Cross education (strength training)+ Conventional therapy E3: HF-rTMS + cross education + conventional therapy C: Conventional therapy Duration: 3d/wk for 10 sessions	BBT (+exp1/2/3) grip strength (+exp1/2) pinch strength (-) E1 vs E2: FMA (+exp2) BBT (-) grip strength (-) pinch strength (-) E2 vs E3: FMA (-) BBT (-) grip strength (-) pinch strength (-) E1 vs E3: FMA (-) BBT (-) grip strength (-) pinch strength (-)
High-frequency rTMS combined with other interventions compared to sham		
Wu X. et al. (2023) RCT (7) NStart=60 NEnd=60 TPS=Subacute A + B vs A vs B vs 0 *Also in Table 27 (Additional Afferent and Peripheral Stimulation Methods)*	E1: HF-rTMS + cervical nerve root magnetic stimulation E2: HF-rTMS + sham cervical nerve root magnetic stimulation E3: Sham HF-rTMS + cervical nerve root magnetic stimulation C: Sham HF-rTMS + Sham cervical nerve root magnetic stimulation Duration: E1,E2,E3 (1 session/d, 5ds/wk, 3wks); Conventional therapy (60 mins/d, 5ds/wk, 3wks);	E1 vs C: FMA-UE (+exp1) WMFT (+exp1) mBI (+exp1) Brunnstrom Stage of Recovery (-) E1 vs E2: FMA-UE (-) WMFT (+exp1) mBI (-) Brunnstrom Stage of Recovery (-) E1 vs E3: FMA-UE (-) WMFT (+exp1) mBI (+exp1) Brunnstrom Stage of Recovery (-) E2 vs C: FMA-UE (-) WMFT (+exp2) mBI (-) Brunnstrom Stage of Recovery (-) E2 vs E3: FMA-UE (-) WMFT (-) mBI (-) Brunnstrom Stage of Recovery (-) E3 vs C: FMA-UE (-) WMFT (+exp3) mBI (-) Brunnstrom Stage of Recovery (-)
de Freitas Zanona A. et al. (2023) RCT (8) NStart=36 NEnd=36	E1: rTMS + Sham TENS with Mirror therapy and Nonelectrical somatosensory stimulation	E1 vs E2 vs E3 vs C: MEP amplitude (-) somatosensory evoked potential (-) ASY index (no stat)

TPS=Subacute A + B + C + D vs A + B + C vs A vs 0 *Also in Table 10 (Mirror Therapy); Table 23 (Transcutaneous Electrical Nerve Stimulation (TENS)); Table 27 (Additional Afferent and Peripheral Stimulation Methods)*	E2: Sham rTMS + TENS with Mirror therapy and Nonelectrical somatosensory stimulation E3: rTMS + TENS with Mirror therapy and Nonelectrical somatosensory stimulation C: Sham rTMS + Sham TENS with Mirror therapy and Nonelectrical somatosensory stimulation Duration: 80mins/d (20 mins of rTMS, 15 mins of Nonelectrical somatosensory stimulation, 45 minutes of mirror therapy with TENS); 5d/wk, 2wks	
de Freitas Zanona A. et al. (2022) Pilot RCT (8) NStart=40 NEnd=40 TPS=Subacute A + B + C + D vs A + B + C vs A vs 0 *Also in Table 27 (Additional Afferent and Peripheral Stimulation Methods)*	E1: rTMS + Sham TENS with Mirror therapy and Nonelectrical somatosensory stimulation E2: Sham rTMS + TENS with Mirror therapy and Nonelectrical somatosensory stimulation E3: rTMS + TENS with Mirror therapy and Nonelectrical somatosensory stimulation C: Sham rTMS + Sham TENS with Mirror therapy and Nonelectrical somatosensory stimulation Duration: 130min/d(20min rTMS, 25min sensory training, 40 min mirror therapy, 45min TENS), 5d/wk, 2wks	E1/E2/E3 vs C: FMA-UE; - Motor (+exp1, +exp3); - Sensory (+exp1, +exp2, +exp3) NSA (-) BBT (-) MAL; - QOM (+exp1, +exp3); - AOM (+exp3) JTT (+exp3) FIM (+exp3) self care (-)
RTMS combined with other interventions compared to tdcs or sham		
D'Agata et al. (2016) RCT Crossover (6) NStart=34 NEnd=28 TPS=Chronic A + B vs A + C vs A	E1: rTMS + Mirror therapy ; E2: bilateral tDCS + Mirror therapy C: Sham tDCS + mirror therapy Duration: 5x/wk, 2wks (6mo washout for E1 and E2 groups)	E1 vs E2 vs C: Action Research Arm Test (-) ERP latencies + MMSE + digit span + copy of figure immediate recall + short story test + attentional matrices + cancellation task + nelson modified card sorting task + hamilton depression
High-frequency rTMS combined with other interventions compared to sham or task-specific training		
Kim et al. (2014b) RCT (8) NStart=31 NEnd=31 TPS=Chronic A + B vs A/B *Also in Table 4 (Task-Specific Training)*	E: High frequency (10Hz) rTMS+ task-oriented training C: Sham rTMS+ task-oriented training Duration: 10min/d, 5d/wk for 4wk	E vs C: Motor Function Test (+exp) MEP latency (-) MEP amplitude (+exp)
Low-frequency rTMS combined with other interventions compared to sham or exercise and custom physiotherapy protocols		
Conforto et al. (2012) Pilot RCT (8) NStart=30 NEnd=29 TPS=Acute A + B vs A/B *Also in Table 3 (Exercise and Strength Training)*	E: Low frequency rTMS +outpatient customary rehabilitation C: Sham rTMS+ outpatient customary rehabilitation Duration: 25min/d, 5d/wk for 4wk	E vs C: JTHFT (no between stat) Pinch force (no stat) FMA (no stat) AS (no stat) Modified Rankin Scale (no stat)

Paired associative stimulation (ccPAS) compared to sham		
Xing et al. (2024) RCT (8) NStart=44 NEnd=40 TPS=Chronic A vs 0	E: cortico-cortical paired associative stimulation (ccPAS) + routine rehabilitation C: Sham ccPAS + routine rehabilitation Duration: 15min/d, 6d/wk, 2wks	E vs C: FMA-UE (+exp)
Cross-Referenced RCTs: Combined or Comparative Interventions Involving Repetitive Transcranial Magnetic Stimulation (rTMS) (results included in this table's levels of evidence)		
Jia et al. (2024) RCT (8) NStart=56 NEnd=56 TPS=Acute A + B vs A/B *Primary listing: Table 11 (Mental Practice)*	E1: Graded motor imagery + rTMS + conventional rehabilitation E2: rTMS + conventional rehabilitation C: Graded motor imagery + conventional rehabilitation Duration: 20min/d 5d/wk for 4wks stimulation + 30min/d MI	E1/E2 vs C: FMA-UE (+exp1) ARAT (+exp1) mBI (+exp1) Motor Activity Log amount of use (-) quality of movement (+exp1) MEPs (+exp1) E1 vs E2: FMA-UE (+exp1) ARAT (-) mBI (-) Motor Activity Log amount of use (+exp1) quality of movement (-) MEPs (-)
Liang et al. (2024) Pilot RCT (8) NStart=45 NEnd=45 TPS=Subacute A + B vs A/B vs 0 *Primary listing: Table 27 (Additional Afferent and Peripheral Stimulation Methods)*	E1: Paired associative stimulation (rTMS + rPMS) + physiotherapy E2: rTMS + physiotherapy C: Sham rTMS + physiotherapy Duration: 20min/d stimulation + 40min/d 5d/wk for 4wks physiotherapy	E1/E2 vs C: FMA-UE (+exp1/2) Functional Comprehensive Assessment (+exp1/2) Barthel Index (+exp1/2) neurophysiological changes MEP latency (-) MEP amplitude (-) rMT (-) short-interval intracortical inhibition (+exp1/2) E1 vs E2: FMA-UE (-) Functional Comprehensive Assessment (-) Barthel Index (-) neurophysiological changes MEP latency (-) MEP amplitude (-) rMT (-) short-interval intracortical inhibition (-)
Wang T. et al. (2023) RCT (7) NStart=69 NEnd=69 TPS=Subacute A vs B vs 0 *Primary listing: Table 16 (Robotics)*	E1: Soft Robotic Glove + Conventional therapy E2: Low frequency rTMS + Conventional therapy C: Conventional therapy Duration: 50 mins/d (Experimental groups: 30 mins for conventional therapy, 20 mins for robotic glove use or	E1 vs C: FMA-UE change (+exp1) mBI change (-) surface electromyographic amplitude of the wrist dorsal extensor muscle group (-) Resting Motor Threshold (-) E2 vs C:

	rTMS; Control group: 50 minutes of conventional therapy); 5ds/wk, 2wks	FMA-UE change (+exp2) mBI change (-) surface electromyographic amplitude of the wrist dorsal extensor muscle group (-) Resting Motor Threshold (+exp2) E1 vs E2: FMA-UE change (-) mBI change (-) surface electromyographic amplitude of the wrist dorsal extensor muscle group (-) Resting Motor Threshold (+exp2)
Brihmat et al. (2023) RCT Crossover (6) NStart=25 NEnd=24 TPS=Chronic A + B + C vs A/A + B *Primary listing: Table 27 (Additional Afferent and Peripheral Stimulation Methods)*	E1: Paired associative stimulation (PAS) + Motor imagery (MI) E2: PAS C: Sham PAS + MI Duration: 15min/d, 1d/wk for 3wks - 1wks washout between sessions	E1/E2 vs C: MEPs (-) aROM (-)
Qin et al. (2023) RCT (5) NStart=61 NEnd=49 TPS=Subacute A + B vs A/B vs 0 *Primary listing: Table 27 (Additional Afferent and Peripheral Stimulation Methods)*	E1: Low-frequency rTMS (LF-rTMS) + peripheral repetitive magnetic stimulation (rPMS) + routine rehabilitation E2: LF-rTMS + routine rehabilitation C: Routine rehabilitation Duration: 5d/wk for 8wks	E1/E2 vs C: fMRI (+exp1) mAS (+exp1) FMA-UE (+exp1/2) mBI (+exp1/2) E1 vs E2: fMRI (+exp1) mAS (+exp1) FMA-UE (+exp1) mBI (+exp1)
Yamada et al. (2022) RCT Crossover (7) NStart=37 NEnd=37 TPS=Chronic A + B vs A/B *Primary listing: Table 3 (Exercise and Strength Training)*	E: Custom occupational therapy + rTMS-LF C: Custom Occupational Therapy Duration: 280min/d(40min rTMS, 240min OT), 6d/wk, 2wks, 1d washout	E vs C: WMFT (+exp) FMA-UE (+exp)
Rosso et al. (2022) Pilot RCT (7) NStart=28 NEnd=27 TPS=Chronic A + B vs 0 *Primary listing: Table 27 (Additional Afferent and Peripheral Stimulation Methods)*	E: Cerebello-Motor paired associated stimulation (PAS) + physiotherapy C: Sham + physiotherapy Duration: 120 stimulations/day, 5 days/wk, 1 wk	E vs C: JTT (-) Grip strength (-)
Kuzu et al. (2021) RCT (6) NStart=20 NEnd=20 TPS=Chronic A vs B vs 0 *Primary listing: Table 30 (Theta Burst Stimulation (TBS))*	E1: cTBS + physiotherapy E2: rTMS + physiotherapy C: Sham cTBS + physiotherapy Duration: E1: 20m/d, 10 sessions, 4 weeks E2: 40s/d, 10 sessions, 4 weeks	E1/E2 vs C: FMA-UE (+exp1,2) MAS wrist flexor spasticity (+exp1) MAL-28(+exp1,2) FIM-Self-Care (+exp1,2) Brunnstrom recovery stages (-) E1 vs E2: (-)

Sui et al. (2021) RCT (5) NStart=120 NEnd=80 TPS=Subacute A1 vs A2 vs 0 *Primary listing: Table 27 (Additional Afferent and Peripheral Stimulation Methods)*	E1: Ipsilesional Paired Associated Stimulation (PAS) E2: Contralesional PAS E3: Bilateral PAS C: Conventional Care Duration: 1x/d, 7d/wk, 4wks	E1/E2/E3 vs C: MEP (+exp2) RMT (+exp2) STEF (+exp1,2,3) FMA (+exp1,2,3) mBI (+exp1,2,3) E1 vs E2 vs E3: STEF (+exp3) FMA (+exp3) mBI (+exp3) MEP (+exp3) RMT (+exp3)
Chen et al. (2020a) RCT (7) NStart=40 NEnd=35 TPS=Subacute A vs B *Primary listing: Table 27 (Additional Afferent and Peripheral Stimulation Methods)*	E: Functional Magnetic Stimulation (applied peripherally) C: Low-Frequency rTMS Duration: 5x/wk, 2wks	E vs C: Fugl-Meyer Assessment (+exp) Barthel Index (+exp)
Pan et al. (2019) RCT (7) NStart=44 NEnd=42 TPS=Subacute A + B vs A/B *Primary listing: Table 11 (Mental Practice)*	E: Low frequence rTMS (1Hz) + mental practice C: rTMS (1Hz) + audiotape-led relaxation Duration: 30min, 5d/wk, for 2wks rTMS + 2hr/d, 5d/wk, for 2 wks MI/Audiotaped-led relaxation	E vs C: WMFT (+exp) FMAUE (+exp) mod BI (+exp) BBT (+exp)
Etoh et al. (2019) RCT Crossover (8) NStart=20 NEnd=20 TPS=Chronic A + B vs A/B *Primary listing: Table 22 (Neuromuscular Electrical Stimulation (NMES))*	E1: NMES + rTMS (1HZ) E2: Sham NMES + rTMS (1Hz) Duration: 5d/wk for 4wks NMES or sham + 60min/d Repetitive facilitative exercise	E1 vs E2: FMA (-) ARAT (-) BBT (+exp) MAS (+exp)
Watanabe et al. (2018) Pilot RCT (8) NStart=21 NEnd=21 TPS=Acute A vs B vs 0 *Primary listing: Table 30 (Theta Burst Stimulation (TBS))*	E1: Intermittent theta-burst stimulation of the affected motor cortex hand area + conventional therapy E2: low-frequency rTMS + conventional therapy C: Sham stimulation + conventional therapy Duration: 1x/d, 10d stimulation & 2hr, 1x/d, 10d conventional therapy	E1/E2 vs C: E1 v E2/C: Fugl-Meyer Assessment (-) Stroke Impairment Assessment; - total upper limb (-) knee-mouth test (-) - finger function (+exp1) Modified Ashworth Scale; - total upper limb (-) - shoulder and elbow (-) wrist and finger (+exp2) Grip Strength (-) motor evoked potential amplitude (+exp1/2)
Ji et al. (2014) RCT (7) NStart=35 NEnd=35 TPS=Chronic	E1: Mirror therapy + high frequency (10Hz) rTMS + Traditional PT E2: Mirror therapy + Traditional PT C: Sham + Traditional PT Duration: 15 min/d rTMS + 30min, 5x/d for 6wk Traditional PT	E1 vs E2: Fugl-Meyer Assessment (+exp1) Box and Block Test (+exp1) E1 vs C: Fugl-Meyer Assessment (+exp1)

A + B vs A/B vs 0 *Primary listing: Table 10 (Mirror Therapy)*		Box and Block Test (+exp1) MEP amplitude (+exp1) latency (+exp1) E2 vs C: Fugl-Meyer Assessment (+exp2) Box and Block Test (+exp2) MEP Amplitude (-) Latency (+exp2)
Theilig et al. (2011) RCT (6) NStart=24 NEnd=24 TPS=Subacute A + B vs A/B *Primary listing: Table 22 (Neuromuscular Electrical Stimulation (NMES))*	E: EMG-NMES + rTMS (1 Hz) C: EMG-NMES + Sham rTMS Duration: 45min (20min EMG-NMS + 15min rTMS/Sham), for 2wk	E vs C: Wolf Motor Function Test (-) Tardieu Scale (-) Passive wrist extension (-) Motor evoked potentials (-)

Abbreviations and table notes: C=control group; D=days; E=experimental group; H=hours; Min=minutes; RCT=randomized controlled trial; TPS=time post stroke category (Acute: less than 30 days, Subacute: more than 1 month but less than 6 months, Chronic: over 6 months); Wk=weeks.

+exp indicates a statistically significant between groups difference at α=0.05 in favour of the experimental group

+exp1/+exp2/+exp3 indicates a statistically significant between groups difference at α=0.05 in favour of the first, second or third experimental group

+con indicates a statistically significant between groups difference at α=0.05 in favour of the control group

- indicates no statistically significant between groups differences at α=0.05

1. Body Functions and Structures

MOTOR FUNCTION			
LoE	**Conclusion Statement**	**RCTs**	**References**
1a	Low-frequency repetitive transcranial magnetic stimulation may not have a difference in efficacy when compared to sham for improving motor function.	15	Qian et al. (2024); Gottlieb et al. (2021); Revill et al. (2020); Sharma et al. (2020); Meng & Song (2017); Lüdemann-Podubecká et al. (2016); Blesneag et al. (2015); Lüdemann-Podubecká et al. (2015); Matsuura et al. (2015); BarrosGalvao et al. (2014); Wang et al. (2014a); Etoh et al. (2013); Seniow et al. (2012); Khedr et al. (2009a); Mansur et al. (2005)
1b	Low frequency repetitive transcranial magnetic stimulation applied to primary motor cortex with conventional rehab may produce greater improvements in motor function than Low frequency repetitive transcranial magnetic stimulation applied to premotor area with conventional rehab.	1	Wang et al. (2014a)
1a	Repetitive transcranial magnetic stimulation may produce greater improvements in motor function than sham.	13	Aydin et al. (2024); Zhao L. et al. (2024); Wang et al. (2023d); Wang et al. (2022); Chen et al. (2021c); Chen et al. (2021d); Chiu et al. (2020); Du et al. (2019); Chervyakov et al. (2018); Long et al. (2018); Guan et al. (2017); Emara et al. (2010); Fregni et al. (2006)

1b	Repetitive transcranial magnetic stimulation - M1 area with rehab may not have a difference in efficacy when compared to repetitive transcranial magnetic stimulation - SMA with routin rehab for improving motor function.	1	Zhao L. et al. (2024)
1b	Low-frequency repetitive transcranial magnetic stimulation with rehabilitation may produce greater improvements in motor function than High-frequency repetitive transcranial magnetic stimulation with rehabilitation.	1	Wang et al. (2023d)
1b	High-frequency repetitive transcranial magnetic stimulation with conventional care may produce greater improvements in motor function than low-frequency repetitive transcranial magnetic stimulation with conventional care.	1	Wang et al. (2022)
1b	There is conflicting evidence about the effect of Low Frequency Combined with High Frequency Repetitive Transcranial Magnetic Stimulation when compared to Low Frequency Repetitive Transcranial Magnetic Stimulation for improving motor function.	1	Long et al. (2018)
1a	High-frequency repetitive transcranial magnetic stimulation may produce greater improvements in motor function than sham.	4	Valovicová et al. (2024); Ibrahim et al. (2020); Ke et al. (2020); Hosomi et al. (2016)
1b	High-Frequency repetitive transcranial magnetic stimulation with Short Inter-Train Intervals may not have a difference in efficacy when compared to High-Frequency repetitive transcranial magnetic stimulation with Long Inter-Train Intervals for improving motor function.	1	Ke et al. (2020)
1b	Paired associative stimulation may not have a difference in efficacy when compared to Active peripheral electrical stimulation with Sham cortical stimulation for improving motor function.	1	Tarri et al. (2018)
1b	High-frequency repetitive transcranial magnetic stimulation combined with other interventions may produce greater improvements in motor function than high-frequency rtms.	1	Cho et al. (2017)
1b	Low-frequency repetitive transcranial magnetic stimulation combined with other interventions may produce greater improvements in motor function than Sham repetitive transcranial magnetic stimulation with sham Itbs.	1	Sung et al. (2013)
1b	Repetitive transcranial magnetic stimulation may not have a difference in efficacy when compared to Dual transcranial direct current stimulation for improving motor function.	1	Miu et al. (2020)
1b	Low frequency repetitive transcranial magnetic stimulation with intermittent theta burst stimulation may produce greater improvements in motor function than Sham repetitive transcranial magnetic stimulation with intermittent theta burst stimulation or Low frequency repetitive transcranial magnetic stimulation and sham intermittent theta burst stimulation.	1	Sung et al. (2013)
1b	Sham repetitive transcranial magnetic stimulation with intermittent theta burst stimulation may not have a difference in efficacy when compared to Low frequency repetitive transcranial magnetic stimulation with sham intermittent theta burst stimulation for improving motor function.	1	Sung et al. (2013)
1a	Low-frequency repetitive transcranial magnetic stimulation combined with other interventions may not have a difference in efficacy when compared to sham or task-specific training for improving motor function.	6	Edwards et al. (2023); Luk et al. (2022); Kim et al. (2020a); Harvey et al. (2018); Rose et al. (2014); Vongvaivanichakul et al. (2014)
1b	Low frequency repetitive transcranial magnetic stimulation with Action Observation may not have a difference in efficacy when compared to Low frequency repetitive transcranial magnetic stimulation for improving motor function.	1	Noh et al. (2019)

1b	Low frequency repetitive transcranial magnetic stimulation may not have a difference in efficacy when compared to Physical therapy for improving motor function.	1	Tosun et al. (2017)
2	Low frequency repetitive transcranial magnetic stimulation with scalp acupuncture may produce greater improvements in motor function than Scalp Acupuncture.	1	Zhao et al. (2018)
1a	Low-frequency repetitive transcranial magnetic stimulation combined with other interventions may produce greater improvements in motor function than sham.	5	Pipatsrisawat et al. (2022); Meng et al. (2020); BoninPinto et al. (2019); Li et al. (2016b); Wang et al. (2014b)
1b	Low frequency repetitive transcranial magnetic stimulation with intermittent Theta Burst Stimulation may produce greater improvements in motor function than Low frequency repetitive transcranial magnetic stimulation with sham theta burst stimulation.	1	Meng et al. (2020)
1b	There is conflicting evidence about the effect of Active repetitive transcranial magnetic stimulation with fluoxetine when compared to Sham repetitive transcranial magnetic stimulation with fluoxetine for improving motor function.	1	BoninPinto et al. (2019)
1b	10 Sessions Low Frequency repetitive transcranial magnetic stimulation before 10 Sessions Intermittent Theta Burst Stimulation may produce greater improvements in motor function than 10 Sessions Low Frequency repetitive transcranial magnetic stimulation before 10 Sessions Intermittent Theta Burst Stimulation.	1	Wang et al. (2014b)
1b	Low-frequency repetitive transcranial magnetic stimulation may produce greater improvements in motor function than conventional therapy.	2	Lv Y. et al. (2023); El-Tamawy et al. (2019)
1b	10 sessions repetitive transcranial magnetic stimulation with conventional therapy may result in lesser improvements in motor function when compared to 30 sessions repetitive transcranial magnetic stimulation with conventional therapy.	1	Lv Y. et al. (2023)
1b	20 sessions repetitive transcranial magnetic stimulation with conventional therapy may not have a difference in efficacy when compared to 30 sessions repetitive transcranial magnetic stimulation with conventional therapy for improving motor function.	1	Lv Y. et al. (2023)
1b	High frequency repetitive transcranial magnetic stimulation with constraint-induced movement therapy may not have a difference in efficacy when compared to Sham repetitive transcranial magnetic stimulation with constraint-induced movement therapy for improving motor function.	1	Malcolm et al. (2007)
1b	There is conflicting evidence about the effect of Repetitive transcranial magnetic stimulation combined with other interventions when compared to sham or task-specific training for improving motor function.	2	Abdelkader et al. (2024); Chang et al. (2012)
1b	Bilateral repetitive transcranial magnetic stimulation (high-frequency repetitive transcranial magnetic stimulation with low-frequency repetitive transcranial magnetic stimulation) and Task-oriented therapy may not have a difference in efficacy when compared to Excitatory repetitive transcranial magnetic stimulation (high-frequency repetitive transcranial magnetic stimulation with sham low-frequency repetitive transcranial magnetic stimulation) and Task-oriented therapy for improving motor function.	1	Abdelkader et al. (2024)
1b	Bilateral repetitive transcranial magnetic stimulation (high-frequency repetitive transcranial magnetic stimulation with low-frequency repetitive transcranial magnetic stimulation) and Task-oriented therapy may not have a difference in efficacy when compared to Inhibitory repetitive transcranial magnetic stimulation (sham high-frequency repetitive transcranial magnetic stimulation with low-	1	Abdelkader et al. (2024)

	frequency repetitive transcranial magnetic stimulation) and Task-oriented therapy for improving motor function.		
1b	Excitatory repetitive transcranial magnetic stimulation (high-frequency repetitive transcranial magnetic stimulation with sham low-frequency repetitive transcranial magnetic stimulation) and Task-oriented therapy may not have a difference in efficacy when compared to Inhibitory repetitive transcranial magnetic stimulation (sham high-frequency repetitive transcranial magnetic stimulation with low-frequency repetitive transcranial magnetic stimulation) and Task-oriented therapy for improving motor function.	1	Abdelkader et al. (2024)
1a	Different approaches to repetitive transcranial magnetic stimulation may not have a difference in efficacy when compared with one another for improving motor function.	4	Cha, HG et al. (2024); Mahmoud W. et al. (2024); Gao et al. (2023); Emara et al. (2010)
1b	Repetitive transcranial magnetic stimulation may produce greater improvements in motor function than conventional therapy.	1	Askin et al. (2017)
1b	Low frequency repetitive transcranial magnetic stimulation with occupational therapy training may produce greater improvements in motor function than constraint-induced movement therapy.	1	Abo et al. (2014)
1b	Low frequency repetitive transcranial magnetic stimulation with virtual reality may produce greater improvements in motor function than Sham repetitive transcranial magnetic stimulation with virtual reality.	1	Zheng et al. (2015)
1b	High Frequency repetitive transcranial magnetic stimulation with Rehabilitation Program may not have a difference in efficacy when compared to Rehabilitation Program for improving motor function.	1	Haghighi F.M. et al. (2021)
2	High frequency repetitive transcranial magnetic stimulation with grip training and conventional rehab may not have a difference in efficacy when compared to repetitive transcranial magnetic stimulation with conventional rehab or Grip training and conventional rehab for improving motor function.	1	Yang Y. et al. (2021)
1b	Low-frequency repetitive transcranial magnetic stimulation with functional electrical stimulation and conventional rehab may produce greater improvements in motor function than functional electrical stimulation with conventional rehab.	1	Yang et al. (2022b)
1b	Low-frequency repetitive transcranial magnetic stimulation with functional electrical stimulation and conventional rehab may produce greater improvements in motor function than Low-frequency repetitive transcranial magnetic stimulation with conventional rehab.	1	Yang et al. (2022b)
1a	High-frequency repetitive transcranial magnetic stimulation combined with other interventions may not have a difference in efficacy when compared to sham or motor relearning programmes for improving motor function.	2	Lee et al. (2024a); Shim & Lee (2023)
1b	High-frequency repetitive transcranial magnetic stimulation with Conventional Therapy may produce greater improvements in motor function than Conventional therapy.	1	Rezaei et al. (2023)
1b	High-frequency repetitive transcranial magnetic stimulation with Conventional Therapy may result in lesser improvements in motor function when compared to Contralateral limb Cross education (strength training) with Conventional therapy.	1	Rezaei et al. (2023)
1b	Contralateral limb Cross education (strength training) with Conventional therapy may not have a difference in efficacy when compared to high-frequency repetitive transcranial magnetic stimulation with cross education and conventional therapy for improving motor function.	1	Rezaei et al. (2023)
1b	High-frequency repetitive transcranial magnetic stimulation with Conventional Therapy may not have a difference in efficacy when	1	Rezaei et al. (2023)

	compared to high-frequency repetitive transcranial magnetic stimulation with cross education and conventional therapy for improving motor function.		
1b	High-frequency repetitive transcranial magnetic stimulation combined with other interventions may produce greater improvements in motor function than sham.	1	Wu X. et al. (2023)
1b	There is conflicting evidence about the effect of High-frequency repetitive transcranial magnetic stimulation with cervical nerve root magnetic stimulation when compared to high-frequency repetitive transcranial magnetic stimulation with sham cervical nerve root magnetic stimulation for improving motor function.	1	Wu X. et al. (2023)
1b	There is conflicting evidence about the effect of High-frequency repetitive transcranial magnetic stimulation with cervical nerve root magnetic stimulation when compared to Sham high-frequency repetitive transcranial magnetic stimulation with cervical nerve root magnetic stimulation for improving motor function.	1	Wu X. et al. (2023)
1b	High-frequency repetitive transcranial magnetic stimulation with sham cervical nerve root magnetic stimulation may not have a difference in efficacy when compared to Sham high-frequency repetitive transcranial magnetic stimulation with cervical nerve root magnetic stimulation for improving motor function.	1	Wu X. et al. (2023)
1b	Mirror therapy with high frequency repetitive transcranial magnetic stimulation and Traditional physical therapy may produce greater improvements in motor function than Sham with Traditional physical therapy.	1	Ji et al. (2014)
1b	Mirror therapy with high frequency repetitive transcranial magnetic stimulation and Traditional physical therapy may produce greater improvements in motor function than Mirror therapy with Traditional physical therapy.	1	Ji et al. (2014)
1b	Functional Magnetic Stimulation (applied peripherally) may produce greater improvements in motor function than Low-Frequency repetitive transcranial magnetic stimulation.	1	Chen et al. (2020a)
1b	Electromyography-triggered neuromuscular electrical stimulation with repetitive transcranial magnetic stimulation may not have a difference in efficacy when compared to electromyography-triggered neuromuscular electrical stimulation with Sham repetitive transcranial magnetic stimulation for improving motor function.	1	Theilig et al. (2011)
1b	Low frequence repetitive transcranial magnetic stimulation with mental practice may produce greater improvements in motor function than repetitive transcranial magnetic stimulation with audiotape-led relaxation.	1	Pan et al. (2019)
1b	Neuromuscular electrical stimulation with repetitive transcranial magnetic stimulation may not have a difference in efficacy when compared to Sham neuromuscular electrical stimulation with repetitive transcranial magnetic stimulation for improving motor function.	1	Etoh et al. (2019)
1b	Continuous theta burst stimulation with physiotherapy may produce greater improvements in motor function than Sham continuous theta burst stimulation with physiotherapy.	1	Kuzu et al. (2021)
2	Ipsilesional Paired Associated Stimulation (PAS) may produce greater improvements in motor function than Conventional Care.	1	Sui et al. (2021)
2	Ipsilesional Paired Associated Stimulation (PAS) may result in lesser improvements in motor function when compared to Contralesional PAS or Bilateral PAS.	1	Sui et al. (2021)

1b	Custom occupational therapy with repetitive transcranial magnetic stimulation-LF may produce greater improvements in motor function than Custom Occupational Therapy.	1	Yamada et al. (2022)
1b	Soft Robotic Glove with Conventional therapy may produce greater improvements in motor function than Conventional therapy.	1	Wang T. et al. (2023)
1b	Soft Robotic Glove with Conventional therapy may not have a difference in efficacy when compared to Low frequency repetitive transcranial magnetic stimulation with Conventional therapy for improving motor function.	1	Wang T. et al. (2023)
2	Low-frequency repetitive transcranial magnetic stimulation with peripheral repetitive magnetic stimulation (rPMS) and rehabilitation may produce greater improvements in motor function than rehabilitation.	1	Qin et al. (2023)
2	Low-frequency repetitive transcranial magnetic stimulation with peripheral repetitive magnetic stimulation (rPMS) and rehabilitation may produce greater improvements in motor function than low-frequency repetitive transcranial magnetic stimulation with rehabilitation.	1	Qin et al. (2023)
1b	Graded motor imagery with repetitive transcranial magnetic stimulation and conventional rehabilitation may produce greater improvements in motor function than Graded motor imagery with conventional rehabilitation.	1	Jia et al. (2024)
1b	Graded motor imagery with repetitive transcranial magnetic stimulation and conventional rehabilitation may not have a difference in efficacy when compared to repetitive transcranial magnetic stimulation with conventional rehabilitation for improving motor function.	1	Jia et al. (2024)
1b	Repetitive transcranial magnetic stimulation with mirror therapy may not have a difference in efficacy when compared to bilateral tDCS with mirror therapy or sham tDCS with mirror therapy for improving motor function.	1	D'Agata et al. (2016)
1b	High-frequency rTMS combined with other interventions may produce greater improvements in motor function than sham.	1	de Freitas Zanona A. et al. (2022)
1b	Low-frequency rTMS combined with other interventions may not have a difference in efficacy when compared to conventional therapy for improving motor function.	1	Kim et al. (2020c)
1b	Scalp acupuncture (SA) may not have a difference in efficacy when compared to SAEM-CS- SA and electromagnetic convergence stimulation (SA and LF-rTMS simultaneously) for improving motor function.	1	Kim et al. (2020c)
1b	Repetitive transcranial magnetic stimulation (rTMS) may produce greater improvements in motor function than SAEM-CS- SA and electromagnetic convergence stimulation (SA and LF-rTMS simultaneously).	1	Kim et al. (2020c)
1b	Scalp acupuncture (SA) may not have a difference in efficacy when compared to Repetitive transcranial magnetic stimulation (rTMS) for improving motor function.	1	Kim et al. (2020c)
1b	Low-frequency rTMS combined with other interventions may not have a difference in efficacy when compared to task-specific training or sham for improving motor function.	1	Higgins et al. (2015)
1b	High frequency (10Hz) rTMS with task-oriented training may produce greater improvements in motor function than Sham rTMS with task-oriented training.	1	Kim et al. (2014b)

1b	Paired associative stimulation (rTMS with rPMS) and physiotherapy may not have a difference in efficacy when compared to rTMS with physiotherapy for improving motor function.	1	Liang et al. (2024)
1b	Cerebello-Motor paired associated stimulation (PAS) with physiotherapy may not have a difference in efficacy when compared to Sham with physiotherapy for improving motor function.	1	Rosso et al. (2022)
1b	Intermittent theta-burst stimulation of the affected motor cortex hand area with conventional therapy may not have a difference in efficacy when compared to Sham stimulation with conventional therapy for improving motor function.	1	Watanabe et al. (2018)
1b	Cortico-cortical paired associative stimulation (ccPAS) with routine rehabilitation may produce greater improvements in motor function than Sham ccPAS with routine rehabilitation.	1	Xing et al. (2024)

STROKE SEVERITY			
LoE	**Conclusion Statement**	**RCTs**	**References**
1a	Low-frequency repetitive transcranial magnetic stimulation may not have a difference in efficacy when compared to sham for improving stroke severity.	6	Qian et al. (2024); Sharma et al. (2020); Meng & Song (2017); Seniow et al. (2012); Khedr et al. (2010a); Khedr et al. (2009a)
1b	1Hz repetitive transcranial magnetic stimulation may produce greater improvements in stroke severity than 3Hz repetitive transcranial magnetic stimulation.	1	Khedr et al. (2009a)
1a	Repetitive transcranial magnetic stimulation may produce greater improvements in stroke severity than sham.	8	Wang et al. (2023d); Chen et al. (2021c); Chen et al. (2021d); Chiu et al. (2020); Du et al. (2019); Guan et al. (2017); Emara et al. (2010); Khedr et al. (2010b)
1b	Low-frequency repetitive transcranial magnetic stimulation with rehabilitation may produce greater improvements in stroke severity than High-frequency repetitive transcranial magnetic stimulation with rehabilitation.	1	Wang et al. (2023d)
1a	High-frequency repetitive transcranial magnetic stimulation may not have a difference in efficacy when compared to sham for improving stroke severity.	5	Valovicová et al. (2024); Ke et al. (2020); Choi et al. (2018); Gu et al. (2017); Hosomi et al. (2016)
1b	High-Frequency repetitive transcranial magnetic stimulation with Short Inter-Train Intervals may not have a difference in efficacy when compared to High-Frequency repetitive transcranial magnetic stimulation with Long Inter-Train Intervals for improving stroke severity.	1	Ke et al. (2020)
1a	Low-frequency repetitive transcranial magnetic stimulation combined with other interventions may not have a difference in efficacy when compared to sham or task-specific training for improving stroke severity.	2	Edwards et al. (2023); Kim et al. (2020a)
1b	Low frequency repetitive transcranial magnetic stimulation may not have a difference in efficacy when compared to Physical therapy for improving stroke severity.	1	Tosun et al. (2017)
1b	Low frequency Repetitive Transcranial Magnetic Stimulation to unaffected hemisphere with Brunnstrom movement therapy may not have a difference in efficacy when compared to Sham Repetitive Transcranial Magnetic Stimulation with Brunnstrom movement therapy for improving stroke severity.	1	Ozkeskin et al. (2017)
1b	Repetitive transcranial magnetic stimulation may not have a difference in efficacy when compared to conventional therapy for improving stroke severity.	1	Askin et al. (2017)

1b	High-frequency repetitive transcranial magnetic stimulation combined with other interventions may not have a difference in efficacy when compared to sham for improving stroke severity.	1	Wu X. et al. (2023)
1b	High-frequency repetitive transcranial magnetic stimulation with cervical nerve root magnetic stimulation may not have a difference in efficacy when compared to high-frequency repetitive transcranial magnetic stimulation with sham cervical nerve root magnetic stimulation for improving stroke severity.	1	Wu X. et al. (2023)
1b	High-frequency repetitive transcranial magnetic stimulation with cervical nerve root magnetic stimulation may not have a difference in efficacy when compared to Sham high-frequency repetitive transcranial magnetic stimulation with cervical nerve root magnetic stimulation for improving stroke severity.	1	Wu X. et al. (2023)
1b	High-frequency repetitive transcranial magnetic stimulation with sham cervical nerve root magnetic stimulation may not have a difference in efficacy when compared to Sham high-frequency repetitive transcranial magnetic stimulation with cervical nerve root magnetic stimulation for improving stroke severity.	1	Wu X. et al. (2023)
1b	Continuous theta burst stimulation with physiotherapy may not have a difference in efficacy when compared to Sham continuous theta burst stimulation with physiotherapy for improving stroke severity.	1	Kuzu et al. (2021)
1b	Unilateral High-frequency repetitive transcranial magnetic stimulation (HF-rTMS) may result in lesser improvements in stroke severity when compared to Bilateral application of HF- and LF-rTMS (BL-rTMS).	1	Sasaki et al. (2014)
1b	3Hz rTMS may not have a difference in efficacy when compared to 10Hz rTMS for improving stroke severity.	1	Khedr et al. (2010b)
1b	Repetitive transcranial magnetic stimulation: some approaches may produce greater improvements in stroke severity than others.	1	Emara et al. (2010)

MUSCLE STRENGTH			
LoE	**Conclusion Statement**	**RCTs**	**References**
1a	Low-frequency repetitive transcranial magnetic stimulation may not have a difference in efficacy when compared to sham for improving muscle strength.	7	Qian et al. (2024); Matsuura et al. (2015); Wang et al. (2014a); Khedr et al. (2010a); Khedr et al. (2009a); Liepert et al. (2007); Takeuchi et al. (2005)
1b	Low frequency repetitive transcranial magnetic stimulation applied to primary motor cortex with conventional rehab may produce greater improvements in muscle strength than Low frequency repetitive transcranial magnetic stimulation applied to premotor area with conventional rehab.	1	Wang et al. (2014a)
1b	1Hz repetitive transcranial magnetic stimulation may not have a difference in efficacy when compared to 3Hz repetitive transcranial magnetic stimulation for improving muscle strength.	1	Khedr et al. (2009a)
1a	Repetitive transcranial magnetic stimulation may not have a difference in efficacy when compared to sham for improving muscle strength.	4	Chiu et al. (2020); Sasaki et al. (2013); Khedr et al. (2010b); Khedr et al. (2009b)
1b	High-frequency repetitive transcranial magnetic stimulation may not have a difference in efficacy when compared to low-frequency repetitive transcranial magnetic stimulation for improving muscle strength.	1	Sasaki et al. (2013)
1a	High-frequency repetitive transcranial magnetic stimulation may not have a difference in efficacy when compared to sham for improving muscle strength.	4	Ibrahim et al. (2020); Choi et al. (2018); Gu et al. (2017); Hosomi et al. (2016)

1b	Low frequency repetitive transcranial magnetic stimulation with pinch motor training (a metronome-paced pinch of their index finger and thumb of the affected hand as fast as possible) may produce greater improvements in muscle strength than pinch motor training with sham repetitive transcranial magnetic stimulation.	1	Takeuchi et al. (2008)
2	There is conflicting evidence about the effect of High-frequency repetitive transcranial magnetic stimulation combined with other interventions when compared to high-frequency rtms for improving muscle strength.	1	Kim & Yim et al. (2018)
1b	Low-frequency repetitive transcranial magnetic stimulation combined with other interventions may produce greater improvements in muscle strength than Sham repetitive transcranial magnetic stimulation with sham Itbs.	1	Sung et al. (2013)
1b	Repetitive transcranial magnetic stimulation may not have a difference in efficacy when compared to Dual transcranial direct current stimulation for improving muscle strength.	1	Miu et al. (2020)
1b	Low frequency repetitive transcranial magnetic stimulation with intermittent theta burst stimulation may produce greater improvements in muscle strength than Sham repetitive transcranial magnetic stimulation with intermittent theta burst stimulation or Low frequency repetitive transcranial magnetic stimulation and sham intermittent theta burst stimulation.	1	Sung et al. (2013)
1b	Sham repetitive transcranial magnetic stimulation with intermittent theta burst stimulation may result in lesser improvements in muscle strength when compared to Low frequency repetitive transcranial magnetic stimulation with sham intermittent theta burst stimulation.	1	Sung et al. (2013)
1b	Low Frequency repetitive transcranial magnetic stimulation may result in lesser improvements in muscle strength when compared to ANodal transcranial direct current stimulation or Low Frequency repetitive transcranial magnetic stimulation with ANodal transcranial direct current stimulation.	1	Takeuchi et al. (2012)
1a	Low-frequency repetitive transcranial magnetic stimulation combined with other interventions may not have a difference in efficacy when compared to sham or task-specific training for improving muscle strength.	3	Luk et al. (2022); Kim et al. (2020a); Rose et al. (2014)
1b	Low frequency repetitive transcranial magnetic stimulation with Action Observation may not have a difference in efficacy when compared to Low frequency repetitive transcranial magnetic stimulation for improving muscle strength.	1	Noh et al. (2019)
1b	Low frequency repetitive transcranial magnetic stimulation may not have a difference in efficacy when compared to Physical therapy for improving muscle strength.	1	Tosun et al. (2017)
1b	Low-frequency repetitive transcranial magnetic stimulation combined with other interventions may produce greater improvements in muscle strength than sham.	1	Wang et al. (2014b)
1b	10 Sessions Low Frequency repetitive transcranial magnetic stimulation before 10 Sessions Intermittent Theta Burst Stimulation may not have a difference in efficacy when compared to 10 Sessions Low Frequency repetitive transcranial magnetic stimulation before 10 Sessions Intermittent Theta Burst Stimulation for improving muscle strength.	1	Wang et al. (2014b)
2	Low-frequency repetitive transcranial magnetic stimulation may produce greater improvements in muscle strength than conventional therapy.	1	El-Tamawy et al. (2019)
1b	Bilateral repetitive transcranial magnetic stimulation may not have a difference in efficacy when compared to Unaffected side repetitive	1	Takeuchi et al. (2009)

	transcranial magnetic stimulation or Affected side repetitive transcranial magnetic stimulation for improving muscle strength.		
1b	There is conflicting evidence about the effect of Repetitive transcranial magnetic stimulation when compared to conventional therapy for improving muscle strength.	1	Petruseviciene et al. (2023)
1b	There is conflicting evidence about the effect of High Frequency repetitive transcranial magnetic stimulation with Rehabilitation Program when compared to Rehabilitation Program for improving muscle strength.	1	Haghighi F.M. et al. (2021)
2	High frequency repetitive transcranial magnetic stimulation with grip training and conventional rehab may not have a difference in efficacy when compared to repetitive transcranial magnetic stimulation with conventional rehab or Grip training and conventional rehab for improving muscle strength.	1	Yang Y. et al. (2021)
1b	High-frequency repetitive transcranial magnetic stimulation combined with other interventions may produce greater improvements in muscle strength than sham or motor relearning programmes.	1	Shim & Lee (2023)
1b	There is conflicting evidence about the effect of High-frequency repetitive transcranial magnetic stimulation with Conventional Therapy when compared to Conventional therapy for improving muscle strength.	1	Rezaei et al. (2023)
1b	High-frequency repetitive transcranial magnetic stimulation with Conventional Therapy may not have a difference in efficacy when compared to Contralateral limb Cross education (strength training) with Conventional therapy for improving muscle strength.	1	Rezaei et al. (2023)
1b	Contralateral limb Cross education (strength training) with Conventional therapy may not have a difference in efficacy when compared to high-frequency repetitive transcranial magnetic stimulation with cross education and conventional therapy for improving muscle strength.	1	Rezaei et al. (2023)
1b	High-frequency repetitive transcranial magnetic stimulation with Conventional Therapy may not have a difference in efficacy when compared to high-frequency repetitive transcranial magnetic stimulation with cross education and conventional therapy for improving muscle strength.	1	Rezaei et al. (2023)
1b	Different approaches to repetitive transcranial magnetic stimulation may not have a difference in efficacy when compared with one another for improving muscle strength.	1	Mahmoud W. et al. (2024)
1b	Unilateral High-frequency repetitive transcranial magnetic stimulation (HF-rTMS) may not have a difference in efficacy when compared to Bilateral application of HF- and LF-rTMS (BL-rTMS) for improving muscle strength.	1	Sasaki et al. (2014)
1b	3Hz rTMS may not have a difference in efficacy when compared to 10Hz rTMS for improving muscle strength.	1	Khedr et al. (2010b)
1b	Cerebello-Motor paired associated stimulation (PAS) with physiotherapy may not have a difference in efficacy when compared to Sham with physiotherapy for improving muscle strength.	1	Rosso et al. (2022)
1b	Intermittent theta-burst stimulation of the affected motor cortex hand area with conventional therapy may not have a difference in efficacy when compared to Sham stimulation with conventional therapy for improving muscle strength.	1	Watanabe et al. (2018)

SPASTICITY			
LoE	**Conclusion Statement**	**RCTs**	**References**
1a	Low-frequency repetitive transcranial magnetic stimulation may not have a difference in efficacy when compared to sham for improving spasticity.	3	Gottlieb et al. (2021); BarrosGalvao et al. (2014); Etoh et al. (2013)
1a	There is conflicting evidence about the effect of Repetitive transcranial magnetic stimulation when compared to sham for improving spasticity.	2	Sengul et al. (2023); Chervyakov et al. (2018)
1b	High-frequency repetitive transcranial magnetic stimulation may not have a difference in efficacy when compared to sham for improving spasticity.	1	Valovicová et al. (2024)
1a	Low-frequency repetitive transcranial magnetic stimulation combined with other interventions may not have a difference in efficacy when compared to sham or task-specific training for improving spasticity.	2	Kim et al. (2020a); Rose et al. (2014)
1b	Low frequency repetitive transcranial magnetic stimulation may not have a difference in efficacy when compared to Physical therapy for improving spasticity.	1	Tosun et al. (2017)
1b	Repetitive transcranial magnetic stimulation combined with other interventions may not have a difference in efficacy when compared to sham or task-specific training for improving spasticity.	1	Abdelkader et al. (2024)
1b	Bilateral repetitive transcranial magnetic stimulation (high-frequency repetitive transcranial magnetic stimulation with low-frequency repetitive transcranial magnetic stimulation) and Task-oriented therapy may not have a difference in efficacy when compared to Excitatory repetitive transcranial magnetic stimulation (high-frequency repetitive transcranial magnetic stimulation with sham low-frequency repetitive transcranial magnetic stimulation) and Task-oriented therapy for improving spasticity.	1	Abdelkader et al. (2024)
1b	Bilateral repetitive transcranial magnetic stimulation (high-frequency repetitive transcranial magnetic stimulation with low-frequency repetitive transcranial magnetic stimulation) and Task-oriented therapy may not have a difference in efficacy when compared to Inhibitory repetitive transcranial magnetic stimulation (sham high-frequency repetitive transcranial magnetic stimulation with low-frequency repetitive transcranial magnetic stimulation) and Task-oriented therapy for improving spasticity.	1	Abdelkader et al. (2024)
1b	Excitatory repetitive transcranial magnetic stimulation (high-frequency repetitive transcranial magnetic stimulation with sham low-frequency repetitive transcranial magnetic stimulation) and Task-oriented therapy may not have a difference in efficacy when compared to Inhibitory repetitive transcranial magnetic stimulation (sham high-frequency repetitive transcranial magnetic stimulation with low-frequency repetitive transcranial magnetic stimulation) and Task-oriented therapy for improving spasticity.	1	Abdelkader et al. (2024)
1b	Low frequency Repetitive Transcranial Magnetic Stimulation to unaffected hemisphere with Brunnstrom movement therapy may not have a difference in efficacy when compared to Sham Repetitive Transcranial Magnetic Stimulation with Brunnstrom movement therapy for improving spasticity.	1	Ozkeskin et al. (2017)
1b	Repetitive transcranial magnetic stimulation may produce greater improvements in spasticity than conventional therapy.	1	Askin et al. (2017)
1b	Electromyography-triggered neuromuscular electrical stimulation with repetitive transcranial magnetic stimulation may not have a difference in efficacy when compared to electromyography-triggered neuromuscular electrical stimulation with Sham repetitive transcranial magnetic stimulation for improving spasticity.	1	Theilig et al. (2011)

1b	Neuromuscular electrical stimulation with repetitive transcranial magnetic stimulation may produce greater improvements in spasticity than Sham neuromuscular electrical stimulation with repetitive transcranial magnetic stimulation.	1	Etoh et al. (2019)
1b	Continuous theta burst stimulation with physiotherapy may produce greater improvements in spasticity than Sham continuous theta burst stimulation with physiotherapy.	1	Kuzu et al. (2021)
2	Low-frequency repetitive transcranial magnetic stimulation with peripheral repetitive magnetic stimulation (rPMS) and rehabilitation may produce greater improvements in spasticity than rehabilitation.	1	Qin et al. (2023)
2	Low-frequency repetitive transcranial magnetic stimulation with peripheral repetitive magnetic stimulation (rPMS) and rehabilitation may produce greater improvements in spasticity than low-frequency repetitive transcranial magnetic stimulation with rehabilitation.	1	Qin et al. (2023)
1b	Different approaches to repetitive transcranial magnetic stimulation may not have a difference in efficacy when compared with one another for improving spasticity.	1	Mahmoud W. et al. (2024)
1b	Intermittent theta-burst stimulation of the affected motor cortex hand area with conventional therapy may not have a difference in efficacy when compared to Sham stimulation with conventional therapy for improving spasticity.	1	Watanabe et al. (2018)

RANGE OF MOTION			
LoE	**Conclusion Statement**	**RCTs**	**References**
1b	Low-frequency repetitive transcranial magnetic stimulation may not have a difference in efficacy when compared to sham for improving range of motion.	1	BarrosGalvao et al. (2014)
1b	Repetitive transcranial magnetic stimulation may not have a difference in efficacy when compared to sham for improving range of motion.	1	Aydin et al. (2024)
1b	High-frequency repetitive transcranial magnetic stimulation may not have a difference in efficacy when compared to sham for improving range of motion.	1	Choi et al. (2018)
1b	Low-frequency repetitive transcranial magnetic stimulation combined with other interventions may not have a difference in efficacy when compared to sham or task-specific training for improving range of motion.	1	Rose et al. (2014)
1b	Different approaches to repetitive transcranial magnetic stimulation may not have a difference in efficacy when compared with one another for improving range of motion.	1	Gao et al. (2023)
1b	Paired associative stimulation (PAS) with Motor imagery may not have a difference in efficacy when compared to Sham PAS with motor imagery for improving range of motion.	1	Brihmat et al. (2023)
1b	Electromyography-triggered neuromuscular electrical stimulation with repetitive transcranial magnetic stimulation may not have a difference in efficacy when compared to electromyography-triggered neuromuscular electrical stimulation with Sham repetitive transcranial magnetic stimulation for improving range of motion.	1	Theilig et al. (2011)

PROPRIOCEPTION			
LoE	**Conclusion Statement**	**RCTs**	**References**
1b	High-Frequency repetitive transcranial magnetic stimulation with Peripheral Somatosensory Stimulation (sensory level electrical stimulation and vibratory stimulation) may not have a difference in	1	Pundik et al. (2021)

	efficacy when compared to Sham repetitive transcranial magnetic stimulation with Peripheral Somatosensory Stimulation for improving proprioception.		
1b	There is conflicting evidence about the effect of High-Frequency repetitive transcranial magnetic stimulation with Peripheral Somatosensory Stimulation (sensory level electrical stimulation and vibratory stimulation) when compared to Low-Frequency repetitive transcranial magnetic stimulation with Peripheral Somatosensory Stimulation for improving proprioception.	1	Pundik et al. (2021)
1b	Low frequency Repetitive Transcranial Magnetic Stimulation to unaffected hemisphere with Brunnstrom movement therapy may produce greater improvements in proprioception than Sham Repetitive Transcranial Magnetic Stimulation with Brunnstrom movement therapy.	1	Ozkeskin et al. (2017)
1b	High-frequency rTMS combined with other interventions may not have a difference in efficacy when compared to sham for improving proprioception.	1	de Freitas Zanona A. et al. (2022)
1b	Simultaneous cathodal tDCS with 10hz rTMS may produce greater improvements in proprioception than rTMS 10Hz with Sham tDCS.	1	Kwon et al. (2016)
1b	Simultaneous anodal tDCS with 10hz rTMS may not have a difference in efficacy when compared to rTMS 10Hz with Sham tDCS for improving proprioception.	1	Kwon et al. (2016)
1b	Preconditioning cathodal tCDS with 10hz rTMS may not have a difference in efficacy when compared to rTMS 10Hz with Sham tDCS for improving proprioception.	1	Kwon et al. (2016)
1b	Preconditioning anodal tDCS with 10hz rTMS may not have a difference in efficacy when compared to rTMS 10Hz with Sham tDCS for improving proprioception.	1	Kwon et al. (2016)

2. Activities

ACTIVITIES OF DAILY LIVING			
LoE	**Conclusion Statement**	**RCTs**	**References**
1a	Low-frequency repetitive transcranial magnetic stimulation may not have a difference in efficacy when compared to sham for improving performance of activities of daily living.	7	Qian et al. (2024); Revill et al. (2020); Sharma et al. (2020); Meng & Song (2017); BarrosGalvao et al. (2014); Khedr et al. (2010a); Khedr et al. (2009a)
1b	1Hz repetitive transcranial magnetic stimulation may not have a difference in efficacy when compared to 3Hz repetitive transcranial magnetic stimulation for improving performance of activities of daily living.	1	Khedr et al. (2009a)
1a	Repetitive transcranial magnetic stimulation may produce greater improvements in performance of activities of daily living than sham.	8	Wang et al. (2023d); Wang et al. (2022); Chen et al. (2021c); Chen et al. (2021d); Chervyakov et al. (2018); Guan et al. (2017); Emara et al. (2010); Khedr et al. (2009b)
1b	Low-frequency repetitive transcranial magnetic stimulation with rehabilitation may produce greater improvements in performance of activities of daily living than High-frequency repetitive transcranial magnetic stimulation with rehabilitation.	1	Wang et al. (2023d)
1b	High-frequency repetitive transcranial magnetic stimulation with conventional care may produce greater improvements in	1	Wang et al. (2022)

	performance of activities of daily living than low-frequency repetitive transcranial magnetic stimulation with conventional care.		
1a	High-frequency repetitive transcranial magnetic stimulation may produce greater improvements in performance of activities of daily living than sham.	3	Valovicová et al. (2024); Ke et al. (2020); Hosomi et al. (2016)
1b	High-Frequency repetitive transcranial magnetic stimulation with Short Inter-Train Intervals may not have a difference in efficacy when compared to High-Frequency repetitive transcranial magnetic stimulation with Long Inter-Train Intervals for improving performance of activities of daily living.	1	Ke et al. (2020)
1b	There is conflicting evidence about the effect of Low-frequency repetitive transcranial magnetic stimulation combined with other interventions when compared to Sham repetitive transcranial magnetic stimulation with sham Itbs for improving performance of activities of daily living.	1	Sung et al. (2013)
1b	Repetitive transcranial magnetic stimulation may not have a difference in efficacy when compared to Dual transcranial direct current stimulation for improving performance of activities of daily living.	1	Miu et al. (2020)
1b	There is conflicting evidence about the effect of Low frequency repetitive transcranial magnetic stimulation with intermittent theta burst stimulation when compared to Sham repetitive transcranial magnetic stimulation with intermittent theta burst stimulation or Low frequency repetitive transcranial magnetic stimulation and sham intermittent theta burst stimulation for improving performance of activities of daily living.	1	Sung et al. (2013)
1b	Sham repetitive transcranial magnetic stimulation with intermittent theta burst stimulation may not have a difference in efficacy when compared to Low frequency repetitive transcranial magnetic stimulation with sham intermittent theta burst stimulation for improving performance of activities of daily living.	1	Sung et al. (2013)
1a	Low-frequency repetitive transcranial magnetic stimulation combined with other interventions may not have a difference in efficacy when compared to sham or task-specific training for improving performance of activities of daily living.	2	Kim et al. (2020a); Rose et al. (2014)
1b	Low frequency repetitive transcranial magnetic stimulation may not have a difference in efficacy when compared to Physical therapy for improving performance of activities of daily living.	1	Tosun et al. (2017)
2	Low frequency repetitive transcranial magnetic stimulation with scalp acupuncture may produce greater improvements in performance of activities of daily living than Scalp Acupuncture.	1	Zhao et al. (2018)
1b	There is conflicting evidence about the effect of Low-frequency repetitive transcranial magnetic stimulation combined with other interventions when compared to sham for improving performance of activities of daily living.	1	Meng et al. (2020)
1b	Low frequency repetitive transcranial magnetic stimulation with intermittent Theta Burst Stimulation may produce greater improvements in performance of activities of daily living than Low frequency repetitive transcranial magnetic stimulation with sham theta burst stimulation.	1	Meng et al. (2020)
1b	High frequency repetitive transcranial magnetic stimulation with constraint-induced movement therapy may not have a difference in efficacy when compared to Sham repetitive transcranial magnetic stimulation with constraint-induced movement therapy for improving performance of activities of daily living.	1	Malcolm et al. (2007)

1a	Different approaches to repetitive transcranial magnetic stimulation may not have a difference in efficacy when compared with one another for improving performance of activities of daily living.	3	Cha, HG et al. (2024); Mahmoud W. et al. (2024); Emara et al. (2010)
1a	There is conflicting evidence about the effect of Repetitive transcranial magnetic stimulation when compared to conventional therapy for improving performance of activities of daily living.	2	Petruseviciene et al. (2023); Askin et al. (2017)
1b	Low frequency repetitive transcranial magnetic stimulation with virtual reality may not have a difference in efficacy when compared to Sham repetitive transcranial magnetic stimulation with virtual reality for improving performance of activities of daily living.	1	Zheng et al. (2015)
2	High frequency repetitive transcranial magnetic stimulation with grip training and conventional rehab may not have a difference in efficacy when compared to repetitive transcranial magnetic stimulation with conventional rehab or Grip training and conventional rehab for improving performance of activities of daily living.	1	Yang Y. et al. (2021)
1b	High-frequency repetitive transcranial magnetic stimulation combined with other interventions may not have a difference in efficacy when compared to sham or motor relearning programmes for improving performance of activities of daily living.	1	Shim & Lee (2023)
1b	High-frequency repetitive transcranial magnetic stimulation combined with other interventions may not have a difference in efficacy when compared to sham for improving performance of activities of daily living.	1	Wu X. et al. (2023)
1b	High-frequency repetitive transcranial magnetic stimulation with cervical nerve root magnetic stimulation may not have a difference in efficacy when compared to high-frequency repetitive transcranial magnetic stimulation with sham cervical nerve root magnetic stimulation for improving performance of activities of daily living.	1	Wu X. et al. (2023)
1b	High-frequency repetitive transcranial magnetic stimulation with cervical nerve root magnetic stimulation may produce greater improvements in performance of activities of daily living than Sham high-frequency repetitive transcranial magnetic stimulation with cervical nerve root magnetic stimulation.	1	Wu X. et al. (2023)
1b	High-frequency repetitive transcranial magnetic stimulation with sham cervical nerve root magnetic stimulation may not have a difference in efficacy when compared to Sham high-frequency repetitive transcranial magnetic stimulation with cervical nerve root magnetic stimulation for improving performance of activities of daily living.	1	Wu X. et al. (2023)
1b	Functional Magnetic Stimulation (applied peripherally) may produce greater improvements in performance of activities of daily living than Low-Frequency repetitive transcranial magnetic stimulation.	1	Chen et al. (2020a)
1b	Low frequence repetitive transcranial magnetic stimulation with mental practice may produce greater improvements in performance of activities of daily living than repetitive transcranial magnetic stimulation with audiotape-led relaxation.	1	Pan et al. (2019)
1b	Continuous theta burst stimulation with physiotherapy may produce greater improvements in performance of activities of daily living than Sham continuous theta burst stimulation with physiotherapy.	1	Kuzu et al. (2021)
2	Ipsilesional Paired Associated Stimulation (PAS) may produce greater improvements in performance of activities of daily living than Conventional Care.	1	Sui et al. (2021)
2	Ipsilesional Paired Associated Stimulation (PAS) may result in lesser improvements in performance of activities of daily living when compared to Contralesional PAS or Bilateral PAS.	1	Sui et al. (2021)

1b	Soft Robotic Glove with Conventional therapy may not have a difference in efficacy when compared to Conventional therapy for improving performance of activities of daily living.	1	Wang T. et al. (2023)
1b	Soft Robotic Glove with Conventional therapy may not have a difference in efficacy when compared to Low frequency repetitive transcranial magnetic stimulation with Conventional therapy for improving performance of activities of daily living.	1	Wang T. et al. (2023)
2	Low-frequency repetitive transcranial magnetic stimulation with peripheral repetitive magnetic stimulation (rPMS) and rehabilitation may produce greater improvements in performance of activities of daily living than rehabilitation.	1	Qin et al. (2023)
2	Low-frequency repetitive transcranial magnetic stimulation with peripheral repetitive magnetic stimulation (rPMS) and rehabilitation may produce greater improvements in performance of activities of daily living than low-frequency repetitive transcranial magnetic stimulation with rehabilitation.	1	Qin et al. (2023)
1b	There is conflicting evidence about the effect of Graded motor imagery with repetitive transcranial magnetic stimulation and conventional rehabilitation when compared to Graded motor imagery with conventional rehabilitation for improving performance of activities of daily living.	1	Jia et al. (2024)
1b	There is conflicting evidence about the effect of Graded motor imagery with repetitive transcranial magnetic stimulation and conventional rehabilitation when compared to repetitive transcranial magnetic stimulation with conventional rehabilitation for improving performance of activities of daily living.	1	Jia et al. (2024)
1b	There is conflicting evidence about the effect of High-frequency rTMS combined with other interventions when compared to sham for improving performance of activities of daily living.	1	de Freitas Zanona A. et al. (2022)
1b	Low-frequency rTMS combined with other interventions may not have a difference in efficacy when compared to conventional therapy for improving performance of activities of daily living.	1	Kim et al. (2020c)
1b	Scalp acupuncture (SA) may not have a difference in efficacy when compared to SAEM-CS- SA and electromagnetic convergence stimulation (SA and LF-rTMS simultaneously) for improving performance of activities of daily living.	1	Kim et al. (2020c)
1b	Repetitive transcranial magnetic stimulation (rTMS) may produce greater improvements in performance of activities of daily living than SAEM-CS- SA and electromagnetic convergence stimulation (SA and LF-rTMS simultaneously).	1	Kim et al. (2020c)
1b	Scalp acupuncture (SA) may result in lesser improvements in performance of activities of daily living when compared to Repetitive transcranial magnetic stimulation (rTMS).	1	Kim et al. (2020c)
1b	Low-frequency rTMS combined with other interventions may not have a difference in efficacy when compared to task-specific training or sham for improving performance of activities of daily living.	1	Higgins et al. (2015)
1b	Paired associative stimulation (rTMS with rPMS) and physiotherapy may not have a difference in efficacy when compared to rTMS with physiotherapy for improving performance of activities of daily living.	1	Liang et al. (2024)

DEXTERITY			
LoE	**Conclusion Statement**	**RCTs**	**References**
1a	Low-frequency repetitive transcranial magnetic stimulation may produce greater improvements in dexterity than sham.	5	Lüdemann-Podubecká et al. (2016); Matsuura et al. (2015);

			Khedr et al. (2009a); Liepert et al. (2007); Mansur et al. (2005)
1b	1Hz repetitive transcranial magnetic stimulation may produce greater improvements in dexterity than 3Hz repetitive transcranial magnetic stimulation.	1	Khedr et al. (2009a)
1b	Repetitive transcranial magnetic stimulation may not have a difference in efficacy when compared to sham for improving dexterity.	1	Fregni et al. (2006)
2	High-frequency repetitive transcranial magnetic stimulation combined with other interventions may not have a difference in efficacy when compared to high-frequency rtms for improving dexterity.	1	Kim & Yim et al. (2018)
1b	Repetitive transcranial magnetic stimulation may not have a difference in efficacy when compared to Dual transcranial direct current stimulation for improving dexterity.	1	Miu et al. (2020)
1a	Low-frequency repetitive transcranial magnetic stimulation combined with other interventions may not have a difference in efficacy when compared to sham or task-specific training for improving dexterity.	2	Luk et al. (2022); Kim et al. (2020a)
2	Interleaved combination method (ICM) repetitive transcranial magnetic stimulation with motor training may not have a difference in efficacy when compared to Preconditioned combination method (PCM) repetitive transcranial magnetic stimulation with motor training for improving dexterity.	1	Kwon et al. (2014)
1b	There is conflicting evidence about the effect of Repetitive transcranial magnetic stimulation when compared to conventional therapy for improving dexterity.	1	Askin et al. (2017)
1b	High Frequency repetitive transcranial magnetic stimulation with Rehabilitation Program may produce greater improvements in dexterity than Rehabilitation Program.	1	Haghighi F.M. et al. (2021)
1a	High-frequency repetitive transcranial magnetic stimulation combined with other interventions may not have a difference in efficacy when compared to sham or motor relearning programmes for improving dexterity.	2	Lee et al. (2024a); Shim & Lee (2023)
1b	High-frequency repetitive transcranial magnetic stimulation with Conventional Therapy may produce greater improvements in dexterity than Conventional therapy.	1	Rezaei et al. (2023)
1b	High-frequency repetitive transcranial magnetic stimulation with Conventional Therapy may not have a difference in efficacy when compared to Contralateral limb Cross education (strength training) with Conventional therapy for improving dexterity.	1	Rezaei et al. (2023)
1b	Contralateral limb Cross education (strength training) with Conventional therapy may not have a difference in efficacy when compared to high-frequency repetitive transcranial magnetic stimulation with cross education and conventional therapy for improving dexterity.	1	Rezaei et al. (2023)
1b	High-frequency repetitive transcranial magnetic stimulation with Conventional Therapy may not have a difference in efficacy when compared to high-frequency repetitive transcranial magnetic stimulation with cross education and conventional therapy for improving dexterity.	1	Rezaei et al. (2023)
1b	Mirror therapy with high frequency repetitive transcranial magnetic stimulation and Traditional physical therapy may produce greater improvements in dexterity than Sham with Traditional physical therapy.	1	Ji et al. (2014)

1b	Mirror therapy with high frequency repetitive transcranial magnetic stimulation and Traditional physical therapy may produce greater improvements in dexterity than Mirror therapy with Traditional physical therapy.	1	Ji et al. (2014)
1b	Low frequence repetitive transcranial magnetic stimulation with mental practice may produce greater improvements in dexterity than repetitive transcranial magnetic stimulation with audiotape-led relaxation.	1	Pan et al. (2019)
1b	Neuromuscular electrical stimulation with repetitive transcranial magnetic stimulation may produce greater improvements in dexterity than Sham neuromuscular electrical stimulation with repetitive transcranial magnetic stimulation.	1	Etoh et al. (2019)
1b	Active priming of low-frequency repetitive transcranial magnetic stimulation may not have a difference in efficacy when compared to sham priming for improving dexterity.	1	Cassidy et al. (2015)
1b	High-frequency rTMS combined with other interventions may not have a difference in efficacy when compared to sham for improving dexterity.	1	de Freitas Zanona A. et al. (2022)
1b	Low-frequency rTMS combined with other interventions may not have a difference in efficacy when compared to task-specific training or sham for improving dexterity.	1	Higgins et al. (2015)

Key Points

- Low-frequency repetitive transcranial magnetic stimulation may be beneficial for improving dexterity, but not motor function, stroke severity, muscle strength, spasticity, range of motion, and performance of activities of daily living, after stroke when compared to sham.
- Low frequency repetitive transcranial magnetic stimulation applied to primary motor cortex with conventional rehab may be beneficial for improving motor function and muscle strength after stroke when compared to Low frequency repetitive transcranial magnetic stimulation applied to premotor area with conventional rehab.
- Repetitive transcranial magnetic stimulation: some approaches may be more beneficial than others for improving stroke severity; different approaches to repetitive transcranial magnetic stimulation may not have a difference in efficacy when compared with one another for improving motor function, muscle strength, spasticity, range of motion, and performance of activities of daily living.
- Repetitive transcranial magnetic stimulation - M1 area with rehab may not be beneficial for improving motor function after stroke when compared to repetitive transcranial magnetic stimulation - SMA with routin rehab.
- Low-frequency repetitive transcranial magnetic stimulation with rehabilitation may be beneficial for improving motor function, performance of activities of daily living, and stroke severity after stroke when compared to High-frequency repetitive transcranial magnetic stimulation with rehabilitation.
- High-frequency repetitive transcranial magnetic stimulation with conventional care may be beneficial for improving motor function and performance of activities of daily living after stroke when compared to low-frequency repetitive transcranial magnetic stimulation with conventional care.
- The literature is mixed regarding the effect of Low Frequency Combined with High Frequency Repetitive Transcranial Magnetic Stimulation on improvement of motor function after stroke when compared to Low Frequency Repetitive Transcranial Magnetic Stimulation.
- High-frequency repetitive transcranial magnetic stimulation may be beneficial for improving motor function and performance of activities of daily living, but not spasticity, range of motion, stroke severity, and muscle strength, after stroke when compared to sham.
- High-Frequency repetitive transcranial magnetic stimulation with Short Inter-Train Intervals may not be beneficial for improving motor function, performance of activities of daily living, and stroke severity after stroke when compared to High-Frequency repetitive transcranial magnetic stimulation with Long Inter-Train Intervals.

- Paired associative stimulation may not be beneficial for improving motor function after stroke when compared to Active peripheral electrical stimulation with Sham cortical stimulation.
- High-frequency repetitive transcranial magnetic stimulation combined with other interventions may be beneficial for improving motor function, but not dexterity, after stroke when compared to high-frequency rtms; the literature is mixed regarding muscle strength.
- Low-frequency repetitive transcranial magnetic stimulation combined with other interventions may be beneficial for improving motor function and muscle strength after stroke when compared to Sham repetitive transcranial magnetic stimulation with sham ltbs; the literature is mixed regarding performance of activities of daily living.
- Repetitive transcranial magnetic stimulation may not be beneficial for improving motor function, dexterity, performance of activities of daily living, and muscle strength after stroke when compared to Dual transcranial direct current stimulation.
- Low frequency repetitive transcranial magnetic stimulation with intermittent theta burst stimulation may be beneficial for improving motor function and muscle strength after stroke when compared to Sham repetitive transcranial magnetic stimulation with intermittent theta burst stimulation or Low frequency repetitive transcranial magnetic stimulation and sham intermittent theta burst stimulation; the literature is mixed regarding performance of activities of daily living.
- Sham repetitive transcranial magnetic stimulation with intermittent theta burst stimulation may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Low frequency repetitive transcranial magnetic stimulation with sham intermittent theta burst stimulation.
- Sham repetitive transcranial magnetic stimulation with intermittent theta burst stimulation may be less beneficial than Low frequency repetitive transcranial magnetic stimulation with sham intermittent theta burst stimulation for improving muscle strength after stroke.
- Low-frequency repetitive transcranial magnetic stimulation combined with other interventions may not be beneficial for improving motor function, dexterity, performance of activities of daily living, spasticity, range of motion, stroke severity, and muscle strength after stroke when compared to sham or task-specific training.
- Low frequency repetitive transcranial magnetic stimulation with Action Observation may not be beneficial for improving motor function and muscle strength after stroke when compared to Low frequency repetitive transcranial magnetic stimulation.
- Low frequency repetitive transcranial magnetic stimulation may not be beneficial for improving motor function, performance of activities of daily living, spasticity, stroke severity, and muscle strength after stroke when compared to Physical therapy.
- Low frequency repetitive transcranial magnetic stimulation with scalp acupuncture may be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Scalp Acupuncture.
- Low-frequency repetitive transcranial magnetic stimulation combined with other interventions may be beneficial for improving motor function and muscle strength after stroke when compared to sham; the literature is mixed regarding performance of activities of daily living.
- Low frequency repetitive transcranial magnetic stimulation with intermittent Theta Burst Stimulation may be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Low frequency repetitive transcranial magnetic stimulation with sham theta burst stimulation.
- The literature is mixed regarding the effect of Active repetitive transcranial magnetic stimulation with fluoxetine on improvement of motor function after stroke when compared to Sham repetitive transcranial magnetic stimulation with fluoxetine.
- 10 Sessions Low Frequency repetitive transcranial magnetic stimulation before 10 Sessions Intermittent Theta Burst Stimulation may be beneficial for improving motor function, but not muscle strength, after stroke when compared to 10 Sessions Low Frequency repetitive transcranial magnetic stimulation before 10 Sessions Intermittent Theta Burst Stimulation.
- Low-frequency repetitive transcranial magnetic stimulation may be beneficial for improving motor function and muscle strength after stroke when compared to conventional therapy.

- 10 sessions repetitive transcranial magnetic stimulation with conventional therapy may be less beneficial than 30 sessions repetitive transcranial magnetic stimulation with conventional therapy for improving motor function after stroke.
- 20 sessions repetitive transcranial magnetic stimulation with conventional therapy may not be beneficial for improving motor function after stroke when compared to 30 sessions repetitive transcranial magnetic stimulation with conventional therapy.
- High frequency repetitive transcranial magnetic stimulation with constraint-induced movement therapy may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Sham repetitive transcranial magnetic stimulation with constraint-induced movement therapy.
- Repetitive transcranial magnetic stimulation combined with other interventions may not be beneficial for improving spasticity after stroke when compared to sham or task-specific training; the literature is mixed regarding motor function.
- Bilateral repetitive transcranial magnetic stimulation (high-frequency repetitive transcranial magnetic stimulation with low-frequency repetitive transcranial magnetic stimulation) and Task-oriented therapy may not be beneficial for improving motor function and spasticity after stroke when compared to Excitatory repetitive transcranial magnetic stimulation (high-frequency repetitive transcranial magnetic stimulation with sham low-frequency repetitive transcranial magnetic stimulation) and Task-oriented therapy.
- Bilateral repetitive transcranial magnetic stimulation (high-frequency repetitive transcranial magnetic stimulation with low-frequency repetitive transcranial magnetic stimulation) and Task-oriented therapy may not be beneficial for improving motor function and spasticity after stroke when compared to Inhibitory repetitive transcranial magnetic stimulation (sham high-frequency repetitive transcranial magnetic stimulation with low-frequency repetitive transcranial magnetic stimulation) and Task-oriented therapy.
- Excitatory repetitive transcranial magnetic stimulation (high-frequency repetitive transcranial magnetic stimulation with sham low-frequency repetitive transcranial magnetic stimulation) and Task-oriented therapy may not be beneficial for improving motor function and spasticity after stroke when compared to Inhibitory repetitive transcranial magnetic stimulation (sham high-frequency repetitive transcranial magnetic stimulation with low-frequency repetitive transcranial magnetic stimulation) and Task-oriented therapy.
- Repetitive transcranial magnetic stimulation may be beneficial for improving motor function and spasticity, but not stroke severity, after stroke when compared to conventional therapy; the literature is mixed regarding dexterity, performance of activities of daily living, and muscle strength.
- Low frequency repetitive transcranial magnetic stimulation with occupational therapy training may be beneficial for improving motor function after stroke when compared to constraint-induced movement therapy.
- Low frequency repetitive transcranial magnetic stimulation with virtual reality may be beneficial for improving motor function, but not performance of activities of daily living, after stroke when compared to Sham repetitive transcranial magnetic stimulation with virtual reality.
- High Frequency repetitive transcranial magnetic stimulation with Rehabilitation Program may be beneficial for improving dexterity, but not motor function, after stroke when compared to Rehabilitation Program; the literature is mixed regarding muscle strength.
- High frequency repetitive transcranial magnetic stimulation with grip training and conventional rehab may not be beneficial for improving motor function, performance of activities of daily living, and muscle strength after stroke when compared to repetitive transcranial magnetic stimulation with conventional rehab or Grip training and conventional rehab.
- Low-frequency repetitive transcranial magnetic stimulation with functional electrical stimulation and conventional rehab may be beneficial for improving motor function after stroke when compared to functional electrical stimulation with conventional rehab.
- Low-frequency repetitive transcranial magnetic stimulation with functional electrical stimulation and conventional rehab may be beneficial for improving motor function after stroke when compared to Low-frequency repetitive transcranial magnetic stimulation with conventional rehab.

- High-frequency repetitive transcranial magnetic stimulation combined with other interventions may be beneficial for improving muscle strength, but not motor function, dexterity, and performance of activities of daily living, after stroke when compared to sham or motor relearning programmes.
- High-frequency repetitive transcranial magnetic stimulation with Conventional Therapy may be beneficial for improving motor function and dexterity after stroke when compared to Conventional therapy; the literature is mixed regarding muscle strength.
- High-frequency repetitive transcranial magnetic stimulation with Conventional Therapy may not be beneficial for improving dexterity and muscle strength after stroke when compared to Contralateral limb Cross education (strength training) with Conventional therapy.
- High-frequency repetitive transcranial magnetic stimulation with Conventional Therapy may be less beneficial than Contralateral limb Cross education (strength training) with Conventional therapy for improving motor function after stroke.
- Contralateral limb Cross education (strength training) with Conventional therapy may not be beneficial for improving motor function, dexterity, and muscle strength after stroke when compared to high-frequency repetitive transcranial magnetic stimulation with cross education and conventional therapy.
- High-frequency repetitive transcranial magnetic stimulation with Conventional Therapy may not be beneficial for improving motor function, dexterity, and muscle strength after stroke when compared to high-frequency repetitive transcranial magnetic stimulation with cross education and conventional therapy.
- High-frequency repetitive transcranial magnetic stimulation combined with other interventions may be beneficial for improving motor function, but not performance of activities of daily living and stroke severity, after stroke when compared to sham.
- High-frequency repetitive transcranial magnetic stimulation with cervical nerve root magnetic stimulation may not be beneficial for improving performance of activities of daily living and stroke severity after stroke when compared to high-frequency repetitive transcranial magnetic stimulation with sham cervical nerve root magnetic stimulation; the literature is mixed regarding motor function.
- High-frequency repetitive transcranial magnetic stimulation with cervical nerve root magnetic stimulation may be beneficial for improving performance of activities of daily living, but not stroke severity, after stroke when compared to Sham high-frequency repetitive transcranial magnetic stimulation with cervical nerve root magnetic stimulation; the literature is mixed regarding motor function.
- High-frequency repetitive transcranial magnetic stimulation with sham cervical nerve root magnetic stimulation may not be beneficial for improving motor function, performance of activities of daily living, and stroke severity after stroke when compared to Sham high-frequency repetitive transcranial magnetic stimulation with cervical nerve root magnetic stimulation.
- Mirror therapy with high frequency repetitive transcranial magnetic stimulation and Traditional physical therapy may be beneficial for improving motor function and dexterity after stroke when compared to Sham with Traditional physical therapy.
- Mirror therapy with high frequency repetitive transcranial magnetic stimulation and Traditional physical therapy may be beneficial for improving motor function and dexterity after stroke when compared to Mirror therapy with Traditional physical therapy.
- Functional Magnetic Stimulation (applied peripherally) may be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Low-Frequency repetitive transcranial magnetic stimulation.
- Electromyography-triggered neuromuscular electrical stimulation with repetitive transcranial magnetic stimulation may not be beneficial for improving motor function, spasticity, and range of motion after stroke when compared to electromyography-triggered neuromuscular electrical stimulation with Sham repetitive transcranial magnetic stimulation.
- Low frequence repetitive transcranial magnetic stimulation with mental practice may be beneficial for improving motor function, dexterity, and performance of activities of daily living after stroke when compared to repetitive transcranial magnetic stimulation with audiotape-led relaxation.
- Neuromuscular electrical stimulation with repetitive transcranial magnetic stimulation may be beneficial for improving dexterity and spasticity, but not motor function, after stroke when compared to Sham neuromuscular electrical stimulation with repetitive transcranial magnetic stimulation.

- Continuous theta burst stimulation with physiotherapy may be beneficial for improving motor function, performance of activities of daily living, and spasticity, but not stroke severity, after stroke when compared to Sham continuous theta burst stimulation with physiotherapy.
- Ipsilesional Paired Associated Stimulation (PAS) may be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Conventional Care.
- Ipsilesional Paired Associated Stimulation (PAS) may be less beneficial than Contralesional PAS or Bilateral PAS for improving motor function and performance of activities of daily living after stroke.
- Custom occupational therapy with repetitive transcranial magnetic stimulation-LF may be beneficial for improving motor function after stroke when compared to Custom Occupational Therapy.
- Soft Robotic Glove with Conventional therapy may be beneficial for improving motor function, but not performance of activities of daily living, after stroke when compared to Conventional therapy.
- Soft Robotic Glove with Conventional therapy may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Low frequency repetitive transcranial magnetic stimulation with Conventional therapy.
- Low-frequency repetitive transcranial magnetic stimulation with peripheral repetitive magnetic stimulation (rPMS) and rehabilitation may be beneficial for improving motor function, performance of activities of daily living, and spasticity after stroke when compared to rehabilitation.
- Low-frequency repetitive transcranial magnetic stimulation with peripheral repetitive magnetic stimulation (rPMS) and rehabilitation may be beneficial for improving motor function, performance of activities of daily living, and spasticity after stroke when compared to low-frequency repetitive transcranial magnetic stimulation with rehabilitation.
- Graded motor imagery with repetitive transcranial magnetic stimulation and conventional rehabilitation may be beneficial for improving motor function after stroke when compared to Graded motor imagery with conventional rehabilitation; the literature is mixed regarding performance of activities of daily living.
- Graded motor imagery with repetitive transcranial magnetic stimulation and conventional rehabilitation may not be beneficial for improving motor function after stroke when compared to repetitive transcranial magnetic stimulation with conventional rehabilitation; the literature is mixed regarding performance of activities of daily living.
- Repetitive transcranial magnetic stimulation with mirror therapy may not be beneficial for improving motor function after stroke when compared to bilateral tDCS with mirror therapy or sham tDCS with mirror therapy.
- 1Hz repetitive transcranial magnetic stimulation may be beneficial for improving dexterity and stroke severity, but not performance of activities of daily living and muscle strength, after stroke when compared to 3Hz repetitive transcranial magnetic stimulation.
- Interleaved combination method (ICM) repetitive transcranial magnetic stimulation with motor training may not be beneficial for improving dexterity after stroke when compared to Preconditioned combination method (PCM) repetitive transcranial magnetic stimulation with motor training.
- Active priming of low-frequency repetitive transcranial magnetic stimulation may not be beneficial for improving dexterity after stroke when compared to sham priming.
- Low frequency Repetitive Transcranial Magnetic Stimulation to unaffected hemisphere with Brunnstrom movement therapy may be beneficial for improving proprioception, but not spasticity and stroke severity, after stroke when compared to Sham Repetitive Transcranial Magnetic Stimulation with Brunnstrom movement therapy.
- Paired associative stimulation (PAS) with Motor imagery may not be beneficial for improving range of motion after stroke when compared to Sham PAS with motor imagery.
- High-Frequency repetitive transcranial magnetic stimulation with Peripheral Somatosensory Stimulation (sensory level electrical stimulation and vibratory stimulation) may not be beneficial for improving proprioception after stroke when compared to Sham repetitive transcranial magnetic stimulation with Peripheral Somatosensory Stimulation.
- The literature is mixed regarding the effect of High-Frequency repetitive transcranial magnetic stimulation with Peripheral Somatosensory Stimulation (sensory level electrical stimulation and vibratory stimulation) on improvement of proprioception after stroke when compared to Low-Frequency repetitive transcranial magnetic stimulation with Peripheral Somatosensory Stimulation.

- High-frequency repetitive transcranial magnetic stimulation may not be beneficial for improving muscle strength after stroke when compared to low-frequency repetitive transcranial magnetic stimulation.
- Low frequency repetitive transcranial magnetic stimulation with pinch motor training (a metronome-paced pinch of their index finger and thumb of the affected hand as fast as possible) may be beneficial for improving muscle strength after stroke when compared to pinch motor training with sham repetitive transcranial magnetic stimulation.
- Low Frequency repetitive transcranial magnetic stimulation may be less beneficial than ANodal transcranial direct current stimulation or Low Frequency repetitive transcranial magnetic stimulation with ANodal transcranial direct current stimulation for improving muscle strength after stroke.
- Bilateral repetitive transcranial magnetic stimulation may not be beneficial for improving muscle strength after stroke when compared to Unaffected side repetitive transcranial magnetic stimulation or Affected side repetitive transcranial magnetic stimulation.
- Scalp acupuncture (SA) may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to SAEM-CS- SA and electromagnetic convergence stimulation (SA and LF-rTMS simultaneously).
- Repetitive transcranial magnetic stimulation (rTMS) may be beneficial for improving motor function and performance of activities of daily living after stroke when compared to SAEM-CS- SA and electromagnetic convergence stimulation (SA and LF-rTMS simultaneously).
- Scalp acupuncture (SA) may not be beneficial for improving motor function after stroke when compared to Repetitive transcranial magnetic stimulation (rTMS).
- High frequency (10Hz) rTMS with task-oriented training may be beneficial for improving motor function after stroke when compared to Sham rTMS with task-oriented training.
- Unilateral High-frequency repetitive transcranial magnetic stimulation (HF-rTMS) may not be beneficial for improving muscle strength after stroke when compared to Bilateral application of HF- and LF-rTMS (BL-rTMS).
- 3Hz rTMS may not be beneficial for improving stroke severity and muscle strength after stroke when compared to 10Hz rTMS.
- Repetitive transcranial magnetic stimulation may be beneficial for improving motor function, stroke severity, and performance of activities of daily living, but not muscle strength, range of motion, and dexterity, after stroke when compared to sham; the literature is mixed regarding spasticity.
- High-frequency rTMS combined with other interventions may be beneficial for improving motor function, but not proprioception and dexterity, after stroke when compared to sham; the literature is mixed regarding performance of activities of daily living.
- Low-frequency rTMS combined with other interventions may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to conventional therapy.
- Low-frequency rTMS combined with other interventions may not be beneficial for improving motor function, performance of activities of daily living, and dexterity after stroke when compared to task-specific training or sham.
- Paired associative stimulation (rTMS with rPMS) and physiotherapy may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to rTMS with physiotherapy.
- Cerebello-Motor paired associated stimulation (PAS) with physiotherapy may not be beneficial for improving motor function and muscle strength after stroke when compared to Sham with physiotherapy.
- Intermittent theta-burst stimulation of the affected motor cortex hand area with conventional therapy may not be beneficial for improving motor function, muscle strength, and spasticity after stroke when compared to Sham stimulation with conventional therapy.
- Cortico-cortical paired associative stimulation (ccPAS) with routine rehabilitation may be beneficial for improving motor function after stroke when compared to Sham ccPAS with routine rehabilitation.
- Scalp acupuncture (SA) may be less beneficial than Repetitive transcranial magnetic stimulation (rTMS) for improving performance of activities of daily living after stroke.
- Unilateral High-frequency repetitive transcranial magnetic stimulation (HF-rTMS) may be less beneficial than Bilateral application of HF- and LF-rTMS (BL-rTMS) for improving stroke severity after stroke.

- Simultaneous cathodal tDCS with 10hz rTMS may be beneficial for improving proprioception after stroke when compared to rTMS 10Hz with Sham tDCS.
- Simultaneous anodal tDCS with 10hz rTMS may not be beneficial for improving proprioception after stroke when compared to rTMS 10Hz with Sham tDCS.
- Preconditioning cathodal tCDS with 10hz rTMS may not be beneficial for improving proprioception after stroke when compared to rTMS 10Hz with Sham tDCS.
- Preconditioning anodal tDCS with 10hz rTMS may not be beneficial for improving proprioception after stroke when compared to rTMS 10Hz with Sham tDCS.

Summary of Key Points: Repetitive Transcranial Magnetic Stimulation (rTMS)

Intervention	Control(s)	Function domain(s)	Effect
Low-frequency repetitive transcranial magnetic stimulation	sham	Dexterity	+
Low-frequency repetitive transcranial magnetic stimulation	sham	Motor function, stroke severity, muscle strength, spasticity, range of motion, performance of activities of daily living	–
Low frequency repetitive transcranial magnetic stimulation applied to primary motor cortex with conventional rehab	Low frequency repetitive transcranial magnetic stimulation applied to premotor area with conventional rehab	Motor function, muscle strength	+
Repetitive transcranial magnetic stimulation	sham	Motor function, stroke severity, performance of activities of daily living	+
Repetitive transcranial magnetic stimulation	sham	Muscle strength, range of motion, dexterity	–
Repetitive transcranial magnetic stimulation	sham	Spasticity	=
Repetitive transcranial magnetic stimulation - M1 area with rehab	repetitive transcranial magnetic stimulation - SMA with routin rehab	Motor function	–
Low-frequency repetitive transcranial magnetic stimulation with rehabilitation	High-frequency repetitive transcranial magnetic stimulation with rehabilitation	Motor function, performance of activities of daily living, stroke severity	+
High-frequency repetitive transcranial magnetic stimulation with conventional care	low-frequency repetitive transcranial magnetic stimulation with conventional care	Motor function, performance of activities of daily living	+
Low Frequency Combined with High Frequency Repetitive Transcranial Magnetic Stimulation	Low Frequency Repetitive Transcranial Magnetic Stimulation	Motor function	=
High-frequency repetitive transcranial magnetic stimulation	sham	Motor function, performance of activities of daily living	+
High-frequency repetitive transcranial magnetic stimulation	sham	Spasticity, range of motion, stroke severity, muscle strength	–
High-Frequency repetitive transcranial magnetic stimulation with Short Inter-Train Intervals	High-Frequency repetitive transcranial magnetic stimulation with Long Inter-Train Intervals	Motor function, performance of activities of daily living, stroke severity	–
Paired associative stimulation	Active peripheral electrical stimulation with Sham cortical stimulation	Motor function	–
High-frequency repetitive transcranial magnetic stimulation combined with other interventions	high-frequency rtms	Motor function	+

High-frequency repetitive transcranial magnetic stimulation combined with other interventions	high-frequency rtms	Muscle strength	=
High-frequency repetitive transcranial magnetic stimulation combined with other interventions	high-frequency rtms	Dexterity	–
Low-frequency repetitive transcranial magnetic stimulation combined with other interventions	Sham repetitive transcranial magnetic stimulation with sham ltbs	Motor function, muscle strength	+
Low-frequency repetitive transcranial magnetic stimulation combined with other interventions	Sham repetitive transcranial magnetic stimulation with sham ltbs	Performance of activities of daily living	=
Repetitive transcranial magnetic stimulation	Dual transcranial direct current stimulation	Motor function, dexterity, performance of activities of daily living, muscle strength	–
Low frequency repetitive transcranial magnetic stimulation with intermittent theta burst stimulation	Sham repetitive transcranial magnetic stimulation with intermittent theta burst stimulation or Low frequency repetitive transcranial magnetic stimulation and sham intermittent theta burst stimulation	Motor function, muscle strength	+
Low frequency repetitive transcranial magnetic stimulation with intermittent theta burst stimulation	Sham repetitive transcranial magnetic stimulation with intermittent theta burst stimulation or Low frequency repetitive transcranial magnetic stimulation and sham intermittent theta burst stimulation	Performance of activities of daily living	=
Sham repetitive transcranial magnetic stimulation with intermittent theta burst stimulation	Low frequency repetitive transcranial magnetic stimulation with sham intermittent theta burst stimulation	Motor function, performance of activities of daily living, muscle strength	–
Low-frequency repetitive transcranial magnetic stimulation combined with other interventions	sham or task-specific training	Motor function, dexterity, performance of activities of daily living, spasticity, range of motion, stroke severity, muscle strength	–
Low frequency repetitive transcranial magnetic stimulation with Action Observation	Low frequency repetitive transcranial magnetic stimulation	Motor function, muscle strength	–
Low frequency repetitive transcranial magnetic stimulation	Physical therapy	Motor function, performance of activities of daily living, spasticity, stroke severity, muscle strength	–
Low frequency repetitive transcranial magnetic stimulation with scalp acupuncture	Scalp Acupuncture	Motor function, performance of activities of daily living	+
Low-frequency repetitive transcranial magnetic stimulation combined with other interventions	sham	Motor function, muscle strength	+
Low-frequency repetitive transcranial magnetic stimulation combined with other interventions	sham	Performance of activities of daily living	=
Low frequency repetitive transcranial magnetic stimulation with intermittent Theta Burst Stimulation	Low frequency repetitive transcranial magnetic stimulation with sham theta burst stimulation	Motor function, performance of activities of daily living	+

Active repetitive transcranial magnetic stimulation with fluoxetine	Sham repetitive transcranial magnetic stimulation with fluoxetine	Motor function	=
10 Sessions Low Frequency repetitive transcranial magnetic stimulation before 10 Sessions Intermittent Theta Burst Stimulation	10 Sessions Low Frequency repetitive transcranial magnetic stimulation before 10 Sessions Intermittent Theta Burst Stimulation	Motor function	+
10 Sessions Low Frequency repetitive transcranial magnetic stimulation before 10 Sessions Intermittent Theta Burst Stimulation	10 Sessions Low Frequency repetitive transcranial magnetic stimulation before 10 Sessions Intermittent Theta Burst Stimulation	Muscle strength	–
Low-frequency repetitive transcranial magnetic stimulation	conventional therapy	Motor function, muscle strength	+
10 sessions repetitive transcranial magnetic stimulation with conventional therapy	30 sessions repetitive transcranial magnetic stimulation with conventional therapy	Motor function	–
20 sessions repetitive transcranial magnetic stimulation with conventional therapy	30 sessions repetitive transcranial magnetic stimulation with conventional therapy	Motor function	–
High frequency repetitive transcranial magnetic stimulation with constraint-induced movement therapy	Sham repetitive transcranial magnetic stimulation with constraint-induced movement therapy	Motor function, performance of activities of daily living	–
Repetitive transcranial magnetic stimulation combined with other interventions	sham or task-specific training	Spasticity	–
Repetitive transcranial magnetic stimulation combined with other interventions	sham or task-specific training	Motor function	=
Bilateral repetitive transcranial magnetic stimulation (high-frequency repetitive transcranial magnetic stimulation with low-frequency repetitive transcranial magnetic stimulation) and Task-oriented therapy	Excitatory repetitive transcranial magnetic stimulation (high-frequency repetitive transcranial magnetic stimulation with sham low-frequency repetitive transcranial magnetic stimulation) and Task-oriented therapy	Motor function, spasticity	–
Bilateral repetitive transcranial magnetic stimulation (high-frequency repetitive transcranial magnetic stimulation with low-frequency repetitive transcranial magnetic stimulation) and Task-oriented therapy	Inhibitory repetitive transcranial magnetic stimulation (sham high-frequency repetitive transcranial magnetic stimulation with low-frequency repetitive transcranial magnetic stimulation) and Task-oriented therapy	Motor function, spasticity	–
Excitatory repetitive transcranial magnetic stimulation (high-frequency repetitive transcranial magnetic stimulation with sham low-frequency repetitive transcranial magnetic stimulation) and Task-oriented therapy	Inhibitory repetitive transcranial magnetic stimulation (sham high-frequency repetitive transcranial magnetic stimulation with low-frequency repetitive transcranial magnetic stimulation) and Task-oriented therapy	Motor function, spasticity	–
Repetitive transcranial magnetic stimulation	One another (different approaches compared)	Motor function, muscle strength, spasticity, range of motion, performance of activities of daily living	–

Repetitive transcranial magnetic stimulation	One another (different approaches compared)	Stroke severity	+
Repetitive transcranial magnetic stimulation	conventional therapy	Motor function, spasticity	+
Repetitive transcranial magnetic stimulation	conventional therapy	Stroke severity	−
Repetitive transcranial magnetic stimulation	conventional therapy	Dexterity, performance of activities of daily living, muscle strength	=
Low frequency repetitive transcranial magnetic stimulation with occupational therapy training	constraint-induced movement therapy	Motor function	+
Low frequency repetitive transcranial magnetic stimulation with virtual reality	Sham repetitive transcranial magnetic stimulation with virtual reality	Motor function	+
Low frequency repetitive transcranial magnetic stimulation with virtual reality	Sham repetitive transcranial magnetic stimulation with virtual reality	Performance of activities of daily living	−
High Frequency repetitive transcranial magnetic stimulation with Rehabilitation Program	Rehabilitation Program	Dexterity	+
High Frequency repetitive transcranial magnetic stimulation with Rehabilitation Program	Rehabilitation Program	Motor function	−
High Frequency repetitive transcranial magnetic stimulation with Rehabilitation Program	Rehabilitation Program	Muscle strength	=
High frequency repetitive transcranial magnetic stimulation with grip training and conventional rehab	repetitive transcranial magnetic stimulation with conventional rehab or Grip training and conventional rehab	Motor function, performance of activities of daily living, muscle strength	−
Low-frequency repetitive transcranial magnetic stimulation with functional electrical stimulation and conventional rehab	functional electrical stimulation with conventional rehab	Motor function	+
Low-frequency repetitive transcranial magnetic stimulation with functional electrical stimulation and conventional rehab	Low-frequency repetitive transcranial magnetic stimulation with conventional rehab	Motor function	+
High-frequency repetitive transcranial magnetic stimulation combined with other interventions	sham or motor relearning programmes	Muscle strength	+
High-frequency repetitive transcranial magnetic stimulation combined with other interventions	sham or motor relearning programmes	Motor function, dexterity, performance of activities of daily living	−
High-frequency repetitive transcranial magnetic stimulation with Conventional Therapy	Conventional therapy	Motor function, dexterity	+
High-frequency repetitive transcranial magnetic stimulation with Conventional Therapy	Conventional therapy	Muscle strength	=
High-frequency repetitive transcranial magnetic stimulation with Conventional Therapy	Contralateral limb Cross education (strength training) with Conventional therapy	Motor function, dexterity, muscle strength	−

Contralateral limb Cross education (strength training) with Conventional therapy	high-frequency repetitive transcranial magnetic stimulation with cross education and conventional therapy	Motor function, dexterity, muscle strength	–
High-frequency repetitive transcranial magnetic stimulation with Conventional Therapy	high-frequency repetitive transcranial magnetic stimulation with cross education and conventional therapy	Motor function, dexterity, muscle strength	–
High-frequency repetitive transcranial magnetic stimulation combined with other interventions	sham	Motor function	+
High-frequency repetitive transcranial magnetic stimulation combined with other interventions	sham	Performance of activities of daily living, stroke severity	–
High-frequency repetitive transcranial magnetic stimulation with cervical nerve root magnetic stimulation	high-frequency repetitive transcranial magnetic stimulation with sham cervical nerve root magnetic stimulation	Performance of activities of daily living, stroke severity	–
High-frequency repetitive transcranial magnetic stimulation with cervical nerve root magnetic stimulation	high-frequency repetitive transcranial magnetic stimulation with sham cervical nerve root magnetic stimulation	Motor function	=
High-frequency repetitive transcranial magnetic stimulation with cervical nerve root magnetic stimulation	Sham high-frequency repetitive transcranial magnetic stimulation with cervical nerve root magnetic stimulation	Performance of activities of daily living	+
High-frequency repetitive transcranial magnetic stimulation with cervical nerve root magnetic stimulation	Sham high-frequency repetitive transcranial magnetic stimulation with cervical nerve root magnetic stimulation	Stroke severity	–
High-frequency repetitive transcranial magnetic stimulation with cervical nerve root magnetic stimulation	Sham high-frequency repetitive transcranial magnetic stimulation with cervical nerve root magnetic stimulation	Motor function	=
High-frequency repetitive transcranial magnetic stimulation with sham cervical nerve root magnetic stimulation	Sham high-frequency repetitive transcranial magnetic stimulation with cervical nerve root magnetic stimulation	Motor function, performance of activities of daily living, stroke severity	–
Mirror therapy with high frequency repetitive transcranial magnetic stimulation and Traditional physical therapy	Sham with Traditional physical therapy	Motor function, dexterity	+
Mirror therapy with high frequency repetitive transcranial magnetic stimulation and Traditional physical therapy	Mirror therapy with Traditional physical therapy	Motor function, dexterity	+
Functional Magnetic Stimulation (applied peripherally)	Low-Frequency repetitive transcranial magnetic stimulation	Motor function, performance of activities of daily living	+
Electromyography-triggered neuromuscular electrical stimulation with repetitive transcranial magnetic stimulation	electromyography-triggered neuromuscular electrical stimulation with Sham repetitive transcranial magnetic stimulation	Motor function, spasticity, range of motion	–
Low frequence repetitive transcranial magnetic stimulation with mental practice	repetitive transcranial magnetic stimulation with audiotape-led relaxation	Motor function, dexterity, performance of activities of daily living	+

Neuromuscular electrical stimulation with repetitive transcranial magnetic stimulation	Sham neuromuscular electrical stimulation with repetitive transcranial magnetic stimulation	Dexterity, spasticity	+
Neuromuscular electrical stimulation with repetitive transcranial magnetic stimulation	Sham neuromuscular electrical stimulation with repetitive transcranial magnetic stimulation	Motor function	–
Continuous theta burst stimulation with physiotherapy	Sham continuous theta burst stimulation with physiotherapy	Motor function, performance of activities of daily living, spasticity	+
Continuous theta burst stimulation with physiotherapy	Sham continuous theta burst stimulation with physiotherapy	Stroke severity	–
Ipsilesional Paired Associated Stimulation (PAS)	Conventional Care	Motor function, performance of activities of daily living	+
Ipsilesional Paired Associated Stimulation (PAS)	Contralesional PAS or Bilateral PAS	Motor function, performance of activities of daily living	–
Custom occupational therapy with repetitive transcranial magnetic stimulation-LF	Custom Occupational Therapy	Motor function	+
Soft Robotic Glove with Conventional therapy	Conventional therapy	Motor function	+
Soft Robotic Glove with Conventional therapy	Conventional therapy	Performance of activities of daily living	–
Soft Robotic Glove with Conventional therapy	Low frequency repetitive transcranial magnetic stimulation with Conventional therapy	Motor function, performance of activities of daily living	–
Low-frequency repetitive transcranial magnetic stimulation with peripheral repetitive magnetic stimulation (rPMS) and rehabilitation	rehabilitation	Motor function, performance of activities of daily living, spasticity	+
Low-frequency repetitive transcranial magnetic stimulation with peripheral repetitive magnetic stimulation (rPMS) and rehabilitation	low-frequency repetitive transcranial magnetic stimulation with rehabilitation	Motor function, performance of activities of daily living, spasticity	+
Graded motor imagery with repetitive transcranial magnetic stimulation and conventional rehabilitation	Graded motor imagery with conventional rehabilitation	Motor function	+
Graded motor imagery with repetitive transcranial magnetic stimulation and conventional rehabilitation	Graded motor imagery with conventional rehabilitation	Performance of activities of daily living	=
Graded motor imagery with repetitive transcranial magnetic stimulation and conventional rehabilitation	repetitive transcranial magnetic stimulation with conventional rehabilitation	Motor function	–
Graded motor imagery with repetitive transcranial magnetic stimulation and conventional rehabilitation	repetitive transcranial magnetic stimulation with conventional rehabilitation	Performance of activities of daily living	=
Repetitive transcranial magnetic stimulation with mirror therapy	bilateral tDCS with mirror therapy or sham tDCS with mirror therapy	Motor function	–
1Hz repetitive transcranial magnetic stimulation	3Hz repetitive transcranial magnetic stimulation	Dexterity, stroke severity	+
1Hz repetitive transcranial magnetic stimulation	3Hz repetitive transcranial magnetic stimulation	Performance of activities of daily living, muscle strength	–

Interleaved combination method (ICM) repetitive transcranial magnetic stimulation with motor training	Preconditioned combination method (PCM) repetitive transcranial magnetic stimulation with motor training	Dexterity	–
Active priming of low-frequency repetitive transcranial magnetic stimulation	sham priming	Dexterity	–
Low frequency Repetitive Transcranial Magnetic Stimulation to unaffected hemisphere with Brunnstrom movement therapy	Sham Repetitive Transcranial Magnetic Stimulation with Brunnstrom movement therapy	Proprioception	+
Low frequency Repetitive Transcranial Magnetic Stimulation to unaffected hemisphere with Brunnstrom movement therapy	Sham Repetitive Transcranial Magnetic Stimulation with Brunnstrom movement therapy	Spasticity, stroke severity	–
Paired associative stimulation (PAS) with Motor imagery	Sham PAS with motor imagery	Range of motion	–
High-Frequency repetitive transcranial magnetic stimulation with Peripheral Somatosensory Stimulation (sensory level electrical stimulation and vibratory stimulation)	Sham repetitive transcranial magnetic stimulation with Peripheral Somatosensory Stimulation	Proprioception	–
High-Frequency repetitive transcranial magnetic stimulation with Peripheral Somatosensory Stimulation (sensory level electrical stimulation and vibratory stimulation)	Low-Frequency repetitive transcranial magnetic stimulation with Peripheral Somatosensory Stimulation	Proprioception	=
High-frequency repetitive transcranial magnetic stimulation	low-frequency repetitive transcranial magnetic stimulation	Muscle strength	–
Low frequency repetitive transcranial magnetic stimulation with pinch motor training (a metronome-paced pinch of their index finger and thumb of the affected hand as fast as possible)	pinch motor training with sham repetitive transcranial magnetic stimulation	Muscle strength	+
Low Frequency repetitive transcranial magnetic stimulation	ANodal transcranial direct current stimulation or Low Frequency repetitive transcranial magnetic stimulation with ANodal transcranial direct current stimulation	Muscle strength	–
Bilateral repetitive transcranial magnetic stimulation	Unaffected side repetitive transcranial magnetic stimulation or Affected side repetitive transcranial magnetic stimulation	Muscle strength	–
Scalp acupuncture (SA)	SAEM-CS- SA and electromagnetic convergence stimulation (SA and LF-rTMS simultaneously)	Motor function, performance of activities of daily living	–
Repetitive transcranial magnetic stimulation (rTMS)	SAEM-CS- SA and electromagnetic convergence stimulation (SA and LF-rTMS simultaneously)	Motor function, performance of activities of daily living	+
Scalp acupuncture (SA)	Repetitive transcranial magnetic stimulation (rTMS)	Motor function, performance of activities of daily living	–
High frequency (10Hz) rTMS with task-oriented training	Sham rTMS with task-oriented training	Motor function	+

Unilateral High-frequency repetitive transcranial magnetic stimulation (HF-rTMS)	Bilateral application of HF- and LF-rTMS (BL-rTMS)	Stroke severity, muscle strength	−
3Hz rTMS	10Hz rTMS	Stroke severity, muscle strength	−
High-frequency rTMS combined with other interventions	sham	Proprioception, dexterity	−
High-frequency rTMS combined with other interventions	sham	Performance of activities of daily living	=
High-frequency rTMS combined with other interventions	sham	Motor function	+
Low-frequency rTMS combined with other interventions	conventional therapy	Motor function, performance of activities of daily living	−
Low-frequency rTMS combined with other interventions	task-specific training or sham	Motor function, performance of activities of daily living, dexterity	−
Paired associative stimulation (rTMS with rPMS) and physiotherapy	rTMS with physiotherapy	Motor function, performance of activities of daily living	−
Cerebello-Motor paired associated stimulation (PAS) with physiotherapy	Sham with physiotherapy	Motor function, muscle strength	−
Intermittent theta-burst stimulation of the affected motor cortex hand area with conventional therapy	Sham stimulation with conventional therapy	Motor function, muscle strength, spasticity	−
Cortico-cortical paired associative stimulation (ccPAS) with routine rehabilitation	Sham ccPAS with routine rehabilitation	Motor function	+
Simultaneous cathodal tDCS with 10hz rTMS	rTMS 10Hz with Sham tDCS	Proprioception	+
Simultaneous anodal tDCS with 10hz rTMS	rTMS 10Hz with Sham tDCS	Proprioception	−
Preconditioning cathodal tCDS with 10hz rTMS	rTMS 10Hz with Sham tDCS	Proprioception	−
Preconditioning anodal tDCS with 10hz rTMS	rTMS 10Hz with Sham tDCS	Proprioception	−

Theta Burst Stimulation (TBS)



Adapted from: https://www.psychiatryadvisor.com/home/depression-advisor/intermittent-theta-burst-stimulation-for-major-depressive-disorder-treatment/

Theta Burst Stimulation (TBS) is an emerging treatment modality that is a patterned form of rTMS where stimulation pulses are delivered in triplets or bursts at a high frequency (50Hz), and in a short interval (200ms), intending to mimic naturally occurring theta brain oscillations (Schwippel et al. 2019). TBS can also be used to adjust interhemispheric rivalry after a stroke and promote motor recovery through the delivery of continuous TBS (cTBS) to reduce cortical excitability in the contralesional hemisphere (600 pulses over 40 seconds); or intermittent TBS (iTBS) to increase cortical excitability in the ipsilesional hemisphere (600 pulses over 190 seconds) (Schwippel et al. 2019; Cotoi et al. 2019).

A total of twenty-two RCTs were found that evaluated theta burst stimulation (TBS) for upper extremity motor rehabilitation. Four RCTs compared theta burst stimulation (TBS) combined with other interventions with sham (Bian et al. (2024); Kuzu et al. (2021); Nicolo et al. (2018); Watanabe et al. (2018)). Eleven RCTs compared theta burst stimulation (TBS) with sham (Tang et al. (2024); El Nahas et al. (2022); Chen et al. (2021a); Dionísio et al. (2021); Chen et al. (2019b); Ackerley et al. (2016); Kim et al. (2015a); DiLazzaro et al. (2013); Hsu et al. (2013); Talelli et al. (2012); Ackerley et al. (2010)). One RCT compared theta burst stimulation (TBS) combined with other interventions with sham or exercise and custom physiotherapy protocols (Ackerley et al. (2014)). One RCT compared theta burst stimulation (TBS) combined with other interventions with exercise and custom physiotherapy protocols (Khan et al. (2019)). One RCT compared theta burst stimulation (TBS) combined with other interventions with sham or virtual reality training (Chen et al. (2021b)). One RCT compared theta burst stimulation (TBS) combined with other interventions with sham or robotics (Zhang et al. (2022a)). One RCT compared theta burst stimulation (TBS) combined with other interventions with peripheral magnetic stimulation or sham (Jiang et al. (2023)). One RCT compared theta burst stimulation (TBS) with sham or conventional therapy (Vink et al. (2023)). One RCT compared theta burst stimulation (TBS) combined with other interventions with sham or exoskeleton robotics (DiLazzaro et al. (2016)).

In addition, 8 RCTs in which theta burst stimulation (TBS) formed part of a combined or comparative intervention are cross-referenced at the end of Table 30; their primary listings appear in other tables.

The methodological details and results of all twenty-two RCTs are presented in Table 30.

Table 30. RCTs Evaluating Theta Burst Stimulation (TBS) for Upper Extremity Motor Rehabilitation

Authors (Year) Study Design (PEDro Score) Sample Size start Sample Size end Time post stroke category	Interventions Duration: Session length, frequency per week for total number of weeks	Outcome Measures Result (direction of effect)

Study design		
Theta burst stimulation (TBS) combined with other interventions compared to sham		
Bian et al. (2024) RCT (10) NStart=66 NEnd=60 TPS=Acute A + B vs A/B *Also in Table 31 (Transcranial Direct Current Stimulation (tDCS))*	E1: iTBS + high definition tDCS + routine rehabilitation E2: sham tDCS + iTBS + routine rehabilitation C: Sham iTBS and tDCS + routine rehabilitation Duration: 20min/d tDCS and 192sec/d iTBS 5d/wk for 3wks	E1/E2 vs C: FMA-UE (+exp1) Functional Test for the Hemiplegic Upper Extremity (-) Motricity Index-UE (+exp1) modified Barthel Index (+exp1) modified Ashworth Scale pectoralis major (-) biceps (-) E1 vs E2: FMA-UE (-) Functional Test for the Hemiplegic Upper Extremity (-) Motricity Index-UE (-) modified Barthel Index (-) modified Ashworth Scale pectoralis major (-) biceps (-)
Kuzu et al. (2021) RCT (6) NStart=20 NEnd=20 TPS=Chronic A vs B vs 0 *Also in Table 29 (Repetitive Transcranial Magnetic Stimulation (rTMS))*	E1: cTBS + physiotherapy E2: rTMS + physiotherapy C: Sham cTBS + physiotherapy Duration: E1: 20m/d, 10 sessions, 4 weeks E2: 40s/d, 10 sessions, 4 weeks	E1/E2 vs C: FMA-UE (+exp1,2) MAS wrist flexor spasticity (+exp1) MAL-28(+exp1,2) FIM-Self-Care (+exp1,2) Brunnstrom recovery stages (-) E1 vs E2: (-)
Nicolo et al. (2018) RCT (8) NStart=41 NEnd=41 TPS=Subacute A vs B vs 0 *Also in Table 31 (Transcranial Direct Current Stimulation (tDCS))*	E1: Neuronavigated Continuous Theta Burst Stimulation (TBS) E2: Cathodal -tDCS C: Sham Duration: 30min, 3x/wk, 3wk	E1 vs C: Fugl-Meyer Assessment Upper Extremity (-) Box and Block Test (-) Nine Hole Peg Test (-) Motor Activity Log-14 Quantitative Score (-) Jamar Dynamometer: (-) E2 vs C: Fugl-Meyers Assessment Upper Extremity (-) Box and Block Test (-) Nine Hole Peg Test (-) Motor Activity Log-14 Quantitative Score (-) Jamar Dynamometer: (-) E1 vs C: Fugl-Meyer Assessment Upper Extremity (-) Box and Block Test (-) Nine Hole Peg Test (-) Motor Activity Log-14 Quantitative Score (-) Jamar Dynamometer: (-) E1 vs E2:

		Fugl-Meyer Assessment Upper Extremity (-) Box and Block Test (-) Nine Hole Peg Test (-) Motor Activity Log-14 Quantitative Score (-) Jamar Dynamometer: (-)
Watanabe et al. (2018) Pilot RCT (8) NStart=21 NEnd=21 TPS=Acute A vs B vs 0 *Also in Table 29 (Repetitive Transcranial Magnetic Stimulation (rTMS))*	E1: Intermittent theta-burst stimulation of the affected motor cortex hand area + conventional therapy E2: low-frequency rTMS + conventional therapy C: Sham stimulation + conventional therapy Duration: 1x/d, 10d stimulation & 2hr, 1x/d, 10d conventional therapy	E1/E2 vs C: E1 v E2/C: Fugl-Meyer Assessment (-) Stroke Impairment Assessment; - total upper limb (-) knee-mouth test (-) - finger function (+exp1) Modified Ashworth Scale; - total upper limb (-) - shoulder and elbow (-) wrist and finger (+exp2) Grip Strength (-) motor evoked potential amplitude (+exp1/2)
Theta burst stimulation (TBS) compared to sham		
Tang et al. (2024) RCT (9) NStart=45 NEnd=43 TPS=Subacute A1 vs A2 vs 0	E1: High-dose intermittent TBS + Conventional therapy E2: continuous TBS + Conventional therapy C: Sham TBS + Conventional therapy Duration: TBS/Sham (3 sessions/day; 5d/wk, 3wks); Conventional therapy (60 mins/d, 5ds/wk, 3wks)	E1 vs C: FMA-UE (+exp1) FMA-LE (+exp1) WMFT (+exp1) Grip Strength (+exp1) Functional ambulation category (-) mBI (+exp1) SIS (-) E2 vs C: FMA-UE (+exp2) FMA-LE (-) WMFT (+exp2) Grip Strength (+exp2) Functional ambulation category (-) mBI (+exp2) SIS (+exp2)
El Nahas et al. (2022) RCT (8) NStart=42 NEnd=36 TPS=Chronic A vs 0	E: Peripheral Intermittent Theta Burst Stimulation (piTBS) C: Sham Duration: 1session/every other d, 8d (8 sessions)	E vs C: MAS (+exp) estimated dose of Onabotulinum toxin A (+exp)
Chen et al. (2021a) RCT (7) NStart=32 NEnd=29 TPS=Subacute A vs 0	E: cerebellar iTBS before conventional physical therapy C: sham iTBS before conventional physical therapy Duration: 50min, 5d/wk, 2 wks	E vs C: modified Ashworth scale elbow flexor (+exp) wrist flexor (+exp) modified Tardieu scale elbow flexor (+exp) wrist flexor (+exp) shear wave velocity biceps brachii (+exp) flexor carpi radialis (+exp)

		Hmax/Mmax ratio (-) BI (-) MEP (-)
Dionísio et al. (2021) RCT (7) NStart=10 NEnd=10 TPS=Acute A vs 0	E: cTBS C: Sham cTBS Duration: single session	E vs C: WMFT (-) FAS (-) MEP (-) EEG (-)
Chen et al. (2019b) Pilot RCT (7) NStart=23 NEnd=22 TPS=Chronic A vs 0	E: Intermittent theta burst stimulation (iTBS) C: Sham iTBS Duration: 1 session/d, 10d	E vs C: modified ashworth scale (+exp) FMA (+exp) ARAT (+exp) BBT (+exp) Motor activity log (-)
Ackerley et al. (2016) RCT (8) NStart=18 NEnd=18 TPS=Chronic A vs 0	E: iTBS + physical therapy C: Sham TBS + physical therapy Duration: 45min/d, 5d/wk for 2wk	E vs C: Action Research Arm Test (+exp) Upper Extremity Fugl-Meyer Assessment (-) corticomotor excitability asymmetry index functional MRI activation laterality index
Kim et al. (2015a) RCT Crossover (6) NStart=15 NEnd=15 TPS=Chronic A vs 0	E: Intermittent Theta burst stim C: Sham TBS Duration: Not reported	E vs C: MAS (+exp) mod Tardieu scale (+exp) peak torque (+exp) H/M wave amplitude ratio integrated EMG activity
DiLazzaro et al. (2013) Pilot RCT (6) NStart=12 NEnd=12 TPS=Chronic A vs 0	E: cTBS C: Sham cTBS Duration: 40min/d, 5d/wk for 2wk	E vs C: ARAT (-) 9HPT (-) JTHFT (-) Grasp strength (-) Pinch strength (-) MEP amplitude
Hsu et al. (2013) Pilot RCT (8) NStart=12 NEnd=12 TPS=Acute A vs 0	E: Transcranial magnetic burst stimulation 1200pulses/session + conventional therapy C: Sham iTBS + conventional therapy Duration: 1 session/d, 10d	E vs C: NIHSS (+exp) FMA-UE (+exp) ARAT (-) Active Motor Thresholds (-) Motor Evoked Potentials (-)
Talelli et al. (2012) RCT (7) NStart=41 NEnd=32 TPS=Chronic A1 vs A2 vs 0	E1: iTBS E2: cTBS C1: iSham C2: cSham Duration: 1hr/d, 5d/wk for 2wk	E vs C: Nine Hole Peg Test (-) Jebsen Taylor Hand Test (-) Grasp and Pinch-Grip Dynamometry (-) Goal Attaintment Scale (-) VAS-Pain
Ackerley et al. (2010) RCT Crossover (6) NStart=10 NEnd=10 TPS=Chronic	E1: Intermittent theta burst stimulation (TBS) + upper-limb training E2: Continuous TBS + upper-limb training C: Sham TBS + upper-limb training Duration: 600 stimuli	E1 vs C: Griplift (-) Action Research Arm Test (-) MEP amplitude E2 vs C:

A1 vs A2 vs 0		Griplift (+exp2) Action Research Arm Test (-) E1 vs E2: Griplift (-) Action Research Arm Test (-)
Theta burst stimulation (TBS) combined with other interventions compared to sham or exercise and custom physiotherapy protocols		
Ackerley et al. (2014) RCT Crossover (7) NStart=13 NEnd=13 TPS=Chronic A + B1 vs A + B2 vs A *Also in Table 3 (Exercise and Strength Training)*	E1: Intermittent theta burst stimulation (TBS) + dexterity training E2: Continuous TBS + dexterity training C: Sham TBS + dexterity training Duration: 600 stimuli, 1 session, unspecified length	E1 vs C: Motor-Evoked Potentials (+exp1) Grating Orientation Task (-) Precision Grip (-) Action Research Arm Test (-) E2 vs C: Motor-Evoked Potentials (-) Grating Orientation Task (-) Precision Grip (-) Action Research Arm Test (-) E1 vs E2: Motor-Evoked Potentials (no stats) Grating Orientation Task (-) Precision Grip (-) Action Research Arm Test (-) sensory with Semmes-Weinstein monofilaments
Theta burst stimulation (TBS) combined with other interventions compared to exercise and custom physiotherapy protocols		
Khan et al. (2019) RCT (8) NStart=60 NEnd=60 TPS=Chronic A + B vs A + C vs A *Also in Table 22 (Neuromuscular Electrical Stimulation (NMES)); Table 3 (Exercise and Strength Training)*	E1: iTBS + Physical therapy E2: FES + Physical therapy C: Physical Therapy Duration: 4wks, 3x stimulation plus 5x physical therapy for 30min	E1 vs C: Fugl-Meyer Assessment: (+exp1) Modified Rankin Scale: (+exp1) Barthel Index: (+exp1) National Institute of Health Stroke Scale: (+exp1) E2 vs C: Fugl-Meyer Assessment: (+exp2) Modified Rankin Scale: (+exp2) Barthel Index: (+exp2) National Institute of Health Stroke Scale: (+exp2) E1 vs E2: Fugl-Meyer Assessment: (-) Modified Rankin Scale: (-) Barthel Index: (-) National Institute of Health Stroke Scale: (-) RMT resting motor threshold
Theta burst stimulation (TBS) combined with other interventions compared to sham or virtual reality training		
Chen et al. (2021b) RCT (6) NStart=24 NEnd=23 TPS=Chronic A + B vs A/B *Also in Table 17 (Virtual Reality)*	E: iTBS + Virtual reality-based cycling training (bilateral upper limb) C: sham iTBS + VCT Duration: 60min, 5d/wk, 3wks	E vs C: Modified Ashworth Scale-UE (+exp) FMA-UE (-) ARAT (-) BBT (-) 9HPT (-) MAL

		Amount of Use (+exp) MAL Quality of Movement (-) SIS (+exp)
Theta burst stimulation (TBS) combined with other interventions compared to sham or robotics		
Zhang et al. (2022a) RCT (7) NStart=42 NEnd=42 TPS=Chronic A + B vs A/B *Also in Table 16 (Robotics)*	E1: cTBS (priming) + iTBS + robot assisted therapy E2: sham cTBS (nonpriming) + iTBS + robot assisted training C: sham cTBS + sham iTBS + robot-assisted therapy Duration: 40 min/d, 3d/wk, 3wks	E1/E2 vs C: FMA-UE (+exp1) ARAT (-) velocity (-) ERD MVF Induced Beta 3 (+exp1) E1 vs E2: FMA-UE (-) ARAT (-) velocity (-) ERD MVF Induced Beta 3 (-)
Theta burst stimulation (TBS) combined with other interventions compared to peripheral magnetic stimulation or sham		
Jiang et al. (2023) RCT (7) NStart=60 NEnd=56 TPS=Acute A + B vs A vs B *Also in Table 27 (Additional Afferent and Peripheral Stimulation Methods)*	E1: iTBS + peripheral magnetic stimulation + conventional rehab E2: iTBS + sham peripheral stimulation + conventional rehab C: peripheral magnetic stimulation + central sham stimulation + conventional rehab Duration: 3min20s/d iTBS + 7min20s/d peripheral stimulation + 40min/d conventional rehab, 5d/wk, 4wks	E1/E2 vs C: FMA-UE (+exp1) MBI (+exp1) ARAT (+exp1) MAS (-) E1 vs E2: FMA-UE (+exp1) MBI (+exp1) ARAT (+exp1) MAS (-) E2 vs C: FMA-UE (+con) MBI (+con) ARAT (+con) MAS (-)
Theta burst stimulation (TBS) compared to sham or conventional therapy		
Vink et al. (2023) RCT (8) NStart=60 NEnd=56 TPS=Acute A vs 0	E: cTBS + Conventional therapy C: Sham cTBS + Conventional therapy Duration: 61 min/d (< 1 min cTBS, 60 minutes conventional therapy), 5d/wk, 2 wks	E vs C: ARAT (+exp) FMA-UE (+exp) SULCS (+exp) JTHFT (+exp) 9HPT (-) BI (+exp) MRS (+exp) Stoke impact scale (+exp) EQ-5-D (-)
Theta burst stimulation (TBS) combined with other interventions compared to sham or exoskeleton robotics		
DiLazzaro et al. (2016) Pilot RCT (7) NStart=20 NEnd=17 TPS=Chronic A + B vs A/B	E: cTBS + robotic therapy C: Sham stimulation + robotic therapy Duration: 1hr/d, 5d/wk for 2wk	E vs C: FMA-UE (+exp) Motion accuracy (-) Motion direction (-) Motion smoothness (-) speed (-)

Also in Table 16 (Robotics)		Movement duration (-)
Cross-Referenced RCTs: Combined or Comparative Interventions Involving Theta Burst Stimulation (TBS) (results included in this table's levels of evidence)		
Chang et al. (2024b) RCT (9) NStart=28 NEnd=28 TPS=Not Reported A + B vs A/B *Primary listing: Table 27 (Additional Afferent and Peripheral Stimulation Methods)*	E: Repetitive peripheral magnetic stimulation (rPMS) + iTBS + rehabilitation C: sham rPMS + iTBS + rehabilitation Duration: 5d/wk for 2wks	E vs C: FMA-UE (-) ARAT (-) gross movement (-) grasp (-) grip (-) pinch (-) FIM self care (-) SIS (-) strength (-) memory and thinking (-) emotion (-) communication (-) ADL (-) mobility (-) hand function (-) participation (-)
Dai et al. (2024) RCT (5) NStart=36 NEnd=32 TPS=Subacute A + B vs A/B *Primary listing: Table 16 (Robotics)*	E: Robot-assisted therapy + iTBS + Standard therapy C: Robot-assisted therapy + Standard therapy Duration: E: 192sec/d, 5d/wk for 4wks iTBS + 20min/d, 5d/wk for 4wks robotic training; C: 20min/d, 5d/wk for 4wks robotic training	E vs C: FMA-UE (+exp) fNIRS (+exp)
Kolbasi et al. (2024) Pilot RCT (6) NStart=15 NEnd=11 TPS=Chronic A + B vs A/B *Primary listing: Table 6 (Constraint-Induced Movement Therapy (CIMT))*	E1: Modified Constraint-induced movement therapy (mCIMT) + iTBS E2: mCIMT + sham iTBS C: mCIMT Duration: 60min/d, 3d/wk for 5wks mCIMT + 5min/d iTBS	E1/E2 vs C: FMA-UE motor (-) sensation (-) PROM (-) pain (-) EMG measures resting motor threshold (-) MEPs (-) intracortical facilitation (+exp) short intracortical inhibition (-) Wolf Motor Function Test functional ability scale (-) performance time (-) impaired arm strength (-) impaired handgrip strength (-) non impaired handgrip strength (-) Motor Activity Log-28 amount of use scale (-) how well scale (-) FIM-self care (-)
Huang et al. (2022b) Pilot RCT (8) NStart=24	E: Active HD-tDCS-eTBS (high definition transcranial electrical theta burst superimposing direct current stimulation) + UE rehab	E vs C: FMA-UE (-) WMFT (-)

NEnd=24 TPS=Chronic A + B vs 0 *Primary listing: Table 31 (Transcranial Direct Current Stimulation (tDCS))*	C: sham + UE rehab Duration: 50min/d (20min active/sham, 30min UE rehab), 3d/wk, 4wks	JTHFT (-) FNT (-) MAS; shoulder add (+exp) elbow ext (+exp) thumb flex (+exp) elbow flex (-) wrist flex (-) finger flex (-)
Chen et al. (2021f) Pilot RCT (7) NStart=24 NEnd=24 TPS=Chronic A + B vs A/B *Primary listing: Table 31 (Transcranial Direct Current Stimulation (tDCS))*	E: real anodal tDCS + iTBS output during conventional rehabilitation C: sham tDCS + iTBS output during conventional rehabilitation Duration: 1hr, 3d/wk, 6wks conventional rehabilitationwith a 20-min stimulation simultaneously applied during rehabilitation.	E vs C: FMA-UE (-) JTHFT (+exp) Finger to nose test (+exp)
Meng et al. (2020) RCT (8) NStart=28 NEnd=28 TPS=Subacute A + B vs A/B vs 0 *Primary listing: Table 29 (Repetitive Transcranial Magnetic Stimulation (rTMS))*	E1: Low frequency rTMS + intermittent Theta Burst Stimulation E2: Low frequency rTMS + sham TBS C: Sham + sham Duration: 5x/wk, 2wks	E1 vs C: Fugl-Meyers Assessment Upper Extremity: (+exp1) Barthel Index: (+exp1) Cortical Excitability Abductor Pollicis Brevis (+exp) Extensor Digitorum Communis (+exp) Biceps Brachii (+exp) E2 vs C: Fugl-Meyers Assessment Upper Extremity: (-) Barthel Index: (-) Cortical Excitability Abductor Pollicis Brevis (-) Extensor Digitorum Communis (-) Biceps Brachii (-) E1 vs E2: Fugl-Meyers Assessment Upper Extremity: (+exp1) Barthel Index: (+exp1) Cortical Excitability Abductor Pollicis Brevis (-) Extensor Digitorum Communis (+exp) Biceps Brachii (+exp)
Wang et al. (2014b) RCT (9) NStart=48 NEnd=48 TPS=Subacute A + B1 vs A + B2 vs 0 *Primary listing: Table 29 (Repetitive Transcranial Magnetic Stimulation (rTMS))*	E1: 10 Sessions (10min) Low Frequency rTMS (1Hz) before 10 Sessions (190s) Intermittent Theta Burst Stimulation E2: 10 Sessions (190s) Intermittent Theta Burst Stimulation before 10 Sessions (10min) Low Frequency rTMS (1Hz) C: Sham rTMS/iTBS Duration: 1x/d 5x/wk, 4wks (2wks one condition followed by 2 weeks the other)	E1/E2 vs C: Fugl-Meyer Assessment (+exp1) Wolf Motor Function Test (+exp1,+exp2) Medical Research Council Proximal (+exp1,+exp2) Distal (+exp1) E1 vs E: Fugl-Meyer Assessment (+exp1) Wolf Motor Function Test (+exp1) Medical Research Council Proximal (-) Distal (-)
Sung et al. (2013)	E1: Low frequency (1Hz) rTMS + iTBS	E1/E2/E3 vs C:

RCT (7) NStart=54 NEnd=54 TPS=Chronic A + B vs A vs B vs 0 *Primary listing: Table 29 (Repetitive Transcranial Magnetic Stimulation (rTMS))*	E2: Sham rTMS + iTBS E3: Low frequency (1Hz) rTMS + sham iTBS C: Sham rTMS + sham Itbs Duration: 45min, 5d/wk, 4wk	Wolf Motor Function test (+exp1, +exp2, +exp3) Fugl-Meyer Assessment (+exp1, +exp2, +exp3) Medical Research Council Scale (+exp1, +exp2, +exp3) Functional Independence Measure (-) Finger tapping (+exp1, +exp2, +exp3) Reaction time (+exp1, +exp2, +exp3) E1 vs E2/E3: Wolf Motor Function test (+exp1) Fugl-Meyer Assessment (+exp1) Medical Research Council Scale (+exp1) Functional Independence Measure (-) Finger tapping (+exp1) Reaction time (+exp1) E2 vs E3: Wolf Motor Function test (-) Fugl-Meyer Assessment (+exp3) Medical Research Council Scale (+exp3) Functional Independence Measure (-) Finger tapping (-) Reaction time (-)

Abbreviations and table notes: C=control group; D=days; E=experimental group; H=hours; Min=minutes; RCT=randomized controlled trial; TPS=time post stroke category (Acute: less than 30 days, Subacute: more than 1 month but less than 6 months, Chronic: over 6 months); Wk=weeks.

+exp indicates a statistically significant between groups difference at α=0.05 in favour of the experimental group

+exp1/+exp2/+exp3 indicates a statistically significant between groups difference at α=0.05 in favour of the first, second or third experimental group

+con indicates a statistically significant between groups difference at α=0.05 in favour of the control group

- indicates no statistically significant between groups differences at α=0.05

1. Body Functions and Structures

MOTOR FUNCTION			
LoE	**Conclusion Statement**	**RCTs**	**References**
1a	Theta burst stimulation combined with other interventions may not have a difference in efficacy when compared to sham for improving motor function.	4	Bian et al. (2024); Kuzu et al. (2021); Nicolo et al. (2018); Watanabe et al. (2018)
1b	Intermittent theta burst stimulation with high definition transcranial direct current stimulation and rehabilitation may not have a difference in efficacy when compared to sham transcranial direct current stimulation with intermittent theta burst stimulation and rehabilitation for improving motor function.	1	Bian et al. (2024)
1b	Neuronavigated Continuous Theta Burst Stimulation may not have a difference in efficacy when compared to Cathodal -transcranial direct current stimulation for improving motor function.	1	Nicolo et al. (2018)
1a	Theta burst stimulation may not have a difference in efficacy when compared to sham for improving motor function.	8	Tang et al. (2024); Dionísio et al. (2021); Chen et al. (2019b); Ackerley et al. (2016); DiLazzaro et al. (2013); Hsu et al. (2013); Talelli et al. (2012); Ackerley et al. (2010)
1b	Intermittent theta burst stimulation with upper-limb training may not have a difference in efficacy when compared to Continuous theta	1	Ackerley et al. (2010)

	burst stimulation with upper-limb training for improving motor function.		
1b	Intermittent theta burst stimulation with dexterity training may not have a difference in efficacy when compared to Sham theta burst stimulation with dexterity training for improving motor function.	1	Ackerley et al. (2014)
1b	Intermittent theta burst stimulation with dexterity training may not have a difference in efficacy when compared to Continuous theta burst stimulation with dexterity training for improving motor function.	1	Ackerley et al. (2014)
1b	Intermittent theta burst stimulation with Physical therapy may produce greater improvements in motor function than Physical Therapy.	1	Khan et al. (2019)
1b	Intermittent theta burst stimulation with Physical therapy may not have a difference in efficacy when compared to functional electrical stimulation with Physical therapy for improving motor function.	1	Khan et al. (2019)
1b	Intermittent theta burst stimulation with Virtual reality-based cycling training (bilateral upper limb) may not have a difference in efficacy when compared to sham intermittent theta burst stimulation with VCT for improving motor function.	1	Chen et al. (2021b)
1b	There is conflicting evidence about the effect of Continuous theta burst stimulation with intermittent theta burst stimulation and robot assisted therapy when compared to sham continuous theta burst stimulation with sham intermittent theta burst stimulation and robot-assisted therapy for improving motor function.	1	Zhang et al. (2022a)
1b	Continuous theta burst stimulation with intermittent theta burst stimulation and robot assisted therapy may not have a difference in efficacy when compared to sham continuous theta burst stimulation with intermittent theta burst stimulation and robot assisted training for improving motor function.	1	Zhang et al. (2022a)
1b	There is conflicting evidence about the effect of Intermittent theta burst stimulation with peripheral magnetic stimulation and conventional rehab when compared to peripheral magnetic stimulation with central sham stimulation and conventional rehab for improving motor function.	1	Jiang et al. (2023)
1b	Intermittent theta burst stimulation with peripheral magnetic stimulation and conventional rehab may produce greater improvements in motor function than intermittent theta burst stimulation with sham peripheral stimulation and conventional rehab.	1	Jiang et al. (2023)
1b	Continuous theta burst stimulation with Conventional therapy may produce greater improvements in motor function than Sham continuous theta burst stimulation with Conventional therapy.	1	Vink et al. (2023)
1b	There is conflicting evidence about the effect of Low frequency repetitive transcranial magnetic stimulation with intermittent Theta Burst Stimulation when compared to Sham with sham for improving motor function.	1	Meng et al. (2020)
1b	Low frequency repetitive transcranial magnetic stimulation with intermittent Theta Burst Stimulation may produce greater improvements in motor function than Low frequency repetitive transcranial magnetic stimulation with sham theta burst stimulation.	1	Meng et al. (2020)
1b	10 Sessions Low Frequency repetitive transcranial magnetic stimulation before 10 Sessions Intermittent Theta Burst Stimulation may produce greater improvements in motor function than Sham repetitive transcranial magnetic stimulation or intermittent theta burst stimulation.	1	Wang et al. (2014b)
1b	10 Sessions Low Frequency repetitive transcranial magnetic stimulation before 10 Sessions Intermittent Theta Burst Stimulation may produce greater improvements in motor function than 10	1	Wang et al. (2014b)

	Sessions Low Frequency repetitive transcranial magnetic stimulation before 10 Sessions Intermittent Theta Burst Stimulation.		
1b	Low frequency repetitive transcranial magnetic stimulation with intermittent theta burst stimulation may produce greater improvements in motor function than Sham repetitive transcranial magnetic stimulation with sham ltbs.	1	Sung et al. (2013)
1b	Low frequency repetitive transcranial magnetic stimulation with intermittent theta burst stimulation may produce greater improvements in motor function than Sham repetitive transcranial magnetic stimulation with intermittent theta burst stimulation or Low frequency repetitive transcranial magnetic stimulation and sham intermittent theta burst stimulation.	1	Sung et al. (2013)
1b	Sham repetitive transcranial magnetic stimulation with intermittent theta burst stimulation may not have a difference in efficacy when compared to Low frequency repetitive transcranial magnetic stimulation with sham intermittent theta burst stimulation for improving motor function.	1	Sung et al. (2013)
1b	Repetitive peripheral magnetic stimulation (rPMS) with intermittent theta burst stimulation and rehabilitation may not have a difference in efficacy when compared to sham rPMS with intermittent theta burst stimulation and rehabilitation for improving motor function.	1	Chang et al. (2024b)
2	Robot-assisted therapy with intermittent theta burst stimulation and therapy may produce greater improvements in motor function than Robot-assisted therapy with therapy.	1	Dai et al. (2024)
1b	CTBS with robotic therapy may produce greater improvements in motor function than Sham stimulation with robotic therapy.	1	DiLazzaro et al. (2016)
1b	Modified Constraint-induced movement therapy (mCIMT) with iTBS may not have a difference in efficacy when compared to mCIMT for improving motor function.	1	Kolbasi et al. (2024)
1b	MCIMT with sham iTBS may not have a difference in efficacy when compared to mCIMT for improving motor function.	1	Kolbasi et al. (2024)
1b	Active HD-tDCS-eTBS (high definition transcranial electrical theta burst superimposing direct current stimulation) with UE rehab may not have a difference in efficacy when compared to sham with UE rehab for improving motor function.	1	Huang et al. (2022b)
1b	There is conflicting evidence about the effect of real anodal tDCS with iTBS output during conventional rehabilitation when compared to sham tDCS with iTBS output during conventional rehabilitation for improving motor function.	1	Chen et al. (2021f)

STROKE SEVERITY			
LoE	**Conclusion Statement**	**RCTs**	**References**
1b	Theta burst stimulation combined with other interventions may not have a difference in efficacy when compared to sham for improving stroke severity.	1	Kuzu et al. (2021)
1b	Intermittent theta burst stimulation with Physical therapy may produce greater improvements in stroke severity than Physical Therapy.	1	Khan et al. (2019)
1b	Intermittent theta burst stimulation with Physical therapy may not have a difference in efficacy when compared to functional electrical stimulation with Physical therapy for improving stroke severity.	1	Khan et al. (2019)
1b	Continuous theta burst stimulation with Conventional therapy may produce greater improvements in stroke severity than Sham continuous theta burst stimulation with Conventional therapy.	1	Vink et al. (2023)

1b	Theta burst stimulation may produce greater improvements in stroke severity than sham.	1	Hsu et al. (2013)

MUSCLE STRENGTH			
LoE	**Conclusion Statement**	**RCTs**	**References**
1a	Theta burst stimulation combined with other interventions may not have a difference in efficacy when compared to sham for improving muscle strength.	3	Bian et al. (2024); Nicolo et al. (2018); Watanabe et al. (2018)
1b	Intermittent theta burst stimulation with high definition transcranial direct current stimulation and rehabilitation may not have a difference in efficacy when compared to sham transcranial direct current stimulation with intermittent theta burst stimulation and rehabilitation for improving muscle strength.	1	Bian et al. (2024)
1b	Neuronavigated Continuous Theta Burst Stimulation may not have a difference in efficacy when compared to Cathodal -transcranial direct current stimulation for improving muscle strength.	1	Nicolo et al. (2018)
1a	Theta burst stimulation may produce greater improvements in muscle strength than sham.	5	Tang et al. (2024); Kim et al. (2015a); DiLazzaro et al. (2013); Talelli et al. (2012); Ackerley et al. (2010)
1b	10 Sessions Low Frequency repetitive transcranial magnetic stimulation before 10 Sessions Intermittent Theta Burst Stimulation may produce greater improvements in muscle strength than Sham repetitive transcranial magnetic stimulation or intermittent theta burst stimulation.	1	Wang et al. (2014b)
1b	10 Sessions Low Frequency repetitive transcranial magnetic stimulation before 10 Sessions Intermittent Theta Burst Stimulation may not have a difference in efficacy when compared to 10 Sessions Low Frequency repetitive transcranial magnetic stimulation before 10 Sessions Intermittent Theta Burst Stimulation for improving muscle strength.	1	Wang et al. (2014b)
1b	Low frequency repetitive transcranial magnetic stimulation with intermittent theta burst stimulation may produce greater improvements in muscle strength than Sham repetitive transcranial magnetic stimulation with sham Itbs.	1	Sung et al. (2013)
1b	Low frequency repetitive transcranial magnetic stimulation with intermittent theta burst stimulation may produce greater improvements in muscle strength than Sham repetitive transcranial magnetic stimulation with intermittent theta burst stimulation or Low frequency repetitive transcranial magnetic stimulation and sham intermittent theta burst stimulation.	1	Sung et al. (2013)
1b	Sham repetitive transcranial magnetic stimulation with intermittent theta burst stimulation may result in lesser improvements in muscle strength when compared to Low frequency repetitive transcranial magnetic stimulation with sham intermittent theta burst stimulation.	1	Sung et al. (2013)

SPASTICITY			
LoE	**Conclusion Statement**	**RCTs**	**References**
1a	Theta burst stimulation combined with other interventions may not have a difference in efficacy when compared to sham for improving spasticity.	3	Bian et al. (2024); Kuzu et al. (2021); Watanabe et al. (2018)
1b	Intermittent theta burst stimulation with high definition transcranial direct current stimulation and rehabilitation may not have a difference in efficacy when compared to sham transcranial direct	1	Bian et al. (2024)

	current stimulation with intermittent theta burst stimulation and rehabilitation for improving spasticity.		
1a	Theta burst stimulation may produce greater improvements in spasticity than sham.	4	El Nahas et al. (2022); Chen et al. (2021a); Chen et al. (2019b); Kim et al. (2015a)
1b	Intermittent theta burst stimulation with Virtual reality-based cycling training (bilateral upper limb) may produce greater improvements in spasticity than sham intermittent theta burst stimulation with VCT.	1	Chen et al. (2021b)
1b	Intermittent theta burst stimulation with peripheral magnetic stimulation and conventional rehab may not have a difference in efficacy when compared to peripheral magnetic stimulation with central sham stimulation and conventional rehab for improving spasticity.	1	Jiang et al. (2023)
1b	Intermittent theta burst stimulation with peripheral magnetic stimulation and conventional rehab may not have a difference in efficacy when compared to intermittent theta burst stimulation with sham peripheral stimulation and conventional rehab for improving spasticity.	1	Jiang et al. (2023)
1b	There is conflicting evidence about the effect of Active HD-tDCS-eTBS (high definition transcranial electrical theta burst superimposing direct current stimulation) with UE rehab when compared to sham with UE rehab for improving spasticity.	1	Huang et al. (2022b)

2. Activities

ACTIVITIES OF DAILY LIVING			
LoE	**Conclusion Statement**	**RCTs**	**References**
1a	There is conflicting evidence about the effect of Theta burst stimulation combined with other interventions when compared to sham for improving performance of activities of daily living.	3	Bian et al. (2024); Kuzu et al. (2021); Nicolo et al. (2018)
1b	Intermittent theta burst stimulation with high definition transcranial direct current stimulation and rehabilitation may not have a difference in efficacy when compared to sham transcranial direct current stimulation with intermittent theta burst stimulation and rehabilitation for improving performance of activities of daily living.	1	Bian et al. (2024)
1b	Neuronavigated Continuous Theta Burst Stimulation may not have a difference in efficacy when compared to Cathodal -transcranial direct current stimulation for improving performance of activities of daily living.	1	Nicolo et al. (2018)
1a	Theta burst stimulation may not have a difference in efficacy when compared to sham for improving performance of activities of daily living.	5	Tang et al. (2024); Chen et al. (2021a); Dionísio et al. (2021); Chen et al. (2019b); Talelli et al. (2012)
1b	Intermittent theta burst stimulation with Physical therapy may produce greater improvements in performance of activities of daily living than Physical Therapy.	1	Khan et al. (2019)
1b	Intermittent theta burst stimulation with Physical therapy may not have a difference in efficacy when compared to functional electrical stimulation with Physical therapy for improving performance of activities of daily living.	1	Khan et al. (2019)
1b	There is conflicting evidence about the effect of Intermittent theta burst stimulation with Virtual reality-based cycling training (bilateral upper limb) when compared to sham intermittent theta burst stimulation with VCT for improving performance of activities of daily living.	1	Chen et al. (2021b)

1b	There is conflicting evidence about the effect of Intermittent theta burst stimulation with peripheral magnetic stimulation and conventional rehab when compared to peripheral magnetic stimulation with central sham stimulation and conventional rehab for improving performance of activities of daily living.	1	Jiang et al. (2023)
1b	Intermittent theta burst stimulation with peripheral magnetic stimulation and conventional rehab may produce greater improvements in performance of activities of daily living than intermittent theta burst stimulation with sham peripheral stimulation and conventional rehab.	1	Jiang et al. (2023)
1b	Continuous theta burst stimulation with Conventional therapy may produce greater improvements in performance of activities of daily living than Sham continuous theta burst stimulation with Conventional therapy.	1	Vink et al. (2023)
1b	There is conflicting evidence about the effect of Low frequency repetitive transcranial magnetic stimulation with intermittent Theta Burst Stimulation when compared to Sham with sham for improving performance of activities of daily living.	1	Meng et al. (2020)
1b	Low frequency repetitive transcranial magnetic stimulation with intermittent Theta Burst Stimulation may produce greater improvements in performance of activities of daily living than Low frequency repetitive transcranial magnetic stimulation with sham theta burst stimulation.	1	Meng et al. (2020)
1b	There is conflicting evidence about the effect of Low frequency repetitive transcranial magnetic stimulation with intermittent theta burst stimulation when compared to Sham repetitive transcranial magnetic stimulation with sham Itbs for improving performance of activities of daily living.	1	Sung et al. (2013)
1b	There is conflicting evidence about the effect of Low frequency repetitive transcranial magnetic stimulation with intermittent theta burst stimulation when compared to Sham repetitive transcranial magnetic stimulation with intermittent theta burst stimulation or Low frequency repetitive transcranial magnetic stimulation and sham intermittent theta burst stimulation for improving performance of activities of daily living.	1	Sung et al. (2013)
1b	Sham repetitive transcranial magnetic stimulation with intermittent theta burst stimulation may not have a difference in efficacy when compared to Low frequency repetitive transcranial magnetic stimulation with sham intermittent theta burst stimulation for improving performance of activities of daily living.	1	Sung et al. (2013)
1b	Repetitive peripheral magnetic stimulation (rPMS) with intermittent theta burst stimulation and rehabilitation may not have a difference in efficacy when compared to sham rPMS with intermittent theta burst stimulation and rehabilitation for improving performance of activities of daily living.	1	Chang et al. (2024b)
1b	Modified Constraint-induced movement therapy (mCIMT) with iTBS may not have a difference in efficacy when compared to mCIMT for improving performance of activities of daily living.	1	Kolbasi et al. (2024)
1b	MCIMT with sham iTBS may not have a difference in efficacy when compared to mCIMT for improving performance of activities of daily living.	1	Kolbasi et al. (2024)

DEXTERITY			
LoE	**Conclusion Statement**	**RCTs**	**References**
1b	Theta burst stimulation combined with other interventions may not have a difference in efficacy when compared to sham for improving dexterity.	1	Nicolo et al. (2018)
1b	Neuronavigated Continuous Theta Burst Stimulation may not have a difference in efficacy when compared to Cathodal -transcranial direct current stimulation for improving dexterity.	1	Nicolo et al. (2018)
1a	Theta burst stimulation may not have a difference in efficacy when compared to sham for improving dexterity.	3	Chen et al. (2019b); DiLazzaro et al. (2013); Talelli et al. (2012)
1b	Intermittent theta burst stimulation with dexterity training may not have a difference in efficacy when compared to Sham theta burst stimulation with dexterity training for improving dexterity.	1	Ackerley et al. (2014)
1b	Intermittent theta burst stimulation with dexterity training may not have a difference in efficacy when compared to Continuous theta burst stimulation with dexterity training for improving dexterity.	1	Ackerley et al. (2014)
1b	Intermittent theta burst stimulation with Virtual reality-based cycling training (bilateral upper limb) may not have a difference in efficacy when compared to sham intermittent theta burst stimulation with VCT for improving dexterity.	1	Chen et al. (2021b)
1b	Continuous theta burst stimulation with Conventional therapy may not have a difference in efficacy when compared to Sham continuous theta burst stimulation with Conventional therapy for improving dexterity.	1	Vink et al. (2023)
1b	Active HD-tDCS-eTBS (high definition transcranial electrical theta burst superimposing direct current stimulation) with UE rehab may not have a difference in efficacy when compared to sham with UE rehab for improving dexterity.	1	Huang et al. (2022b)
1b	Real anodal tDCS with iTBS output during conventional rehabilitation may produce greater improvements in dexterity than sham tDCS with iTBS output during conventional rehabilitation.	1	Chen et al. (2021f)

Key Points

- Theta burst stimulation may be beneficial for improving stroke severity, muscle strength, and spasticity, but not motor function, performance of activities of daily living, and dexterity, after stroke when compared to sham.
- Intermittent theta burst stimulation with high definition transcranial direct current stimulation and rehabilitation may not be beneficial for improving motor function, performance of activities of daily living, spasticity, and muscle strength after stroke when compared to sham transcranial direct current stimulation with intermittent theta burst stimulation and rehabilitation.
- Neuronavigated Continuous Theta Burst Stimulation may not be beneficial for improving motor function, dexterity, performance of activities of daily living, and muscle strength after stroke when compared to Cathodal -transcranial direct current stimulation.
- Intermittent theta burst stimulation with upper-limb training may not be beneficial for improving motor function after stroke when compared to Continuous theta burst stimulation with upper-limb training.
- Intermittent theta burst stimulation with dexterity training may not be beneficial for improving motor function and dexterity after stroke when compared to Sham theta burst stimulation with dexterity training.
- Intermittent theta burst stimulation with dexterity training may not be beneficial for improving motor function and dexterity after stroke when compared to Continuous theta burst stimulation with dexterity training.

- Intermittent theta burst stimulation with Physical therapy may be beneficial for improving motor function, performance of activities of daily living, and stroke severity after stroke when compared to Physical Therapy.
- Intermittent theta burst stimulation with Physical therapy may not be beneficial for improving motor function, performance of activities of daily living, and stroke severity after stroke when compared to functional electrical stimulation with Physical therapy.
- Intermittent theta burst stimulation with Virtual reality-based cycling training (bilateral upper limb) may be beneficial for improving spasticity, but not motor function and dexterity, after stroke when compared to sham intermittent theta burst stimulation with VCT; the literature is mixed regarding performance of activities of daily living.
- The literature is mixed regarding the effect of Continuous theta burst stimulation with intermittent theta burst stimulation and robot assisted therapy on improvement of motor function after stroke when compared to sham continuous theta burst stimulation with sham intermittent theta burst stimulation and robot-assisted therapy.
- Continuous theta burst stimulation with intermittent theta burst stimulation and robot assisted therapy may not be beneficial for improving motor function after stroke when compared to sham continuous theta burst stimulation with intermittent theta burst stimulation and robot assisted training.
- Intermittent theta burst stimulation with peripheral magnetic stimulation and conventional rehab may not be beneficial for improving spasticity after stroke when compared to peripheral magnetic stimulation with central sham stimulation and conventional rehab; the literature is mixed regarding motor function and performance of activities of daily living.
- Intermittent theta burst stimulation with peripheral magnetic stimulation and conventional rehab may be beneficial for improving motor function and performance of activities of daily living, but not spasticity, after stroke when compared to intermittent theta burst stimulation with sham peripheral stimulation and conventional rehab.
- Continuous theta burst stimulation with Conventional therapy may be beneficial for improving motor function, performance of activities of daily living, and stroke severity, but not dexterity, after stroke when compared to Sham continuous theta burst stimulation with Conventional therapy.
- The literature is mixed regarding the effect of Low frequency repetitive transcranial magnetic stimulation with intermittent Theta Burst Stimulation on improvement of motor function and performance of activities of daily living after stroke when compared to Sham with sham.
- Low frequency repetitive transcranial magnetic stimulation with intermittent Theta Burst Stimulation may be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Low frequency repetitive transcranial magnetic stimulation with sham theta burst stimulation.
- 10 Sessions Low Frequency repetitive transcranial magnetic stimulation before 10 Sessions Intermittent Theta Burst Stimulation may be beneficial for improving motor function and muscle strength after stroke when compared to Sham repetitive transcranial magnetic stimulation or intermittent theta burst stimulation.
- 10 Sessions Low Frequency repetitive transcranial magnetic stimulation before 10 Sessions Intermittent Theta Burst Stimulation may be beneficial for improving motor function, but not muscle strength, after stroke when compared to 10 Sessions Low Frequency repetitive transcranial magnetic stimulation before 10 Sessions Intermittent Theta Burst Stimulation.
- Low frequency repetitive transcranial magnetic stimulation with intermittent theta burst stimulation may be beneficial for improving motor function and muscle strength after stroke when compared to Sham repetitive transcranial magnetic stimulation with sham Itbs; the literature is mixed regarding performance of activities of daily living.
- Low frequency repetitive transcranial magnetic stimulation with intermittent theta burst stimulation may be beneficial for improving motor function and muscle strength after stroke when compared to Sham repetitive transcranial magnetic stimulation with intermittent theta burst stimulation or Low frequency repetitive transcranial magnetic stimulation and sham intermittent theta burst stimulation; the literature is mixed regarding performance of activities of daily living.
- Sham repetitive transcranial magnetic stimulation with intermittent theta burst stimulation may not be beneficial for improving motor function and performance of activities of daily living after stroke when

compared to Low frequency repetitive transcranial magnetic stimulation with sham intermittent theta burst stimulation.

- Sham repetitive transcranial magnetic stimulation with intermittent theta burst stimulation may be less beneficial than Low frequency repetitive transcranial magnetic stimulation with sham intermittent theta burst stimulation for improving muscle strength after stroke.
- Repetitive peripheral magnetic stimulation (rPMS) with intermittent theta burst stimulation and rehabilitation may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to sham rPMS with intermittent theta burst stimulation and rehabilitation.
- Robot-assisted therapy with intermittent theta burst stimulation and therapy may be beneficial for improving motor function after stroke when compared to Robot-assisted therapy with therapy.
- CTBS with robotic therapy may be beneficial for improving motor function after stroke when compared to Sham stimulation with robotic therapy.
- Theta burst stimulation combined with other interventions may not be beneficial for improving motor function, stroke severity, muscle strength, spasticity, and dexterity after stroke when compared to sham; the literature is mixed regarding performance of activities of daily living.
- Modified Constraint-induced movement therapy (mCIMT) with iTBS may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to mCIMT.
- MCIMT with sham iTBS may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to mCIMT.
- Active HD-tDCS-eTBS (high definition transcranial electrical theta burst superimposing direct current stimulation) with UE rehab may not be beneficial for improving motor function and dexterity after stroke when compared to sham with UE rehab; the literature is mixed regarding spasticity.
- Real anodal tDCS with iTBS output during conventional rehabilitation may be beneficial for improving dexterity after stroke when compared to sham tDCS with iTBS output during conventional rehabilitation; the literature is mixed regarding motor function.

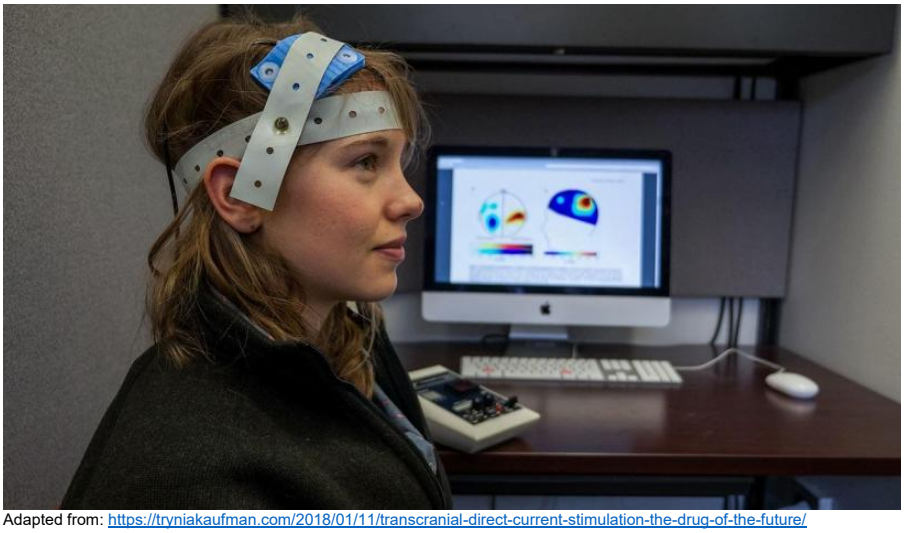
Summary of Key Points: Theta Burst Stimulation (TBS)

Intervention	Control(s)	Function domain(s)	Effect
Theta burst stimulation combined with other interventions	sham	Motor function, dexterity, spasticity, stroke severity, muscle strength	–
Theta burst stimulation combined with other interventions	sham	Performance of activities of daily living	=
Intermittent theta burst stimulation with high definition transcranial direct current stimulation and rehabilitation	sham transcranial direct current stimulation with intermittent theta burst stimulation and rehabilitation	Motor function, performance of activities of daily living, spasticity, muscle strength	–
Neuronavigated Continuous Theta Burst Stimulation	Cathodal -transcranial direct current stimulation	Motor function, dexterity, performance of activities of daily living, muscle strength	–
Theta burst stimulation	sham	Stroke severity, muscle strength, spasticity	+
Theta burst stimulation	sham	Motor function, performance of activities of daily living, dexterity	–
Intermittent theta burst stimulation with upper-limb training	Continuous theta burst stimulation with upper-limb training	Motor function	–
Intermittent theta burst stimulation with dexterity training	Sham theta burst stimulation with dexterity training	Motor function, dexterity	–
Intermittent theta burst stimulation with dexterity training	Continuous theta burst stimulation with dexterity training	Motor function, dexterity	–

Intermittent theta burst stimulation with Physical therapy	Physical Therapy	Motor function, performance of activities of daily living, stroke severity	+
Intermittent theta burst stimulation with Physical therapy	functional electrical stimulation with Physical therapy	Motor function, performance of activities of daily living, stroke severity	-
Intermittent theta burst stimulation with Virtual reality-based cycling training (bilateral upper limb)	sham intermittent theta burst stimulation with VCT	Spasticity	+
Intermittent theta burst stimulation with Virtual reality-based cycling training (bilateral upper limb)	sham intermittent theta burst stimulation with VCT	Motor function, dexterity	-
Intermittent theta burst stimulation with Virtual reality-based cycling training (bilateral upper limb)	sham intermittent theta burst stimulation with VCT	Performance of activities of daily living	=
Continuous theta burst stimulation with intermittent theta burst stimulation and robot assisted therapy	sham continuous theta burst stimulation with sham intermittent theta burst stimulation and robot-assisted therapy	Motor function	=
Continuous theta burst stimulation with intermittent theta burst stimulation and robot assisted therapy	sham continuous theta burst stimulation with intermittent theta burst stimulation and robot assisted training	Motor function	-
Intermittent theta burst stimulation with peripheral magnetic stimulation and conventional rehab	peripheral magnetic stimulation with central sham stimulation and conventional rehab	Spasticity	-
Intermittent theta burst stimulation with peripheral magnetic stimulation and conventional rehab	peripheral magnetic stimulation with central sham stimulation and conventional rehab	Motor function, performance of activities of daily living	=
Intermittent theta burst stimulation with peripheral magnetic stimulation and conventional rehab	intermittent theta burst stimulation with sham peripheral stimulation and conventional rehab	Motor function, performance of activities of daily living	+
Intermittent theta burst stimulation with peripheral magnetic stimulation and conventional rehab	intermittent theta burst stimulation with sham peripheral stimulation and conventional rehab	Spasticity	-
Continuous theta burst stimulation with Conventional therapy	Sham continuous theta burst stimulation with Conventional therapy	Motor function, performance of activities of daily living, stroke severity	+
Continuous theta burst stimulation with Conventional therapy	Sham continuous theta burst stimulation with Conventional therapy	Dexterity	-
Low frequency repetitive transcranial magnetic stimulation with intermittent Theta Burst Stimulation	Sham with sham	Motor function, performance of activities of daily living	=
Low frequency repetitive transcranial magnetic stimulation with intermittent Theta Burst Stimulation	Low frequency repetitive transcranial magnetic stimulation with sham theta burst stimulation	Motor function, performance of activities of daily living	+
10 Sessions Low Frequency repetitive transcranial magnetic stimulation before 10 Sessions Intermittent Theta Burst Stimulation	Sham repetitive transcranial magnetic stimulation or intermittent theta burst stimulation	Motor function, muscle strength	+
10 Sessions Low Frequency repetitive transcranial magnetic stimulation before 10 Sessions Intermittent Theta Burst Stimulation	10 Sessions Low Frequency repetitive transcranial magnetic stimulation before 10 Sessions Intermittent Theta Burst Stimulation	Motor function	+

10 Sessions Low Frequency repetitive transcranial magnetic stimulation before 10 Sessions Intermittent Theta Burst Stimulation	10 Sessions Low Frequency repetitive transcranial magnetic stimulation before 10 Sessions Intermittent Theta Burst Stimulation	Muscle strength	−
Low frequency repetitive transcranial magnetic stimulation with intermittent theta burst stimulation	Sham repetitive transcranial magnetic stimulation with sham Itbs	Motor function, muscle strength	+
Low frequency repetitive transcranial magnetic stimulation with intermittent theta burst stimulation	Sham repetitive transcranial magnetic stimulation with sham Itbs	Performance of activities of daily living	=
Low frequency repetitive transcranial magnetic stimulation with intermittent theta burst stimulation	Sham repetitive transcranial magnetic stimulation with intermittent theta burst stimulation or Low frequency repetitive transcranial magnetic stimulation and sham intermittent theta burst stimulation	Motor function, muscle strength	+
Low frequency repetitive transcranial magnetic stimulation with intermittent theta burst stimulation	Sham repetitive transcranial magnetic stimulation with intermittent theta burst stimulation or Low frequency repetitive transcranial magnetic stimulation and sham intermittent theta burst stimulation	Performance of activities of daily living	=
Sham repetitive transcranial magnetic stimulation with intermittent theta burst stimulation	Low frequency repetitive transcranial magnetic stimulation with sham intermittent theta burst stimulation	Motor function, performance of activities of daily living, muscle strength	−
Repetitive peripheral magnetic stimulation (rPMS) with intermittent theta burst stimulation and rehabilitation	sham rPMS with intermittent theta burst stimulation and rehabilitation	Motor function, performance of activities of daily living	−
Robot-assisted therapy with intermittent theta burst stimulation and therapy	Robot-assisted therapy with therapy	Motor function	+
CTBS with robotic therapy	Sham stimulation with robotic therapy	Motor function	+
Modified Constraint-induced movement therapy (mCIMT) with iTBS	mCIMT	Motor function, performance of activities of daily living	−
MCIMT with sham iTBS	mCIMT	Motor function, performance of activities of daily living	−
Active HD-tDCS-eTBS (high definition transcranial electrical theta burst superimposing direct current stimulation) with UE rehab	sham with UE rehab	Motor function, dexterity	−
Active HD-tDCS-eTBS (high definition transcranial electrical theta burst superimposing direct current stimulation) with UE rehab	sham with UE rehab	Spasticity	=
Real anodal tDCS with iTBS output during conventional rehabilitation	sham tDCS with iTBS output during conventional rehabilitation	Dexterity	+
Real anodal tDCS with iTBS output during conventional rehabilitation	sham tDCS with iTBS output during conventional rehabilitation	Motor function	=

Transcranial Direct Current Stimulation (tDCS)



Adapted from: https://tryniakaufman.com/2018/01/11/transcranial-direct-current-stimulation-the-drug-of-the-future/

Another form of non-invasive brain stimulation is transcranial direct-current stimulation (tDCS). This procedure involves the application of mild electrical currents (1-2 mA) conducted through two saline-soaked, surface electrodes applied to the scalp, overlaying the area of interest and the contralateral forehead above the orbit. Anodal stimulation is performed over the affected hemisphere and increases cortical excitability, while cathodal stimulation is performed over the unaffected hemisphere and decreases cortical excitability (Alonso-Alonso et al., 2007). Additionally, tDCS can be applied on both hemispheres concurrently, this is known as dual tDCS. In contrast to TMS, tDCS does not induce action potentials, but instead modulates the resting membrane potential of the neurons (Alonso-Alonso et al., 2007).

A total of 93 RCTs were found that evaluated transcranial direct current stimulation (tDCS) for upper extremity motor rehabilitation. Seventeen RCTs compared TDCS with sham (Wang et al. (2024); Williamson et al. (2023); Klomjai et al. (2022a); Choi & Nam (2020); Bao et al. (2018); McCambridge et al. (2018); Marquez et al. (2017); DelFelice et al. (2016); Sik et al. (2015); Au-Yeung et al. (2014a); Fusco et al. (2013); Khedr et al. (2013); Stagg et al. (2012); Mahmoudi et al. (2011); Kim et al. (2010); Boggio et al. (2007); Fregni et al. (2005)). Fourteen RCTs compared anodal tDCS with sham (Cordes D. et al. (2024); Midha & Arumugam (2024); Salazar et al. (2024); Vimolratana et al. (2024); Zeng et al. (2024); Gong Q. et al. (2023); Klomjai et al. (2022b); de Souza et al. (2021); Bornheim et al. (2020); Achacheluee et al. (2018); Mortensen et al. (2016); Fusco et al. (2014b); Kasashima et al. (2012); Kim et al. (2009)). One RCT compared different approaches to dual tdcs (Oveisgharan et al. (2018)). Ten RCTs compared dual tDCS with sham (Balikshahi N. et al. (2024); Zhang et al. (2024a); Pinto et al. (2021); Bolognini et al. (2020); Kuo et al. (2020); Koh et al. (2017); van der Vliet et al. (2017); Goodwill et al. (2016); Lefebvre et al. (2014); Lindenberg et al. (2010)). One RCT compared anodal tDCS combined with other interventions with robotics or sham (Mazzoleni et al. (2019)). One RCT compared TDCS combined with other interventions with sham or robotic orthosis (Hesse et al. (2011b)). One RCT evaluated dual tDCS combined with other interventions (Hathaiareerug & Vearasilp (2019)). One RCT compared cathodal tDCS combined with other interventions with sham or virtual reality training (Yao et al. (2020)). One RCT compared anodal tDCS combined with other interventions with sham or task-specific training (Pavlova et al. (2017)). Seven RCTs compared cathodal tDCS with sham (Takahashi et al. (2024); Boasquevisque et al. (2021); Alisar et al. (2020); Rabadi et al. (2017); Fusco et al. (2014a); Wu et al. (2013c); Nair et al. (2011)). One RCT compared anodal tDCS combined with other interventions with tdcs or robotics (Ochi et al. (2013)). One RCT compared dual tDCS combined with other interventions with brain-computer interface or sham or mental practice (Ang et al. (2015a)). Two RCTs compared dual tDCS combined with other interventions with sham or motor relearning programmes (Lefebvre et al. (2015); Lefebvre et al. (2013)). Two RCTs compared dual tDCS combined with other interventions with sham or task-specific training (Hsu et al. (2023); Doost et al. (2019)). Three RCTs compared anodal tDCS combined with other interventions with sham (Huang et al. (2022b); Chen et al. (2021f); Menezes et al. (2018)). One RCT compared anodal tDCS with sham or conventional therapy (Ilić et al. (2016)). One RCT compared anodal tDCS combined with other interventions with graded repetitive arm supplementary program or sham (Allman et al. (2016)). Two RCTs compared dual tDCS combined with other interventions with sham or fes (Salazar et al. (2020); Shaheiwola et al. (2018)). One RCT compared anodal tDCS combined with other interventions with conventional therapy (Llorens et al. (2021)). One RCT compared TDCS combined with other interventions with task-specific training (Adeagbo et al.

(2021)). One RCT compared TDCS combined with other interventions with motor relearning programmes or sham (Taud et al. (2021)). One RCT compared anodal tDCS combined with other interventions with sham or mental practice or task-specific training (Kashoo et al. (2022)). One RCT compared anodal tDCS combined with other interventions with sham or virtual reality training (Lee & Cha (2022)). One RCT compared dual tDCS combined with other interventions with conventional therapy (Tedla et al. (2022)). One RCT compared dual tDCS combined with other interventions with sham (Wei et al. (2022)). One RCT compared anodal tDCS combined with other interventions with sham or exercise and custom physiotherapy protocols (Palimeris et al. (2022)). Two RCTs compared dual tDCS combined with other interventions with sham or exercise and custom physiotherapy protocols (Youssef et al. (2023); Prathum et al. (2022)). Two RCTs compared dual tDCS combined with other interventions with sham or cimt (Garrido et al. (2023); Kim et al. (2021)). One RCT compared TDCS with sham or conventional therapy (Pires et al. (2023)). One RCT compared anodal tDCS combined with other interventions with sham or cimt (Unger et al. (2023)). One RCT compared dual tDCS combined with other interventions with sham or peripheral nerve stimulation (Yague et al. (2023)). One RCT compared dual tDCS combined with other interventions with sham or sensorimotor training (Li et al. (2024c)). One RCT compared different approaches to anodal tDCS combined with other interventions (Powell et al. (2016)). One RCT compared tDCS combined with other interventions with sham or robotics or EMG biofeedback (Hu et al. (2024)). One RCT compared anodal tDCS combined with other interventions with sham or mirror therapy (Liao et al. (2020)). One RCT compared dual tDCS combined with other interventions with mirror therapy or sham (Jin et al. (2019)). One RCT compared dual tDCS combined with other interventions with CIMT (Takebayashi et al. (2017)). One RCT compared tDCS combined with other interventions with sham or CIMT (Rocha et al. (2016)). One RCT compared dual tDCS combined with other interventions with tDCS or sham (Cho & Cha (2015)). One RCT compared cathodal tDCS with conventional therapy (Lee & Lee (2015)). One RCT evaluated cathodal tDCS combined with other interventions (Lee et al. (2014b)). One RCT compared dual tDCS combined with other interventions with sham or tDCS or central nervous system stimulants (Wang et al. (2014c)).

In addition, 24 RCTs in which transcranial direct current stimulation (tDCS) formed part of a combined or comparative intervention are cross-referenced at the end of Table 31; their primary listings appear in other tables.

The methodological details and results of all 93 RCTs are presented in Table 31.

Table 31. RCTs Evaluating Transcranial Direct Current Stimulation (tDCS) for Upper Extremity Motor Rehabilitation

Authors (Year) **Study Design (PEDro Score)** **Sample Size start** **Sample Size end** **Time post stroke category** **Study design**	**Interventions** **Duration: Session length, frequency per week for total number of weeks**	**Outcome Measures** **Result (direction of effect)**
TDCS compared to sham		
Wang et al. (2024) RCT Crossover (6) NStart=28 NEnd=27 TPS=Chronic A1 vs A2 vs 0	E1: Anodal tDCS E2: Cathodal tDCS E3: Bilateral tDCS C: Sham tDCS Duration: 1 session per intervention, 20 mins sessions (washout is 7 days)	E1 vs C: JTHFT (+exp1) EEG measures beta coherance (+exp1) motor gains (+exp2) E2 vs C: JTHFT (+exp1) EEG measures beta coherance (+con) motor gains (+exp2) E3 vs C: JTHFT (-) EEG measures beta coherance (-) motor gains (-)
Williamson et al. (2023)	E1: Anodal HD-tDCS over ipsilesional M1	E1 vs C:

Pilot RCT (7) NStart=8 NEnd=8 TPS=Chronic A1 vs A2 vs 0	E2: Cathodal HD-tDCS over contralesional PMd C: Sham HD-tDCS Duration: 20 minutes/session, 1 session of each - 2wk washout	FMA-UE (+exp1) MEP Latency (+exp1) : MEP Amplitude (-) E2 vs C: FMA-UE (+exp2) MEP Latency (+exp2) : MEP Amplitude (-)
Klomjai et al. (2022a) RCT (8) NStart=82 NEnd=78 TPS=Acute A1 vs A2 vs 0	E1: Anodal tDCS + conventional physio E2: Cathodal tDCS + conventional physio E3: dual tDCS + conventional physio C: Sham tDCS + conventional physio Duration: 80min/d(20min tDCS, 60min physio), 5 consecutive days	E1/E2/E3 vs C: Cerebral Blood Flow MCV (-) FMA-UE (-) FMA-LE (-) WMFT pencil task (+exp3) can task (-) FTSTS (-) TUG (+exp3) Muscle Strength wrist extensor (-) elbow extensor (-) hip flexor (+exp3) hip extensor (-) knee extensor (+exp3) ankle dorsiflexor (+exp1) E1 vs E3: Cerebral Blood Flow MCV (-) FMA-UE (-) FMA-LE (-) WMFT pencil task (+exp3) can task (+exp3) FTSTS (-) TUG (-) Muscle Strength wrist extensor (-) elbow extensor (-) hip flexor (-) hip extensor (-) knee extensor (+exp3) ankle dorsiflexor (-) E2 vs E3: Cerebral Blood Flow MCV (-) FMA-UE (-) FMA-LE (-) WMFT pencil task (-) can task (+exp3) FTSTS (-) TUG (+exp3) Muscle Strength wrist extensor (-) elbow extensor (-) hip flexor (+exp3) hip extensor (-) knee extensor (-)

		ankle dorsiflexor (-)
Choi & Nam (2020) RCT (6) NStart=45 NEnd=35 TPS=Chronic A1 vs A2 vs 0	E1: Unilateral Hemisphere tDCS (1mmA) E2: Dual Hemisphere tDCS (1mmA) C: Placebo tDCS Duration: 20min/d, 5d/wk, 4wks tDCS	E1 vs C: Hand Grip Strength (+exp1) mAS Elbow Flexor Muscle Tone (-) Wrist Flexor Muscle Tone (-) Jebsen Taylor Hand Function Test (+exp1) E2 vs C: Hand Grip Strength (+exp2) mAS Elbow Flexor Muscle Tone (-) Wrist Flexor Muscle Tone (-) Jebsen Taylor Hand Function Test (-) E1 vs E2: Hand Grip Strength (-) mAS Elbow Flexor Muscle Tone (-) Wrist Flexor Muscle Tone (-) Jebsen Taylor Hand Function Test (-)
Bao et al. (2018) RCT Crossover (8) NStart=11 NEnd=11 TPS=Chronic A1 vs A2 vs 0	E1: Cathodal High Definition tDCS E2: ANodal High Definition tDCS C: Sham tDCS Duration: 10min single session, 1 wk washout period	E1/E2 vs C: Other EMG parameters EEG parameters
McCambridge et al. (2018) RCT Crossover (4) NStart=10 NEnd=10 TPS=Chronic A1 vs A2 vs 0	E1: ANodal tDCS E2: Cathodal tDCS C: Sham Stimulation Duration: 10min single session/condition, ~24hr washout	E1 vs E2 vs C: Circle Drawing Task (-) EMG data contralateral and ipsilateral MEPs MRI
Marquez et al. (2017) RCT Crossover (8) NStart=25 NEnd=25 TPS=Chronic A1 vs A2 vs 0	E1: Anodal tDCS E2: Cathodal tDCS C: Sham tDCS Duration: 20min/session , 2wk whashout	E1/E2 vs C: JTHFT (-) Grip strength (-) pinch strength (-)
DelFelice et al. (2016) RCT Crossover (6) NStart=10 NEnd=10 TPS=Chronic A1 vs A2 vs 0	E1: Cathodal tDCS E2: dual tDCS C: Sham tDCS Duration: 20min/d, 5d/wk for 3wk	E1/E2 vs C: mAS (+exp) BFFS (-) ESS (-) ARAT (-) MRCS (-) BI (-) Hamilton Depression Scale postural assessment scale motor nerve conduction CMAP latency CMAP amplitude H wave latency H wave amplitude

		silent period healthy hemisphere
Sik et al. (2015) RCT (7) NStart=36 NEnd=31 TPS=Chronic A1 vs A2 vs 0	E1: Anodal tDCS + PT + OT E2: Dual tDCS + PT + OT C: Sham tDCS + PT + OT Duration: Not Reported	E1/E2 vs C: Wolf Motor Function Test (+exp1, +exp2) Jebsen Taylor Hand Function Test (+exp, +exp2) Kocaeli Functional Evaluation Test (+exp2) E1 vs E2: Wolf Motor Function Test (-) Jebsen Taylor Hand Function Test (-) Kocaeli Functional Evaluation Test (-)
Au-Yeung et al. (2014a) RCT Crossover (9) NStart=10 NEnd=10 TPS=Chronic A1 vs A2 vs 0	E1: Anodal tDCS E2: Cathodal tDCS C: Sham tDCS Duration: 1mA, single 20min session each	E1/E2 vs C: Purdue Pegboard Test (-) Pinch Strength (-) Stroop test Perceived fatigue scale
Fusco et al. (2013) RCT Crossover (5) NStart=9 NEnd=9 TPS=Acute A1 vs A2 vs 0	E1: Dual tDCS; E2: Anodal tDCS; E3: Cathodal tDCS C: Sham Duration: 15min/d for 2d	E1/E2/E3 vs C: Nine Hole Peg Test (+exp, +exp2, +exp3) Grasp Force (-) pinch force Quebec user evaluation scale
Khedr et al. (2013) Pilot RCT (9) NStart=40 NEnd=40 TPS=Acute A1 vs A2 vs 0	E1: Anodal tDCS E2: Cathodal tDCS C: Sham Duration: 25min/d for 6d	E1/E2 vs C: NIHSS (-) Orgogozo MCA scale (+exp) BI (+exp) MRCA; -shoulder abduction (+exp) foot dorsiflexion (+exp) hip flexion (+exp) hand grip strength (-) Active motor threshold (+exp) Resting motor threshold (+exp)
Stagg et al. (2012) RCT Crossover (4) NStart=17 NEnd=17 TPS=Chronic A1 vs A2 vs 0	E1: Anodal tDCS; E2: Cathodal tDCS C: Sham tDCS Duration: 80min/d, 3d/wk for 4wk	E1/E2 vs C: Grip strength (-) E1 vs E2: Grip strength (-) fMRI activation patterns task reaction time.
Mahmoudi et al. (2011) RCT Crossover (6) NStart=10 NEnd=10 TPS=Not Reported A1 vs A2 vs 0	E1: Bilateral tDCS E2: Anodal tDCS E3: Cathodal tDCS E4: Extra-Cephalic tDCS C: Sham tDCS Duration: 20min single session, 96hr washout period	E1/E2/E3/E4 vs C: Jebsen Taylor Hand Function Test (No stats)
Kim et al. (2010) RCT (7) NStart=20 NEnd=18 TPS=Subacute A1 vs A2 vs 0	E1: Anodal tDCS E2: Cathodal tDCS C: Sham tDCS Duration: 20min/d tDCS + occupational therapy & 10min/d occupational therapy, 5d/wk, 2wks	E1/E2 vs C: Fugl-Meyer Assessment (-) MBI (-)

Boggio et al. (2007) RCT Crossover (5) NStart=4 NEnd=4 TPS=Chronic A1 vs A2 vs 0	E1: Anodal tDCS; E2: Cathodal tDCS C: Sham Duration: 20min, 1x/wk for 4wk	E1/E2 vs C: Jebsen-Taylor Hand Function Test (+exp, +exp2) E1 vs E2: Jebsen-Taylor Hand Function Test (-)
Fregni et al. (2005) RCT Crossover (7) NStart=6 NEnd=6 TPS=Chronic A1 vs A2 vs 0	E1: Anodal tDCS; E2: Cathodal tDCS C: Sham (30s) Duration: 20min, one session	E1/E2 vs C: Jebsen Taylor Hand Function Test (+exp, +exp2) E1 vs E2: Jebsen Taylor Hand Function Test (-) VAS-attention VAS-fatigue
Anodal tDCS compared to sham		
Cordes D. et al. (2024) RCT (9) NStart=119 NEnd=94 TPS=Acute A vs 0	E: Anodal tDCS + conventional therapy C: Placebo tDCS + conventional therapy Duration: E: 20min/d tDCS or 40s sham + 45min/d therapy, 5d/wk, 2wks	E vs C: FMA - UE (-) ARAT (-) 9HPT (-) BBT (-) MRC (-) Pinch force (-) Grip force (-) Ashworth scale (-) SIS total (-) communication (+exp) PHQ-9 (-) NIHSS (-) Barthel index (-) Medical research council (-) frey somatosensory (-)
Midha & Arumugam (2024) RCT (9) NStart=14 NEnd=14 TPS=Not Reported A vs 0	E: Multichannel anodal tDCS + conventional rehabilitation C: Sham M-tDCS + conventional rehabilitation Duration: 20min/d, 5d/wk, 4wks	E vs C: FMA (-) MoCA (-) 9HPT (-) SSQOL (-) Grip Strength (-) Pinch strength (-)
Vimolratana et al. (2024) RCT (8) NStart=34 NEnd=34 TPS=Acute A vs 0	E: Anodal tDCS + conventional therapy C: Sham tDCS + Conventional rehabilitation Duration: 50-60 mins/d (20 mins of tDCS/sham tDCS and 30-40 mins of conventional physical therapy), 5ds/wk, 1wk	E vs C: FMA-UE (-) FMA-LE (-) WMFT pencil (-) can (-) Quantatative EEG alpha bands (-) beta bands (-)
Zeng et al. (2024) RCT (8) NStart=69 NEnd=64 TPS=Acute A1 vs A2 vs 0	E1: HD-tDCS + Conventional therapy E2: a-tDCS + Conventional therapy C: Sham tDCS + Conventional therapy Duration: 150 Mins/d (130 mins/d of conventional therapy, 20 mins/d of tDCS/sham tDCS), 5ds/wk, 4wks	E1/E2 vs C: ARAT (-) FMA-UE (+exp1/2) Modified Ashworth Scale (+exp1/2) mBI (+exp1) E1 vs E2:

		ARAT (-) FMA-UE (-) Modified Ashworth Scale (-) mBI (-)
Salazar et al. (2024) Pilot RCT (7) NStart=20 NEnd=20 TPS=Chronic A vs 0	E: Anodal tDCS C: Sham tDCS Duration: E: 10 mins (1 session); C: 1 min (1 session)	E vs C: FMA-UE (no stat) 9HPT (no stat) Finger Sequencing Task (-) Functional Connectivity Left supplementary motor area (+exp) Left inferior frontal gyrus (+exp) Left temporo-occipital cortex (+exp) Left dorsal attention network; -Cost (+exp) -global efficiency (+exp) -Degree Centrality (+exp) betweenness centrality (+exp)
Gong Q. et al. (2023) RCT (7) NStart=77 NEnd=72 TPS=Subacute A vs 0	E: Anodal cerebellar transcranial direct current stimulation (tDCS) + Conventional therapy C: Sham tDCS + Conventional Therapy Duration: 140min/d (20 mins of tDCS/sham tDCS + 120 mins of standard physiotherapy), 5d/wk, 4wks	E vs C: FMA-UE (+exp)
Klomjai et al. (2022b) RCT Crossover (3) NStart=21 NEnd=16 TPS=Not Reported A vs 0	E: active anodoal tDCS + regular rehab training C: sham tDCS + regular rehab training Duration: 40min/session (20min tDCS, 20min measurement); one session/condition - 1wk washout	E vs C: Reciprocal Inhibition contralateral (no stat) ipsilateral (no stat)
de Souza et al. (2021) RCT (10) NStart=26 NEnd=26 TPS=Chronic A vs 0	E: anodal tDCS + physiotherapy C: Sham tDCS + physiotherapy Duration: 40min/d, 5d/wk, 2wks	E vs C: VAS (-) Grip strength (-) ROM (-) FMA-UE (no stat) DASH (no stat) SPADI (no stat) SSQOL (no stat)
Bornheim et al. (2020) RCT (9) NStart=50 NEnd=46 TPS=Acute A vs 0	E: Anodal tDCS (2mA) + Conventional rehabilitation C: Sham tDCS + Conventional rehabilitation Duration: 20min/d, 5d/wk, for 4wks	E vs C: WMFT (+exp) Barthel Index (+exp) Hospital anxiety and Depression Scale (+exp) SIS (+exp) Semmes Weinstein monofilament test (-) FMA-UE (+exp) FMA-LE (+exp) FMA sensitivity (-)
Achacheluee et al. (2018) RCT Crossover (5) NStart=15 NEnd=15 TPS=Chronic A1 vs A2 vs 0	E1: Anodal tDCS at M1 and DLPFC E2: Anodal tDCS at M1 only C: Sham Duration: 20min/session, 1 session	E1 vs C: Reaction time (+exp1) Nine-Hole Peg Test (+exp1) Fugl-Meyer assessment of Upper Extremity (-) E2 vs C:

		Reaction time (-) Nine-Hole Peg Test (-) Fugl-Meyer assessment of Upper Extremity (-) E1 vs E2: Reaction time (-) Nine-Hole Peg Test (+exp1) Fugl-Meyer assessment of Upper Extremity (-)
Mortensen et al. (2016) RCT (7) NStart=16 NEnd=15 TPS=Chronic A vs 0	E: anodal tDCS+ occupational therapy C: Sham tDCS + occupational therapy Duration: 30min/d,5d	E vs C: Grip Strength (+exp) SIS (-) JTHFT (-)
Fusco et al. (2014b) RCT Crossover (7) NStart=18 NEnd=16 TPS=Subacute A vs 0	E: Anodal tDCS + rehabilitative session C: Sham tDCS + rehabilitative session Duration: 15mind/d for 1d tDCS (or sham); 1h/d for 1d rehabilitative session	E vs C: Grip and pinch force dynamometer (-) 9HPT (+exp) VAS pain fatigue
Kasashima et al. (2012) RCT Crossover (4) NStart=6 NEnd=6 TPS=Chronic A vs 0	E: anodal tDCS C: sham stimulation Duration: 10 min/day	E vs C: Measurement of event-related desynchronization (-) EEG power spectrum (-)
Kim et al. (2009) RCT Crossover (7) NStart=10 NEnd=10 TPS=Subacute A vs 0	E: Anodal tDCS C: Sham Stimulation Duration: 20min/d, 2d -24hr washout	E vs C: BBT (+exp) Finger acceleration measurement-index (+exp)
Different approaches to dual tdcs compared against one another		
Oveisgharan et al. (2018) RCT (8) NStart=20 NEnd=20 TPS=Acute A1 vs A2	E: Dual tDCS - on primary motor cortex (M1) (2.0mA/30min) and left dorsolateral prefrontal cortex (DLPFC) (2.0mA/30min) C: tDCS on M1 (2.0mA/30min) and sham tDCS on DLPFC (2.0mA/10s) Duration: 30min/d, 5d/wk, 2wks	E vs C: Fugl-Meyer Assessment Upper Extremity (+exp) Action Research Arm Test (+exp)
Dual tDCS compared to sham		
Balikshahi N. et al. (2024) RCT (9) NStart=52 NEnd=52 TPS=Acute A vs 0	E: Bilateral tDCS + Conventional rehabilitation C: Sham tDCS + Conventional rehabilitation Duration: 50min/d, 5d/wk, 2wks	E vs C: NIHSS (+exp) MRCS (-)
Zhang et al. (2024a) RCT Crossover (7) NStart=26 NEnd=20	E: Bilateral tDCS C: Sham tDCS Duration: 30min/d, 3d, 12mon washout	E vs C: FMA UE (+exp) Wrist (+exp)

TPS=Chronic A vs 0		Hand (-) mAS (-) MRCS (-) MMSE (-) Geriatric Depression Scale (-) VAS Pain (-) Fatigue (-)
Pinto et al. (2021) RCT (7) NStart=60 NEnd=53 TPS=Subacute A vs 0	E: Bilateral tDCS + Conventional Rehab C: Sham tDCS + Conventional Rehab Duration: 30min, 2x/d, 6d/wk, for 2wk	E vs C: E: FMA; UE (-) LE (-) JTHFT (-) BI (-) Hamilton Anxiety Scale (HAM-A) (-) Hamilton Depression Scale (HAM-D) (-) Scandinavian Stroke Scale (SSS) (+exp) Digit Span-Backward (DS-B) (-) Spatial Span Backwards (SS-B) (+exp) Serial substraction Test (SST) (-) Category Fluency Test (CFT), Complex Passage Test (CPT), late recall (+exp) Complex Figure Test (CoFT) (-) Paired Word Associated Learning Test (PWAL) (-) Tower of London (ToL), initiation time (-) execution time (-) correct score (-) move score (-) errors (+exp)
Bolognini et al. (2020) RCT (9) NStart=32 NEnd=21 TPS=Acute A vs 0	E: Dual tDCS C: Sham tDCS Duration: 15min, 2x/d, for 5d	E vs C: Hand Grip Strength (-) Motricity Index (+exp) Barthel Index (-) National Institutes of Health Stroke Scale (-)
Kuo et al. (2020) RCT Crossover (5) NStart=21 NEnd=18 TPS=Acute A1 vs A2 vs 0	E1: RealDual tDCS (using TMS for the record of the results) E2: Real tDCS (using Magnetoencephalography for the record of the results) C1: Sham tDCS (using TMS for the record of the results) C2: Sham tDCS (using Magnetoencephalography for the record of the results) Duration: 20min of tDCS, 40min of TMS, 40min of MEG- 72hr washout	E1 vs E2 vs C1 vs C2: Fugl-Meyer Assessment- Upper Extremity (+exp1, +exp2) Action Research Arm Test (+exp1,+exp2) resting motor treshold (+exp1/2) motor evoked potential (+exp1/2)
Koh et al. (2017) RCT (9) NStart=25 NEnd=24 TPS=Chronic A vs 0	E: Dual tDCS with Sensory Modulation + upper limb training C: Sham tDCS + upper limb training Duration: 30min/d, 3d/wk, 8wks	E vs C: FMA (-) Mod Ashworth scale (-) ARAT (-) BI (-)

van der Vliet et al. (2017) RCT (7) NStart=81 NEnd=80 TPS=Chronic A1 vs A2 vs 0	E1: Short lasting bilateral tDCS online (during motor training) E2: Long lasting bilateral tDCS offline (incongruent with motor training) E3: Short lasting tDCS offline (incongruent with motor training) C: Sham Duration: 30sec/2x bihemispheric 1mA tDCS sham, 20 minutes bihemispheric 1mA tDCS at t=0 and 30 seconds bihemispheric 1mA tDCS at t=35.5 (short-lasting tDCS), and 10 minutes bihemispheric 1mA tDCS at t=0 and t=35.5 minutes (long-lasting tDCS).	E1 vs C: Maximum grip force (-) Motor Skill (-) Purdue Pegboard Test (-) E1 vs E2 vs E3: Maximum grip force (-) Motor Skill (-) Purdue Pegboard test (-)
Goodwill et al. (2016) Pilot RCT (7) NStart=16 NEnd=15 TPS=Chronic A vs 0	E: Bihemispheric tDCS + rehab C: Sham tDCS + rehab Duration: 9x40min; 3session/wk, 3wks	E vs C: Motor assessment scale (+exp) grip strength (-) modified Tardieu scale (-) MEP amplitude; -paretic (+exp); -nonparetic (-); short-interval intracortical inhibition (-); [cortical silent period; -paretic (-); -nonparetic (+exp) ; Laterality index (-)
Lefebvre et al. (2014) RCT Crossover (9) NStart=19 NEnd=19 TPS=Chronic A vs 0	E: Dual tDCS C: Sham dual tDCS Duration: 20min/session dual TDCS or sham dual tDCS; atleast 1 wk washout	E vs C: Purdue pegboard test (+exp) Precision grip force (+exp)
Lindenberg et al. (2010) RCT (6) NStart=20 NEnd=20 TPS=Chronic A vs 0	E: Dual tDCS C: Sham tDCS Duration: 30min/d, 5d/wk for 3wk	E vs C: Fugl-Meyer Assessment (+exp) Wolf Motor Function Test (+exp) fMRI
Anodal tDCS combined with other interventions compared to robotics or sham		
Mazzoleni et al. (2019) RCT (5) NStart=40 NEnd=39 TPS=Acute A + B vs A/B *Also in Table 16 (Robotics)*	E: Robot assisted therapy (InMotion WRIST Robot) + Anodal tDCS C: Robot assisted therapy + sham tDCS Duration: 30min, 5x/wk for 6wks	E vs C: Fugl-Meyers Assessment Wrist: (-) Shoulder/Elbow: (-) Upper Extremity: (-) Modified Ashworth Scale - Wrist (-) Motricity Index: (-) Box and Block Test: (-) Kinematic parameters (-)
TDCS combined with other interventions compared to sham or robotic orthosis		
Hesse et al. (2011b) RCT (8) NStart=96 NEnd=85 TPS=Acute A + B1 vs A + B2 vs A *Also in Table 16 (Robotics)*	E1: Anodal tDCS + Robot-Assisted Arm Training E2: Cathodal tDCS + Robot-Assisted Arm Training C: Sham stimulation + Robot-Asssited Arm Training Duration: 20min/d, 5d/wk for 6wk	E1/E2 vs C: FMA (-) BBT (-) Barthel Index (-) Medical research council (-) modified Ashworth scale (-)

Dual tDCS combined with other interventions compared to control		
Hathaiareerug & Vearasilp (2019) RCT (7) NStart=18 NEnd=17 TPS=Subacute A vs B *Also in Table 45 (Electroacupuncture and Transcutaneous Electrical Acupoint Stimulation)*	E1: Dual tDCS E2: Electroacupuncture Duration: 20min, 1x/wk, 3wks	E1 vs E2: Fugl-Meyer Assessment (-) Purdue Pegboard Test (-) Grip Strength (-)
Cathodal tDCS combined with other interventions compared to sham or virtual reality training		
Yao et al. (2020) RCT (7) NStart=42 NEnd=40 TPS=Subacute A + B vs A/B *Also in Table 17 (Virtual Reality)*	E: Cathodal tDCS + VR C: Sham tDCS + VR Duration: 20min tDCS/sham + VR 5d/wk, for 2wks	E vs C: Fugl Meyer Assessment Upper Extremity (+exp) Action Research Arm Test (+exp) Barthel Index (+exp)
Anodal tDCS combined with other interventions compared to sham or task-specific training		
Pavlova et al. (2017) RCT (7) NStart=11 NEnd=11 TPS=Chronic A + B vs A/B *Also in Table 4 (Task-Specific Training)*	E: Anodal tDCS with visuomotor gripforce tracking task C: Sham tDCS with visuomotor gripforce tracking task Duration: 20min (2x/d), 5d/wk for 4wk	E vs C: FMA (-) WMFT function ability scale (-) BBT (-) Grip MVC Grip Tracking Task
Cathodal tDCS compared to sham		
Takahashi et al. (2024) Pilot RCT (8) NStart=30 NEnd=24 TPS=Subacute A vs 0	E: Cathodal tDCS + Conventional therapy C: Sham tCDS + Conventional Therapy Duration: tDCS group (60 mins/session (20 mins of cathodal tDCS and 40 mins of conventional therapy), 3 sessions/wk, 2wks); Sham group (40 minutes and 30 seconds (30 seconds of sham tDCS and 40 mins of conventional therapy), 3 sessions/wk, 2wks)	E vs C: FMA-UE (-) rs-fMRI; -M1AH-M1UH (-) M1AH-PMUH (-)
Boasquevisque et al. (2021) Pilot RCT (10) NStart=30 NEnd=24 TPS=Subacute A vs 0	E: Cathodal tDCS C: Sham tDCS Duration: Active stimulation: 20 min/d , 3d/wk, 2wks; followed by 30 min exercise	E vs C: NIHSS (+con) FMA-UE (+con) mRS (-) BI (+con) Modified Ashworth Scale (-) MAL (-) MoCA (+con) Pittsburgh Sleep Quality Index (-) SIS (-)
Alisar et al. (2020) RCT (6) NStart=38 NEnd=32 TPS=Chronic A vs 0	E: Cathodal tDCS C: Sham tDCS Duration: 30min 5X/wk for 4wks	E vs C: Fugl-Meyer Assessment UE (-) Functional Independence Measure (+exp) Brunnstrom Stages of Stroke Recovery (-)

Rabadi et al. (2017) Pilot RCT (9) NStart=16 NEnd=16 TPS=Acute A vs 0	E: Cathodal Transcranial Direct Current Stimulation + Occupational therapy C: Sham transcranial direct current stimulation + Occupational therapy Duration: 3hr/d Standard OT, 30 min/d, 5 d/wk, 2 wks c-tDCS/s-tDCS	E vs C: Action Research Arm Test (-) FIM (-) ADL (-)
Fusco et al. (2014a) RCT (6) NStart=14 NEnd=11 TPS=Acute A vs 0	E: Cathodal tDCS + rehab C: Sham tDCS + rehab Duration: 10min cathodal or sham tDCS + 45min rehab/session, 2x/d, 10d/wk, 2wks	E vs C: Canadian Neurological Scale (-) BI (-) 9HPT (-) FMA-UE pinch/grasp force dyaNometer (-) Rivermead mobility index (-) 6min walking test (-) 10 meter walking test (-) Timed up and go test (-) Functional Ambulation Category
Wu et al. (2013c) RCT (9) NStart=90 NEnd=90 TPS=Subacute A vs 0	E: Cathodal tDCS C: Sham tDCS Duration: 20min/d, 5d/wk, 4wk	E vs C: Modified ashworth scale (+exp) Barthel Index (+exp) Fugl-Meyer Assessment (+exp)
Nair et al. (2011) RCT (6) NStart=14 NEnd=14 TPS=Chronic A vs 0	E: Cathodal tDCS C: Sham Duration: 30min, 5d +60min therapy	E vs C: Fugl-Meyer Assessment Upper Extremity (+exp) Three Joint Range of Motion (+exp) fMRI parameters
Anodal tDCS combined with other interventions compared to tdcs or robotics		
Ochi et al. (2013) RCT Crossover (6) NStart=18 NEnd=18 TPS=Chronic A + B1 vs A + B2 *Also in Table 16 (Robotics)*	E: Anodal tDCS on affected hemisphere + robot assisted arm training C: Cathodal tDCS on unaffected hemisphere + robot assisted arm training Duration: 45min/d, for 5d	E vs C: Modified Ashworth Scale (+exp) Fugl-Meyer Assessment (-) Motor Activity Log (-)
Dual tDCS combined with other interventions compared to brain-computer interface or sham or mental practice		
Ang et al. (2015a) RCT (7) NStart=19 NEnd=19 TPS=Chronic A + B + C vs A/A + B *Also in Table 18 (Brain Computer Interfaces); Table 11 (Mental Practice)*	E: Bilateral tDCS + motor imagery brain-computer interface C: Sham tDCS + motor imagery brain-computer interface Duration: 80min/d, 5d/wk for 4wk	E vs C: Fugl-Meyer Assessment Upper Extremity (-) EEG laterality coefficient (ERD) Resting Motor Threshold Ipsilesional M1 (+exp) Contralesional M1 (-) Neurophysiological Outcomes Short Intra-cortical inhibition and Short Intra-cortical Facilitation in Contralesional M1 (-) Cerebral blood flow (+exp1)

Dual tDCS combined with other interventions compared to sham or motor relearning programmes		
Lefebvre et al. (2015) RCT Crossover (5) NStart=19 NEnd=19 TPS=Chronic A + B vs A/B *Also in Table 1 (Neurodevelopmental Techniques)*	E: Dual tDCS + motor skill learning C: Sham dual tDCS + motor skill learning Duration: 30min for one session dual-tDCS or sham	E vs C: Purdue pegboard test (+exp) fMRI measures
Lefebvre et al. (2013) RCT Crossover (6) NStart=18 NEnd=18 TPS=Chronic A + B vs A/B *Also in Table 1 (Neurodevelopmental Techniques)*	E: Dual tDCS + motor learning training C: Sham dual tDCS + motor learning training Duration: 30min/d for one session for each intervention	E vs C: Purdue pegboard test (+exp) Maximal hand grip force (-) motor skill learning index, motor performance index
Dual tDCS combined with other interventions compared to sham or task-specific training		
Hsu et al. (2023) RCT (8) NStart=27 NEnd=27 TPS=Acute A + B vs A/B *Also in Table 4 (Task-Specific Training)*	E: Bilateral tDCS + TST C: Sham tDCS + TST Duration: 3.3hrs(3hrs conventional rehab + 20min tDCS)	E vs C: FMA-UE (+exp) ARAT (-) FMA-LE (-)
Doost et al. (2019) RCT Crossover (7) NStart=21 NEnd=21 TPS=Chronic A + B vs A/B *Also in Table 4 (Task-Specific Training)*	E: Dual-tDCS + CIRCUIT (bimanual co-op task) C: Sham dual-tDCS + CIRCUIT Duration: 30min session; 2-week washout	E vs C: Bimanual speed/accurace (Bi-SAT) (-) Bimanual coordination factor (Bi-CO) (-)
Anodal tDCS combined with other interventions compared to sham		
Huang et al. (2022b) Pilot RCT (8) NStart=24 NEnd=24 TPS=Chronic A + B vs 0 *Also in Table 30 (Theta Burst Stimulation (TBS))*	E: Active HD-tDCS-eTBS (high definition transcranial electrical theta burst superimposing direct current stimulation) + UE rehab C: sham + UE rehab Duration: 50min/d (20min active/sham, 30min UE rehab), 3d/wk, 4wks	E vs C: FMA-UE (-) WMFT (-) JTHFT (-) FNT (-) MAS; shoulder add (+exp) elbow ext (+exp) thumb flex (+exp) elbow flex (-) wrist flex (-) finger flex (-)
Chen et al. (2021f) Pilot RCT (7) NStart=24 NEnd=24 TPS=Chronic A + B vs A/B *Also in Table 30 (Theta Burst Stimulation (TBS))*	E: real anodal tDCS + iTBS output during conventional rehabilitation C: sham tDCS + iTBS output during conventional rehabilitation Duration: 1hr, 3d/wk, 6wks conventional rehabilitationwith a 20-min stimulation simultaneously applied during rehabilitation.	E vs C: FMA-UE (-) JTHFT (+exp) Finger to nose test (+exp)

Menezes et al. (2018) RCT Crossover (8) NStart=22 NEnd=20 TPS=Chronic A + B vs A vs B vs 0 *Also in Table 27 (Additional Afferent and Peripheral Stimulation Methods)*	E1: Active repetitive peripheral nerve sensory stimulation (RPPS) + sham tDCS E2: Sham RRPS + Anodal tDCS E3: Active RRPS + active tDCS C: Sham RRPS + sham tDCS Duration: 1 (2hrs RPPS, 20min tDCS) /session, 10-15d washout	E1 vs C: Active Wrist Range of Motion (Flexion, Extension): (-) Grip and Pinch Strength: (-) E2 vs C: Active Wrist Range of Motion (Flexion, Extension): (-) Grip and Pinch Strength (-) E3 vs C: Active Wrist Range of Motion (Flexion, Extension): (-) Grip and Pinch Strength: (-) E1 vs E2 vs E3: Active Wrist Range of Motion (Flexion, Extension): (-) Grip and Pinch Strength: (-)
Anodal tDCS compared to sham or conventional therapy		
Ilić et al. (2016) RCT (8) NStart=26 NEnd=25 TPS=Chronic A vs 0	E: Anodal tDCS + occupational therapy C: Sham + occupational therapy Duration: 45min/d occupational therapy & 20min/d tDCS or sham, 5d/wk, 2wk	E vs C: JTHFT (+exp) FMA (-) Grip strength (-)
Anodal tDCS combined with other interventions compared to graded repetitive arm supplementary program or sham		
Allman et al. (2016) RCT (8) NStart=26 NEnd=24 TPS=Chronic A + B vs A/B *Also in Table 3 (Exercise and Strength Training)*	E: Anodal tDCS + GRASP C: Sham tDCS + GRASP Duration: tDCS: 1mA, 20min/d, 9d; GRASP: 1hr/d, 9d	E vs C: Action Research Arm Test (no stats) Wolf Motor Function Test (no stats) Fugl-Meyer Upper Extremity Score (no stats)
Dual tDCS combined with other interventions compared to sham or fes		
Salazar et al. (2020) RCT (9) NStart=30 NEnd=30 TPS=Chronic A + B vs A/B *Also in Table 22 (Neuromuscular Electrical Stimulation (NMES))*	E: Dual tDCS + FES C: Sham tDCS + FES Duration: Not Reported	E vs C: Kinematics Task Movement Time (Reaching) (+exp) Mean Reaching Velocity (+exp) Mean Return Velocity (-) Peak Velocity (-) Smoothness (-) Elbow Range of Motion (-) Trunk forward inclination (-) Grip Strength (+exp) Fugl-Meyers Upper Limb (-)
Shaheiwola et al. (2018) RCT (7) NStart=30 NEnd=30 TPS=Chronic A + B vs A/B *Also in Table 22 (Neuromuscular Electrical Stimulation (NMES))*	E: Bilateral active tDCS+FES C: sham tDCS+FES Duration: 20min tDCS + 1hr FES, 5d/wk, 4wk	E vs C: Fugl-Meyer scale (+exp) Wolf motor function test functional ability score (+exp) task time (+exp) Modified Ashworth scale (-) Surface electromyography evaluation (-)

		and the transcranial magnetic stimulation (+exp)
Anodal tDCS combined with other interventions compared to conventional therapy		
Llorens et al. (2021) RCT (7) NStart=32 NEnd=29 TPS=Chronic A + B vs 0 *Also in Table 17 (Virtual Reality)*	E: Anodal tDCS + VR-based therapy + conventional PT C: conventional physiotherapy Duration: 60min/d,3-5d/wk,(25 days)	E vs C: FMA-UL (+exp) Wolf motor function test (+exp) Nottingham sensory assessment (+exp)
TDCS combined with other interventions compared to task-specific training		
Adeagbo et al. (2021) RCT (4) NStart=99 NEnd=78 TPS=Chronic A + B1 vs A + B2 vs A *Also in Table 4 (Task-Specific Training)*	E1: Anodal tDCS + Repetitive Functional Task-Oriented Programme (RFTOP) E2: Cathodal tDCS + RFTTOP C: Repetitive Functional Task Oriented Programme Duration: 20min tDCS + 60min RFTOP, 2d/wk, 6wks	E1/E2 vs C: E1 vs E2/C: FMA Hand (+exp1) Wrist (-) Upper Extremity (-) Coordination (-) Motor function (-) BBT (+exp1)
TDCS combined with other interventions compared to motor relearning programmes or sham		
Taud et al. (2021) RCT (9) NStart=40 NEnd=40 TPS=Chronic A + B1 vs A + B2 vs A *Also in Table 1 (Neurodevelopmental Techniques)*	E1: Visuo-Motor Grip Force Tracking Task Training of the paretic hand + Anodal Unilateral tDCS E2: Visuo-Motor Grip Force Tracking Task Training of the paretic hand+ Bilateral tDCS C: Visuo-Motor Grip Force Tracking Task Training of the paretic hand + Placebo tDCS Duration: 23min/d, 5d, with 60s rest period	E1/E2 vs C: FMA-UE (+exp1) WMFT (-) E1 vs E2: FMA-UE (-) WMFT (-)
Anodal tDCS combined with other interventions compared to sham or mental practice or task-specific training		
Kashoo et al. (2022) RCT (8) NStart=64 NEnd=64 TPS=Chronic A + B + C vs A/A + B *Also in Table 11 (Mental Practice); Table 4 (Task-Specific Training)*	E: anodal tDCS + motor imagery (MI) + upper-limb functional training C: sham tCDS + motor imagery (MI) + upper-limb functional training Duration: 30min/d, 5d/wk, 2wks (10 sessions)	E vs C: FMA (+exp) ARAT (+exp)
Anodal tDCS combined with other interventions compared to sham or virtual reality training		
Lee & Cha (2022) RCT (9) NStart=20 NEnd=20 TPS=Subacute A + B vs X *Also in Table 17 (Virtual Reality)*	E: Anodal tDCS + Virtual Reality C: sham tDCS + Virtual Reality Duration: 20min/d, 5d/wk, 4wks	E vs C: BBT (+exp) JTHFT (-) ST (+exp) TMT (-)
Dual tDCS combined with other interventions compared to conventional therapy		
Tedla et al. (2022) RCT (9) NStart=54	E1: Bilateral tDCS + trunk restraint/training + Conventional physical therapy	E1/E2 vs C: FMA (+exp1/2) WMFT

NEnd=54 TPS=Subacute A + B vs A/B vs 0 *Also in Table 7 (Trunk Restraint)*	E2: Sham tDCS + trunk restraint/training + Conventional physical therapy C: Conventional physical therapy Duration: 90min/d, 4d/wk, 6 wks	time (+exp1/2) function (+exp1/2) TIS (+exp1/2) 10MWT (-) Stroke Specific Quality of Life (+exp1/2) E1 vs E2: FMA (+exp1) WMFT time (+exp1) function (+exp1) TIS (+exp1) 10MWT (-) Stroke Specific Quality of Life (+exp1)
Dual tDCS combined with other interventions compared to sham		
Wei et al. (2022) RCT (8) NStart=26 NEnd=25 TPS=Chronic A + B vs A/B vs 0 *Also in Table 22 (Neuromuscular Electrical Stimulation (NMES))*	E1: Bilateral tDCS + NMES + coventional care E2: tDCS + sham NMES + conventional care C: Sham tDCS and sham NMES + conventional care Duration: 30 min/d, 5d/wk, 3 wks stimulation + 2-3d/wk conventional rehabilitation	E1/E2 vs C: FMA-UE (-) ARAT (-) Modified ashworth scale (-) Barthel Index (-)
Anodal tDCS combined with other interventions compared to sham or exercise and custom physiotherapy protocols		
Palimeris et al. (2022) RCT (6) NStart=98 NEnd=90 TPS=Chronic A + B vs A/B *Also in Table 3 (Exercise and Strength Training)*	E: anodal tDCS + Upper extremity strength training C: Sham tDCS + Upper extremity strength training Duration: 80min/d(60m training, 20m tDCS), 3d/wk, 4wks	E vs C: FMA (-) Grip strength (-) Box and block (-) MAL (-) AROM shoulder (+exp) Wrist and elbow (-) PROM (-)
Dual tDCS combined with other interventions compared to sham or exercise and custom physiotherapy protocols		
Youssef et al. (2023) RCT (8) NStart=35 NEnd=35 TPS=Subacute A + B1 vs A + B2 vs A *Also in Table 3 (Exercise and Strength Training)*	E1: Bihemispheric tDCS + Custum physiotherapy protocol E2: Unihemispheric tDCS + Custum physiotherapy protocol C: Sham tDCS + Custom physiotherapy protocol Duration: 65min/d (20 minutes tDCS/Sham tDCS; 45 minutes of custom physiotherapy protocol); 3 d/wk, 4wks	E1 vs C: FMA-UE (+exp1) FMA-LE (+exp1) Modified Ashworth Scale elbow flexors (+exp1) wrist flexors (+exp1) knee flexors (-) plantar flexors (-) Berg Balance Scale (+exp1) Serum bdnf levels (+exp2) E2 vs C: FMA-UE (+exp2) FMA-LE (+exp2) Modified Ashworth Scale elbow flexors (+exp2) wrist flexors (+exp2) knee flexors (-) plantar flexors (-) Berg Balance Scale (+exp2)

		Serum bdnf levels (+exp2) E1 vs E2: FMA-UE (-) FMA-LE (-) Modified Ashworth Scale elbow flexors (-) wrist flexors (-) knee flexors (-) plantar flexors (-) Berg Balance Scale (-) Serum bdnf levels (-)
Prathum et al. (2022) RCT (8) NStart=26 NEnd=24 TPS=Chronic A + B vs A/B *Also in Table 3 (Exercise and Strength Training)*	E: Dual tDCS + home exercise program C: Sham tDCS + home exercise program Duration: 80min/d(20min tDCS, 60min home exercise), 3d/wk, 4wks	E vs C: FMA FMA-UE (+exp) FMA-LE (+exp) FMA-Total (+exp) WMFT FAS (+exp) Time (-) FTSST (-) 6MWT (-) TUG (-) Grip strength (-) MST (-)
Dual tDCS combined with other interventions compared to sham or cimt		
Garrido et al. (2023) RCT (9) NStart=70 NEnd=56 TPS=Acute A + B vs A/B *Also in Table 6 (Constraint-Induced Movement Therapy (CIMT))*	E: Bilateral tDCS + mCIMT + conventional rehab C: Sham tDCS + mCIMT + conventional rehab Duration: 8hrs/d(8hrs mCIMT, 20min tDCS overlapped), 7d/wk, 1wk	E vs C: FMA (+exp) WMFT (+exp) FIM (+exp)
Kim et al. (2021) Pilot RCT (7) NStart=30 NEnd=30 TPS=Chronic A + B vs A/B *Also in Table 6 (Constraint-Induced Movement Therapy (CIMT))*	E: Dual tDCS + mCIMT+ conventional rehabilitation C: Sham Dual tDCS + mCIMT + conventional rehabilitation Duration: 20min/d tDCS + 30min/d MCT, 5d/week, 4wks CR:1hr/day, 4wks	E vs C: FMA-UE (-) MAL AOU (+exp) QOL (-) Accelerometer Usage of unaffected side (+exp) Usage of affected side (-)
TDCS compared to sham or conventional therapy		
Pires et al. (2023) RCT (10) NStart=57 NEnd=57 TPS=Chronic A1 vs A2 vs 0	E1: Anodal tDCS + conventional E2: Cathodal tDCS + conventional C: Sham tDCS + conventional rehab Duration: 65min/d(20min tDCS, 45 min rehab), 5d/wk, 2wks	E1 vs E2 vs C: FMA-UE (-)
Anodal tDCS combined with other interventions compared to sham or cimt		
Unger et al. (2023) RCT (7)	E: Anodal tDCS +CIMT C: Sham tDCS + CIMT	E vs C: FMA-UE (-)

NStart=25 NEnd=17 TPS=Chronic A + B vs A/B *Also in Table 6 (Constraint-Induced Movement Therapy (CIMT))*	Duration: 60min/d, 3d/wk, 5wks	Functional Connectivity Findings (no stat)
Dual tDCS combined with other interventions compared to sham or peripheral nerve stimulation		
Yague et al. (2023) RCT (8) NStart=19 NEnd=18 TPS=Acute A + B vs A/B *Also in Table 27 (Additional Afferent and Peripheral Stimulation Methods)*	E: Bihemispheric tDCS + Repetitive Peripheral Nerve Stimulation + Conventional Therapy C: Sham tDCS + Repetitive Peripheral Nerve Stimulation + Conventional Therapy Duration: tDCS and peripheral nerve stimulation (20min/d, 5 days); Conventional therapy for length of stay until minimum 3 months after discharge starting 5 days after stroke	E vs C: FMA-UE (-) Modified Ashworth Scale (-) MEP (-) Hmax/Mmax (-) N20 amp (-) rMT (-) cSP (-) iSP (-)
Dual tDCS combined with other interventions compared to sham or sensorimotor training		
Li et al. (2024c) RCT (6) NStart=52 NEnd=52 TPS=Subacute A + B vs A/B *Also in Table 5 (Sensorimotor Training)*	E: Dual tDCS + Sensorimotor training C: Sham tDCS + Sensorimotor training Duration: 60min/d(40min motor training, 20min tDCS), 5d/wk for 4wks	E vs C: FMA-UE (+exp) ARAT (+exp) BBT (+exp) Erasmus-MC revised Nottingham sensory assessment scale light touch (+exp) proprioception (+exp) stereognosis (+exp) current perception threshold 2K Hz (+exp) 250Hz (+exp) 5Hz (+exp) BI (+exp) HADS (+exp) fNIRS (+exp)
Different approaches to anodal tDCS combined with other interventions compared against one another		
Powell et al. (2016) RCT (8) NStart=11 NEnd=10 TPS=Chronic A + B1 vs A + B2	E1: Anodal tDCS before peripheral nerve stimulation + robot-assisted training E2: tDCS after Peripheral nerve stimulation + robot-assisted training Duration: Not reported	E1 vs E2: Fugl-Meyer Assessment (-) Stroke Impact Scale (-) EMG parameters: motor map volume of ipsilesional hemisphere; center of gravity
tDCS combined with other interventions compared to sham or robotics or EMG biofeedback		
Hu et al. (2024) Pilot RCT (9) NStart=19 NEnd=18 TPS=Chronic A + B + C vs A/A + B *Also in Table 16 (Robotics); Table 19 (EMG Biofeedback)*	E: High-definition tDCS + EMG-driven robotic hand (EMG-RH) C: Sham tDCS + EMG-RH Duration: 20min/d stimulation + 60min/d EMG-RH 1-3d/wk for 20 sessions total	E vs C: FMA-UE (+exp) modified Ashworth Scale finger (+exp) wrist (-) ARAT (-) task-based fMRI (+exp) EEG-EMG assessment (-) EMG assessments (+exp)

Anodal tDCS combined with other interventions compared to sham or mirror therapy		
Liao et al. (2020) Pilot RCT (7) NStart=34 NEnd=28 TPS=Chronic A + B vs A/B *Also in Table 10 (Mirror Therapy)*	E1: Sequential Combination of Anodal tDCS + Mirror Therapy E2: Concurrent Combination of tDCS + Mirror Therapy C: Sham tDCS + Mirror Therapy Duration: 90min/d, 5d/wk, 4wks	E1 vs E2 vs C: Nottingham Extended Activities of Daily Life (+exp1) Fugl-Meyer Assessment- Upper Extremity (-) Kinematic Variables Trunk Reaction Time (-) Index Reaction Time (-) Trunk Movement Time (-) Index Movement Time (-) Trunk Total Displacement (-) 0 Index Total Displacement (-)
Dual tDCS combined with other interventions compared to mirror therapy or sham		
Jin et al. (2019) Pilot RCT (7) NStart=30 NEnd=28 TPS=Chronic A + B1 vs A + B2 vs 0 *Also in Table 10 (Mirror Therapy)*	E1: Bilateral tDCS before mirror therapy E2: tDCS during mirror therapy C: Sham tDCS + mirror therapy Duration: 30min/d, 5d/wk, 2wk	E1 vs E2: ARAT (+exp2) FMA (-) BBT (-) E1 vs C: ARAT (-) FMA (-) BBT (-) E2 vs C: ARAT (+exp2) FMA (-) BBT (-)
Dual tDCS combined with other interventions compared to CIMT		
Takebayashi et al. (2017) Pilot RCT (6) NStart=20 NEnd=19 TPS=Chronic A + B + C vs A/A + B *Also in Table 22 (Neuromuscular Electrical Stimulation (NMES)); Table 6 (Constraint-Induced Movement Therapy (CIMT))*	E: dual-tDCS combined with PNMES + CIMT C: CIMT Duration: 2hr CIMT & 20min tDCS & 10min PNMES , 2x/d, 5d/wk, 2wk	E vs C: Fugl-Meyer Assessment-UE (+exp) Motor Activity Log AOU (+exp) QOM (-)
tDCS combined with other interventions compared to sham or CIMT		
Rocha et al. (2016) Pilot RCT (9) NStart=21 NEnd=21 TPS=Chronic A + B1 vs A + B2 vs A *Also in Table 6 (Constraint-Induced Movement Therapy (CIMT))*	E1: Anodal tDCS + Modified CIMT E2: Cathodal tDCS + Modified CIMT C: Sham tDCS + CIMT Duration: 1hr/d, 3d/wk for 4wks tDCS or sham + intensive training; 6hr/d, 7d/wk for 4wks immobilization of paretic upper limb	E1 vs C: Fugl-Meyer Assessment (+exp) Motor Acivity Log (-) Grip Strength (-) E2 vs C: Fugl-Meyer Assessment (-) Motor Acivity Log (-) Grip Strength (-)
Dual tDCS combined with other interventions compared to tDCS or sham		
Cho & Cha (2015) RCT (5) NStart=30 NEnd=27 TPS=Chronic	E: Dual tDCS + Mirror therapy C: tDCS + Sham mirror Duration: 45min, 3x/wk, for 6wks	E vs C: BBT (+exp) Grip strength (+exp) FMA (-) Jebsen-taylor hand test (-)

A + B vs A/B *Also in Table 10 (Mirror Therapy)*		
Cathodal tDCS compared to conventional therapy		
Lee & Lee (2015) RCT (5) NStart=24 NEnd=24 TPS=Chronic A vs 0	E: Cathodal tDCS + physical therapy C: Physical therapy Duration: 30min/d, 5d/wk for 4wk	E vs C: Fugl-Meyer Assessment (+exp)
Cathodal tDCS combined with other interventions compared to control		
Lee et al. (2014b) Pilot RCT (6) NStart=64 NEnd=59 TPS=Acute A + B vs A/B *Also in Table 17 (Virtual Reality)*	E1: Cathodal tDCS E2: VR: E3: Cathodal tDCS+VR Duration: 30min/d, 5d/wk, 3wks	E3 vs E2/E1: Manual Function Test (+exp3) Fugl-Meyer Assessment (+exp3) Modified Barthel Index (-) Manual Muscle Test (-) Modified Ashworth Scale (-) Box and Block Test (-) E1 vs E2: Manual Function Test (+exp1) Fugl-Meyer Assessment (+exp1) Modified Barthel Index (-) Manual Muscle Test (-) Modified Ashworth Scale (-) Box and Block Test (-)
Dual tDCS combined with other interventions compared to sham or tDCS or central nervous system stimulants		
Wang et al. (2014c) Pilot RCT (5) NStart=9 NEnd=9 TPS=Acute A + B vs A/B *Also in Table 41 (Central Nervous System Stimulants)*	E1: dual tDCS + methylphenidate E2: tDCS + placebo E3: Sham tDCS + methylphenidate Duration: 20min/d, 3d/wk, 4wk	E1 vs E2/E3: Purdue Pegboard Test (+exp1) MEP (-)
Cross-Referenced RCTs: Combined or Comparative Interventions Involving Transcranial Direct Current Stimulation (tDCS) (results included in this table's levels of evidence)		
Bian et al. (2024) RCT (10) NStart=66 NEnd=60 TPS=Acute A + B vs A/B *Primary listing: Table 30 (Theta Burst Stimulation (TBS))*	E1: iTBS + high definition tDCS + routine rehabilitation E2: sham tDCS + iTBS + routine rehabilitation C: Sham iTBS and tDCS + routine rehabilitation Duration: 20min/d tDCS and 192sec/d iTBS 5d/wk for 3wks	E1/E2 vs C: FMA-UE (+exp1) Functional Test for the Hemiplegic Upper Extremity (-) Motricity Index-UE (+exp1) modified Barthel Index (+exp1) modified Ashworth Scale pectoralis major (-) biceps (-) E1 vs E2: FMA-UE (-) Functional Test for the Hemiplegic Upper Extremity (-) Motricity Index-UE (-) modified Barthel Index (-) modified Ashworth Scale pectoralis major (-)

		biceps (-)
Bernal-Jiménez et al. (2024) RCT (7) NStart=20 NEnd=19 TPS=Chronic A + B vs A/B *Primary listing: Table 16 (Robotics)*	E: Bilateral tDCS + Robotic training C: Sham tDCS + Robotic training Duration: 30min/d, 5d/wk for 4wks	E vs C: FMA-UE (-) ARAT (-) FIM (-) Grip strength (-) Tardieu Spasticity Scale (-)
Levin et al. (2023) RCT (8) NStart=52 NEnd=46 TPS=Subacute A + B1 vs A + B2 vs A *Primary listing: Table 4 (Task-Specific Training)*	E1: Personalized reach training (active control-restricted range) + anodal tDCS + Virtual reality games E2: Non personalized (entire range of motion) + anodal tDCS + Virtual reality games C: Personal reach training (active control-restricted range) + Sham tDCS + video games Duration: 80min/d(50min training, 30min tDCS), 5d/wk, 2wks	E1/E2 vs C: Tonic Stretch Reflex Threshold angle by EMG (-) arm kinematics (-) velocity of TSRT (-) Tactile sensation (-) PROM (-) FMA-UE (-) WMFT (-)
Morone et al. (2022) RCT (8) NStart=66 NEnd=66 TPS=Chronic A + B vs A/B *Primary listing: Table 16 (Robotics)*	E: Robot-Assisted Therapy (RAT) + dual tDCS C: Robot-Assisted Therapy (RAT) + sham tDCS Duration: 20min tDCS + 40min robotics/d, 5d/wk, 2wks	E vs C: FMA-UE (-) NIHSS (-) VAS (-) MAS (-) BI (-) MRC (-)
Zhao et al. (2022a) RCT (5) NStart=68 NEnd=60 TPS=Acute A + B vs A/B *Primary listing: Table 16 (Robotics)*	E: Smart hand joint training device + bilateral tDCS C: Smart hand joint training device Duration: 40min(20min hand training, 20min tDCS), 6d/wk, 2wks	E vs C: Brunnstrom stages (+exp) FMA-WH (+exp) Functional test of hemiplegic fingers and hand (+exp)
De Laet et al. (2022) RCT Crossover (7) NStart=17 NEnd=17 TPS=Chronic A + B vs A/B *Primary listing: Table 16 (Robotics)*	E: Bimanual motor skill learning robot + tDCS C: Sham tDCS + bimanual motor skill learning robot Duration: 30min/d(one session), 1 week washout before continuing to a 5 minute retention session, and then going back to the 30 min session	E vs C: Bimanual speed/accuracy biSAT (-) Bimanual Coordination biCO (-) bimanual force biFOP (-)
Pipatsrisawat et al. (2022) Pilot RCT (9) NStart=10 NEnd=10 TPS=Subacute A + B vs 0 *Primary listing: Table 29 (Repetitive Transcranial Magnetic Stimulation (rTMS))*	E: active rTMS + cathodal tDCS C: sham rTMS + sham cathodal tDCS Duration: 20min rTMS+ 20min tDCS+ 45min OT (single session)	E vs C: FMA-UE (+exp) WMFT-FAS (-) WMFT-TIME (-)
Halakoo et al. (2020) RCT (7) NStart=35 NEnd=32	E1: Anodal tDCS + FES E2: Sham tDCS + FES C: FES Alone	E1 vs E2/C: EMG Activity of flexor carpi radialis during passive extention of the wrist into the rest position (+exp1) Modified Ashworth Scale (+exp1)

TPS=Subacute A + B vs A/B *Primary listing: Table 22 (Neuromuscular Electrical Stimulation (NMES))*	Duration: E1/2: 20min, 5x/wk, 2wks a-tDCS, C: 10 min/d, 5d/wk, 2wks FES	EMG Activity of Flexor carpi radialis during active wrist flexion and extension (+exp1)
Miu et al. (2020) RCT (8) NStart=51 NEnd=48 TPS=Acute A vs B *Primary listing: Table 29 (Repetitive Transcranial Magnetic Stimulation (rTMS))*	E1: rTMS (1 Hz) E2: Dual tDCS (1.5 mA) Duration: 20min/d, 3d/wk, 2wks	E1 vs E2: Motor Assessment Scale (-) Fugl-Meyer Assessment-Arm (-) Nine-Hole Peg Test (-) Modified Barthel Index (-) Handgrip Strength (-)
Edwards et al. (2019) RCT (8) NStart=82 NEnd=69 TPS=Chronic A + B vs A/B *Primary listing: Table 16 (Robotics)*	E: Anodal tDCS+robot assited arm training C: robot assisted arm training+ sham Duration: 20min/d, 3d/wk, 12wks	E vs C: FMA UE (-) WMFT (-)
Beaulieu et al. (2019) Pilot RCT (8) NStart=14 NEnd=14 TPS=Chronic A + B vs A/B *Primary listing: Table 3 (Exercise and Strength Training)*	E: real bilateral tDCS + resistance training exercise C: sham tDCS+ resistance training exercise Duration: 20min of real or sham tDCS stimulation + resistance training exercise (60min,3x/wk,4wks)	E vs C: FMA Upper extremity (-) WMFT (-) BBT (-) Grip strength (-) MAL (-) Modified Ashworth scale (-)
Nicolo et al. (2018) RCT (8) NStart=41 NEnd=41 TPS=Subacute A vs B vs 0 *Primary listing: Table 30 (Theta Burst Stimulation (TBS))*	E1: Neuronavigated Continuous Theta Burst Stimulation (TBS) E2: Cathodal -tDCS C: Sham Duration: 30min, 3x/wk, 3wk	E1 vs C: Fugl-Meyer Assessment Upper Extremity (-) Box and Block Test (-) Nine Hole Peg Test (-) Motor Activity Log-14 Quantitative Score (-) Jamar Dynamometer: (-) E2 vs C: Fugl-Meyers Assessment Upper Extremity (-) Box and Block Test (-) Nine Hole Peg Test (-) Motor Activity Log-14 Quantitative Score (-) Jamar Dynamometer: (-) E1 vs C: Fugl-Meyer Assessment Upper Extremity (-) Box and Block Test (-) Nine Hole Peg Test (-) Motor Activity Log-14 Quantitative Score (-) Jamar Dynamometer: (-) E1 vs E2:

		Fugl-Meyer Assessment Upper Extremity (-) Box and Block Test (-) Nine Hole Peg Test (-) Motor Activity Log-14 Quantitative Score (-) Jamar Dynamometer: (-)
Dehem et al. (2018) RCT Crossover (7) NStart=21 NEnd=20 TPS=Chronic A + B vs A/B *Primary listing: Table 16 (Robotics)*	E: Dual tDCS (1mA) + robot-assisted upper limb therapy C: Sham dual-tDCS (110microA)+ robot-assisted upper limb therapy Duration: tDCS: 20min; Robot-assisted therapy: 20min	E vs C: Upper-limb Kinematic Measures (-) Box and Block Test (-) Purdue Pegboard Test (-)
Cho et al. (2017) RCT (6) NStart=30 NEnd=30 TPS=Acute A + B vs A/B *Primary listing: Table 29 (Repetitive Transcranial Magnetic Stimulation (rTMS))*	E: High frequency rTMS + cathodal tDCS C: High frequency rTMS Duration: 20min tDCS + 20min rTMS, 5x/wk for 2wks	E vs C: FMA (+exp)
Figlewski et al. (2017) RCT (9) NStart=44 NEnd=40 TPS=Chronic A + B vs A/B *Primary listing: Table 6 (Constraint-Induced Movement Therapy (CIMT))*	E: Anodal tDCS + CIMT C: Sham tDCS + CIMT Duration: 6hr/d for 9d CIMT, 30min/d tDCS during CIMT	E vs C: WMFT-FAS (+exp) WMFT TIME (-) Grip strength (-) Arm strength (-)
Andrade et al. (2017) Pilot RCT (8) NStart=60 NEnd=60 TPS=Subacute A + B1 vs A + B2 vs A *Primary listing: Table 6 (Constraint-Induced Movement Therapy (CIMT))*	E1: Anodal tDCS Ipsilesional M1 + CIMT E2: Anodal tDCS Ipsilesional PMC + CIMT C: Sham Stimulation + cMIT Duration: 30min/d, 5d/wk for 6wk	E vs C: E2 v E1/C: Fugl-Meyer Assessment (+exp2) Modified Ashworth Scale (+exp2) Box and Block Test (+exp2) Medical Research Council Scale (+exp2) E1 vs C: Barthel Index (+exp1) E2 vs C: Barthel Index (+exp2) E1 vs E2: Barthel Index (+exp2)
Kwon et al. (2016) RCT Crossover (6) NStart=20 NEnd=20 TPS=Chronic A + B1 vs A + B2 vs A *Primary listing: Table 29 (Repetitive Transcranial Magnetic Stimulation (rTMS))*	E1: Simultaneous cathodal tDCS + 10hz rTMS E2: Simultaneous anodal tDCS + 10hz rTMS; E3 Preconditioning cathodal tCDS + 10hz rTMS E4: Preconditioning anodal tDCS + 10hz rTMS C: rTMS 10Hz + Sham tDCS Duration: 20min/session; 24hr between sessions	E1 vs E2 vs E3 vs E4 vs C: Sequential Finger Motor Task: Movement time (+exp1) Movement accuracy MEP amplitude and latency
Straudi et al. (2016)	E: Robot-assisted therapy + dual tDCS	E vs C:

Pilot RCT (8) NStart=23 NEnd=23 TPS=Chronic A + B vs A/B *Primary listing: Table 16 (Robotics)*	C: Robot-assisted therapy + sham tDCS Duration: 45min/d, 5d/wk, 2wk	Fugl-Meyer Assessment (-) Box and Block Test (-) Motor Acivity Log AOU (-) QOM (-)
Cunningham et al. (2015) Pilot RCT (7) NStart=12 NEnd=12 TPS=Chronic A + B vs A/B *Primary listing: Table 6 (Constraint-Induced Movement Therapy (CIMT))*	E: Anodal tDCS + CIMT C: Sham tDCS + CIMT Duration: 30min/d, 3d/wk for 10wk	E vs C: Nine Hole Peg Test (-) Motor Activity Log (-) Fugl-Meyer Assessment (-) MEP
Triccas et al. (2015) Pilot RCT (7) NStart=23 NEnd=22 TPS=Chronic A + B vs A/B *Primary listing: Table 16 (Robotics)*	E: Anodal tDCS + robotic ArmeoSpring (RT) C: Sham tDCS + robotic ArmeoSpring Duration: 1hr (40 min RT + 20 min tDCS), 18x over 8wk RT	E vs C: Fugl-Meyer Assessment (no stat) Action Research Arm Test (no stat) Motor Activity Log (no stat) stroke impact scale (no stat)
Viana et al. (2014) Pilot RCT (9) NStart=20 NEnd=20 TPS=Chronic A + B vs A/B *Primary listing: Table 17 (Virtual Reality)*	E: virtual reality + aNodal tDCS C: virtual reality + sham Duration: 1hr/d, 3d/wk for 5wk	E vs C: Fugl-Meyer Assessment (-) Wolf Motor Function Test (-) Modified Ashworth Scale (-) Grip Strength (-) Stroke Specific Quality of Life Scale (+exp) Stroke Specific Quality of Life Scale-UL (-)
Takeuchi et al. (2012) RCT (6) NStart=27 NEnd=20 TPS=Chronic A + B vs A vs B *Primary listing: Table 29 (Repetitive Transcranial Magnetic Stimulation (rTMS))*	E1: Low Frequency rTMS E2: ANodal tDCS E3: Low Frequency rTMS + ANodal tDCS Duration: 20min, single session, 7 day follow up	E1 vs E2 vs E3: Pinch Force paretic hand (+exp3) nonparetic hand (-) Bimanual coordination (+exp3) MEP amplitude (+exp3) Resting motor threshold contralesional (-) ipsilesional (+exp) Transcallosal inhibition (+exp3) Acceleration of both hands. (acceleration & bimanual coordination were evaluated by using the packaged analysis software of the finger-tapping system)
Bolognini et al. (2011) Pilot RCT (7) NStart=14 NEnd=14 TPS=Chronic A + B vs A/B *Primary listing: Table 6 (Constraint-Induced Movement Therapy (CIMT))*	E: Bilateral tDCS and CIMT C: Sham tDCS with CIMT Duration: 90% waking hours, 7d/wk, 2 wks CIMT, 40min/d, 3d over 2wls tDCS or sham	E vs C: Jebsen Taylor Hand Function Test (+exp) Hand grip strength (-) Fugl-Meyer Upper Extremity (-) Motor activity log Amount of use (-) Quality of movement (-) MEP amplitude

Celnik et al. (2009) RCT Crossover (8) NStart=9 NEnd=9 TPS=Chronic A + B vs A/B vs 0 *Primary listing: Table 27 (Additional Afferent and Peripheral Stimulation Methods)*	E1: Peripheral Nerve Stimulation (PNS) (1Hz), + Anodal tDCS (1mA) E2: PNS + sham tDCS E3: tDCS+ sham PNS C: Sham PNS + sham tDCS Duration: 120min/d, 4d PNS + 20min/d, 4d tDCS	E1/E2/E3 vs C: Percent Change of Mean Number of Correct Key Presses (speed) (+exp1) Sleep quality-VAS (-) sleep duration (hours) (-) Subjective sequence difficulty-VAS (-) hand tiredness-VAS (-) Fatigue-VAS (-) attention-VAS (-)

Abbreviations and table notes: C=control group; D=days; E=experimental group; H=hours; Min=minutes; RCT=randomized controlled trial; TPS=time post stroke category (Acute: less than 30 days, Subacute: more than 1 month but less than 6 months, Chronic: over 6 months); Wk=weeks.

+exp indicates a statistically significant between groups difference at α=0.05 in favour of the experimental group

+exp1/+exp2/+exp3 indicates a statistically significant between groups difference at α=0.05 in favour of the first, second or third experimental group

+con indicates a statistically significant between groups difference at α=0.05 in favour of the control group

- indicates no statistically significant between groups differences at α=0.05

1. Body Functions and Structures

MOTOR FUNCTION			
LoE	**Conclusion Statement**	**RCTs**	**References**
1a	Transcranial direct current stimulation may not have a difference in efficacy when compared to sham for improving motor function.	10	Wang et al. (2024); Williamson et al. (2023); Klomjai et al. (2022a); Choi & Nam (2020); Marquez et al. (2017); DelFelice et al. (2016); Sik et al. (2015); Kim et al. (2010); Boggio et al. (2007); Fregni et al. (2005)
1b	Anodal transcranial direct current stimulation with conventional physio may result in lesser improvements in motor function when compared to dual transcranial direct current stimulation with conventional physio.	1	Klomjai et al. (2022a)
1b	Cathodal transcranial direct current stimulation with conventional physio may not have a difference in efficacy when compared to dual transcranial direct current stimulation with conventional physio for improving motor function.	1	Klomjai et al. (2022a)
1b	Unilateral Hemisphere transcranial direct current stimulation may not have a difference in efficacy when compared to Dual Hemisphere transcranial direct current stimulation for improving motor function.	1	Choi & Nam (2020)
1b	Anodal transcranial direct current stimulation with physical therapy and occupational therapy may not have a difference in efficacy when compared to Dual transcranial direct current stimulation with physical therapy and occupational therapy for improving motor function.	1	Sik et al. (2015)
1a	Anodal transcranial direct current stimulation may not have a difference in efficacy when compared to sham for improving motor function.	9	Cordes D. et al. (2024); Midha & Arumugam (2024); Vimolratana et al. (2024); Zeng et al. (2024); Gong Q. et al. (2023); de Souza et al. (2021); Bornheim et al. (2020); Achacheluee et al. (2018); Mortensen et al. (2016)
1b	HD-transcranial direct current stimulation with Conventional therapy may not have a difference in efficacy when compared to a-transcranial direct current stimulation with Conventional therapy for improving motor function.	1	Zeng et al. (2024)

2	Anodal transcranial direct current stimulation at M1 and DLPFC may not have a difference in efficacy when compared to Anodal transcranial direct current stimulation at M1 only for improving motor function.	1	Achacheluee et al. (2018)
1b	Dual transcranial direct current stimulation - on primary motor cortex and left dorsolateral prefrontal cortex (DLPFC) may produce greater improvements in motor function than transcranial direct current stimulation on M1 and sham transcranial direct current stimulation on DLPFC.	1	Oveisgharan et al. (2018)
1a	Dual transcranial direct current stimulation may produce greater improvements in motor function than sham.	6	Zhang et al. (2024a); Pinto et al. (2021); Kuo et al. (2020); Koh et al. (2017); van der Vliet et al. (2017); Lindenberg et al. (2010)
2	Robot assisted therapy (InMotion WRIST Robot) with Anodal transcranial direct current stimulation may not have a difference in efficacy when compared to Robot assisted therapy with sham transcranial direct current stimulation for improving motor function.	1	Mazzoleni et al. (2019)
1b	Anodal transcranial direct current stimulation with Robot-Assisted Arm Training may not have a difference in efficacy when compared to Sham stimulation with Robot-Asssited Arm Training for improving motor function.	1	Hesse et al. (2011b)
1b	Dual transcranial direct current stimulation may not have a difference in efficacy when compared to Electroacupuncture for improving motor function.	1	Hathaiareerug & Vearasilp (2019)
1b	Cathodal transcranial direct current stimulation with virtual reality may produce greater improvements in motor function than Sham transcranial direct current stimulation with virtual reality.	1	Yao et al. (2020)
1b	Anodal transcranial direct current stimulation with visuomotor gripforce tracking task may not have a difference in efficacy when compared to Sham transcranial direct current stimulation with visuomotor gripforce tracking task for improving motor function.	1	Pavlova et al. (2017)
1a	Cathodal transcranial direct current stimulation may produce greater improvements in motor function than sham.	7	Takahashi et al. (2024); Boasquevisque et al. (2021); Alisar et al. (2020); Rabadi et al. (2017); Fusco et al. (2014a); Wu et al. (2013c); Nair et al. (2011)
1b	Anodal transcranial direct current stimulation on affected hemisphere with robot assisted arm training may not have a difference in efficacy when compared to Cathodal transcranial direct current stimulation on unaffected hemisphere with robot assisted arm training for improving motor function.	1	Ochi et al. (2013)
1b	Bilateral transcranial direct current stimulation with motor imagery brain-computer interface may not have a difference in efficacy when compared to Sham transcranial direct current stimulation with motor imagery brain-computer interface for improving motor function.	1	Ang et al. (2015a)
1b	There is conflicting evidence about the effect of Dual transcranial direct current stimulation combined with other interventions when compared to sham or task-specific training for improving motor function.	1	Hsu et al. (2023)
1b	There is conflicting evidence about the effect of Anodal transcranial direct current stimulation with occupational therapy when compared to Sham with occupational therapy for improving motor function.	1	Ilić et al. (2016)
1a	There is conflicting evidence about the effect of Dual transcranial direct current stimulation combined with other interventions when compared to sham or fes for improving motor function.	2	Salazar et al. (2020); Shaheiwola et al. (2018)

1b	Anodal transcranial direct current stimulation with virtual reality-based therapy and conventional physical therapy may produce greater improvements in motor function than conventional physiotherapy.	1	Llorens et al. (2021)
2	Anodal transcranial direct current stimulation with Repetitive Functional Task-Oriented Programme (RFTOP) may not have a difference in efficacy when compared to Repetitive Functional Task Oriented Programme for improving motor function.	1	Adeagbo et al. (2021)
1b	There is conflicting evidence about the effect of Visuo-Motor Grip Force Tracking Task Training of the paretic hand with Anodal Unilateral transcranial direct current stimulation when compared to Visuo-Motor Grip Force Tracking Task Training of the paretic hand with Placebo transcranial direct current stimulation for improving motor function.	1	Taud et al. (2021)
1b	Visuo-Motor Grip Force Tracking Task Training of the paretic hand with Anodal Unilateral transcranial direct current stimulation may not have a difference in efficacy when compared to Visuo-Motor Grip Force Tracking Task Training of the paretic hand with Bilateral transcranial direct current stimulation for improving motor function.	1	Taud et al. (2021)
1b	Anodal transcranial direct current stimulation with motor imagery and upper-limb functional training may produce greater improvements in motor function than sham tCDS with motor imagery and upper-limb functional training.	1	Kashoo et al. (2022)
1b	Anodal transcranial direct current stimulation with Virtual Reality may not have a difference in efficacy when compared to sham transcranial direct current stimulation with Virtual Reality for improving motor function.	1	Lee & Cha (2022)
1b	Bilateral transcranial direct current stimulation with trunk restraint or training and Conventional physical therapy may produce greater improvements in motor function than Conventional physical therapy.	1	Tedla et al. (2022)
1b	Bilateral transcranial direct current stimulation with trunk restraint or training and Conventional physical therapy may produce greater improvements in motor function than Sham transcranial direct current stimulation with trunk restraint or training and Conventional physical therapy.	1	Tedla et al. (2022)
1b	Bilateral transcranial direct current stimulation with neuromuscular electrical stimulation and coventional care may not have a difference in efficacy when compared to Sham transcranial direct current stimulation and neuromuscular electrical stimulation with conventional care for improving motor function.	1	Wei et al. (2022)
1b	Anodal transcranial direct current stimulation with Upper extremity strength training may not have a difference in efficacy when compared to Sham transcranial direct current stimulation with Upper extremity strength training for improving motor function.	1	Palimeris et al. (2022)
1a	Dual transcranial direct current stimulation combined with other interventions may produce greater improvements in motor function than sham or exercise and custom physiotherapy protocols.	2	Youssef et al. (2023); Prathum et al. (2022)
1b	Bihemispheric transcranial direct current stimulation with Custum physiotherapy protocol may not have a difference in efficacy when compared to Unihemispheric transcranial direct current stimulation with Custum physiotherapy protocol for improving motor function.	1	Youssef et al. (2023)
1b	Bilateral transcranial direct current stimulation with modified constraint-induced movement therapy and conventional rehab may produce greater improvements in motor function than Sham transcranial direct current stimulation with modified constraint-induced movement therapy and conventional rehab.	1	Garrido et al. (2023)

1b	Anodal transcranial direct current stimulation with conventional may not have a difference in efficacy when compared to Sham transcranial direct current stimulation with conventional rehab for improving motor function.	1	Pires et al. (2023)
1a	Anodal tDCS with CIMT may not have a difference in efficacy when compared to sham tDCS with CIMT for improving motor function.	3	Unger et al. (2023); Figlewski et al. (2017); Cunningham et al. (2015)
1b	Bihemispheric transcranial direct current stimulation with Repetitive Peripheral Nerve Stimulation and Conventional Therapy may not have a difference in efficacy when compared to Sham transcranial direct current stimulation with Repetitive Peripheral Nerve Stimulation and Conventional Therapy for improving motor function.	1	Yague et al. (2023)
1b	Dual transcranial direct current stimulation with Sensorimotor training may produce greater improvements in motor function than Sham transcranial direct current stimulation with Sensorimotor training.	1	Li et al. (2024c)
1b	High frequency repetitive transcranial magnetic stimulation with cathodal transcranial direct current stimulation may produce greater improvements in motor function than High frequency repetitive transcranial magnetic stimulation.	1	Cho et al. (2017)
1b	Repetitive transcranial magnetic stimulation may not have a difference in efficacy when compared to Dual transcranial direct current stimulation for improving motor function.	1	Miu et al. (2020)
1b	Neuronavigated Continuous Theta Burst Stimulation may not have a difference in efficacy when compared to Sham for improving motor function.	1	Nicolo et al. (2018)
1b	Neuronavigated Continuous Theta Burst Stimulation may not have a difference in efficacy when compared to Cathodal -transcranial direct current stimulation for improving motor function.	1	Nicolo et al. (2018)
1b	Anodal transcranial direct current stimulation with robot assited arm training may not have a difference in efficacy when compared to robot assisted arm training with sham for improving motor function.	1	Edwards et al. (2019)
1b	Robot-Assisted Therapy (RAT) with dual transcranial direct current stimulation may not have a difference in efficacy when compared to Robot-Assisted Therapy (RAT) with sham transcranial direct current stimulation for improving motor function.	1	Morone et al. (2022)
2	Smart hand joint training device with bilateral transcranial direct current stimulation may produce greater improvements in motor function than Smart hand joint training device.	1	Zhao et al. (2022a)
1b	Personalized reach training (active control-restricted range) with anodal transcranial direct current stimulation and Virtual reality games may not have a difference in efficacy when compared to Personal reach training (active control-restricted range) with Sham transcranial direct current stimulation and video games for improving motor function.	1	Levin et al. (2023)
1b	There is conflicting evidence about the effect of Intermittent theta burst stimulation with high definition transcranial direct current stimulation and rehabilitation when compared to Sham intermittent theta burst stimulation and transcranial direct current stimulation with rehabilitation for improving motor function.	1	Bian et al. (2024)
1b	Intermittent theta burst stimulation with high definition transcranial direct current stimulation and rehabilitation may not have a difference in efficacy when compared to sham transcranial direct current stimulation with intermittent theta burst stimulation and rehabilitation for improving motor function.	1	Bian et al. (2024)

1b	Bilateral transcranial direct current stimulation with Robotic training may not have a difference in efficacy when compared to Sham transcranial direct current stimulation with Robotic training for improving motor function.	1	Bernal-Jiménez et al. (2024)
1b	Different approaches to anodal tDCS combined with peripheral nerve stimulation and robot-assisted training may not have a difference in efficacy when compared with one another for improving motor function.	1	Powell et al. (2016)
1b	There is conflicting evidence about the effect of High-definition tDCS with EMG-driven robotic hand (EMG-RH) when compared to Sham tDCS with EMG-RH for improving motor function.	1	Hu et al. (2024)
1a	Anodal tDCS combined with other interventions may not have a difference in efficacy when compared to sham for improving motor function.	2	Huang et al. (2022b); Chen et al. (2021f)
1b	Dual tDCS combined with other interventions may not have a difference in efficacy when compared to sham or cimt for improving motor function.	1	Kim et al. (2021)
1b	Sequential Combination of Anodal tDCS with Mirror Therapy may not have a difference in efficacy when compared to Sham tDCS with Mirror Therapy for improving motor function.	1	Liao et al. (2020)
1b	Bilateral tDCS before mirror therapy may result in lesser improvements in motor function when compared to tDCS during mirror therapy.	1	Jin et al. (2019)
1b	Bilateral tDCS before mirror therapy may not have a difference in efficacy when compared to Sham tDCS with mirror therapy for improving motor function.	1	Jin et al. (2019)
1b	There is conflicting evidence about the effect of tDCS during mirror therapy when compared to Sham tDCS with mirror therapy for improving motor function.	1	Jin et al. (2019)
1b	Dual-tDCS combined with PNMES with CIMT may produce greater improvements in motor function than CIMT.	1	Takebayashi et al. (2017)
1b	There is conflicting evidence about the effect of Anodal tDCS with Modified CIMT when compared to Sham tDCS with CIMT for improving motor function.	1	Rocha et al. (2016)
2	Dual tDCS with Mirror therapy may not have a difference in efficacy when compared to tDCS with Sham mirror for improving motor function.	1	Cho & Cha (2015)
2	Cathodal tDCS with physical therapy may produce greater improvements in motor function than Physical therapy.	1	Lee & Lee (2015)
1b	Cathodal tDCS with VR may produce greater improvements in motor function than VR:.	1	Lee et al. (2014b)
1b	Cathodal tDCS with VR may produce greater improvements in motor function than Cathodal tDCS.	1	Lee et al. (2014b)
1b	Cathodal tDCS may produce greater improvements in motor function than VR:.	1	Lee et al. (2014b)
1b	Active rTMS with cathodal tDCS may produce greater improvements in motor function than sham rTMS with sham cathodal tDCS.	1	Pipatsrisawat et al. (2022)
1b	Real bilateral tDCS with resistance training exercise may not have a difference in efficacy when compared to sham tDCS with resistance training exercise for improving motor function.	1	Beaulieu et al. (2019)
1b	Robot-assisted therapy with dual tDCS may not have a difference in efficacy when compared to Robot-assisted therapy with sham tDCS for improving motor function.	1	Straudi et al. (2016)

1b	Virtual reality with aNodal tDCS may not have a difference in efficacy when compared to virtual reality with sham for improving motor function.	1	Viana et al. (2014)
1b	There is conflicting evidence about the effect of Bilateral tDCS and CIMT when compared to Sham tDCS with CIMT for improving motor function.	1	Bolognini et al. (2011)
1b	Anodal tDCS Ipsilesional PMC with CIMT may produce greater improvements in motor function than Anodal tDCS Ipsilesional M1 with CIMT.	1	Andrade et al. (2017)
1b	Anodal tDCS Ipsilesional PMC with CIMT may produce greater improvements in motor function than Sham Stimulation with cMIT.	1	Andrade et al. (2017)
1b	Concurrent Combination of tDCS with Mirror Therapy may not have a difference in efficacy when compared to Sham tDCS with Mirror Therapy for improving motor function.	1	Liao et al. (2020)
1b	Cathodal tDCS with Modified CIMT may not have a difference in efficacy when compared to Sham tDCS with CIMT for improving motor function.	1	Rocha et al. (2016)

STROKE SEVERITY			
LoE	**Conclusion Statement**	**RCTs**	**References**
1a	Transcranial direct current stimulation may not have a difference in efficacy when compared to sham for improving stroke severity.	2	DelFelice et al. (2016); Khedr et al. (2013)
1b	Anodal transcranial direct current stimulation may not have a difference in efficacy when compared to sham for improving stroke severity.	1	Cordes D. et al. (2024)
1a	Dual transcranial direct current stimulation may produce greater improvements in stroke severity than sham.	3	Balikshahi N. et al. (2024); Pinto et al. (2021); Bolognini et al. (2020)
1a	Cathodal transcranial direct current stimulation may not have a difference in efficacy when compared to sham for improving stroke severity.	3	Boasquevisque et al. (2021); Alisar et al. (2020); Fusco et al. (2014a)
1b	Robot-Assisted Therapy (RAT) with dual transcranial direct current stimulation may not have a difference in efficacy when compared to Robot-Assisted Therapy (RAT) with sham transcranial direct current stimulation for improving stroke severity.	1	Morone et al. (2022)
2	Smart hand joint training device with bilateral transcranial direct current stimulation may produce greater improvements in stroke severity than Smart hand joint training device.	1	Zhao et al. (2022a)

MUSCLE STRENGTH			
LoE	**Conclusion Statement**	**RCTs**	**References**
1a	Transcranial direct current stimulation may not have a difference in efficacy when compared to sham for improving muscle strength.	8	Klomjai et al. (2022a); Choi & Nam (2020); Marquez et al. (2017); DelFelice et al. (2016); Au-Yeung et al. (2014a); Fusco et al. (2013); Khedr et al. (2013); Stagg et al. (2012)
1b	Anodal transcranial direct current stimulation with conventional physio may not have a difference in efficacy when compared to dual transcranial direct current stimulation with conventional physio for improving muscle strength.	1	Klomjai et al. (2022a)
1b	Cathodal transcranial direct current stimulation with conventional physio may not have a difference in efficacy when compared to dual	1	Klomjai et al. (2022a)

	transcranial direct current stimulation with conventional physio for improving muscle strength.		
1b	Unilateral Hemisphere transcranial direct current stimulation may not have a difference in efficacy when compared to Dual Hemisphere transcranial direct current stimulation for improving muscle strength.	1	Choi & Nam (2020)
1a	Anodal transcranial direct current stimulation may not have a difference in efficacy when compared to sham for improving muscle strength.	5	Cordes D. et al. (2024); Midha & Arumugam (2024); de Souza et al. (2021); Mortensen et al. (2016); Fusco et al. (2014b)
1a	Dual transcranial direct current stimulation may not have a difference in efficacy when compared to sham for improving muscle strength.	6	Balikshahi N. et al. (2024); Zhang et al. (2024a); Bolognini et al. (2020); van der Vliet et al. (2017); Goodwill et al. (2016); Lefebvre et al. (2014)
1b	Short lasting bilateral transcranial direct current stimulation online (during motor training) may not have a difference in efficacy when compared to Long lasting bilateral transcranial direct current stimulation offline (incongruent with motor training) or Short lasting transcranial direct current stimulation offline (incongruent with motor training) for improving muscle strength.	1	van der Vliet et al. (2017)
2	Robot assisted therapy (InMotion WRIST Robot) with Anodal transcranial direct current stimulation may not have a difference in efficacy when compared to Robot assisted therapy with sham transcranial direct current stimulation for improving muscle strength.	1	Mazzoleni et al. (2019)
1b	Anodal transcranial direct current stimulation with Robot-Assisted Arm Training may not have a difference in efficacy when compared to Sham stimulation with Robot-Asssited Arm Training for improving muscle strength.	1	Hesse et al. (2011b)
1b	Dual transcranial direct current stimulation may not have a difference in efficacy when compared to Electroacupuncture for improving muscle strength.	1	Hathaiareerug & Vearasilp (2019)
1b	Cathodal transcranial direct current stimulation may not have a difference in efficacy when compared to sham for improving muscle strength.	1	Fusco et al. (2014a)
1b	Dual transcranial direct current stimulation combined with other interventions may not have a difference in efficacy when compared to sham or motor relearning programmes for improving muscle strength.	1	Lefebvre et al. (2013)
1b	Active repetitive peripheral nerve sensory stimulation (RPPS) with sham transcranial direct current stimulation may not have a difference in efficacy when compared to Sham RRPS with sham transcranial direct current stimulation for improving muscle strength.	1	Menezes et al. (2018)
1b	Active repetitive peripheral nerve sensory stimulation (RPPS) with sham transcranial direct current stimulation may not have a difference in efficacy when compared to Sham RRPS with Anodal transcranial direct current stimulation or Active RRPS and active transcranial direct current stimulation for improving muscle strength.	1	Menezes et al. (2018)
1b	Anodal transcranial direct current stimulation with occupational therapy may not have a difference in efficacy when compared to Sham with occupational therapy for improving muscle strength.	1	Ilić et al. (2016)
1b	Dual transcranial direct current stimulation combined with other interventions may produce greater improvements in muscle strength than sham or fes.	1	Salazar et al. (2020)
1b	Anodal transcranial direct current stimulation with Upper extremity strength training may not have a difference in efficacy when	1	Palimeris et al. (2022)

	compared to Sham transcranial direct current stimulation with Upper extremity strength training for improving muscle strength.		
1b	Dual transcranial direct current stimulation combined with other interventions may not have a difference in efficacy when compared to sham or exercise and custom physiotherapy protocols for improving muscle strength.	1	Prathum et al. (2022)
1b	Anodal tDCS with CIMT may not have a difference in efficacy when compared to sham tDCS with CIMT for improving muscle strength.	1	Figlewski et al. (2017)
1b	Repetitive transcranial magnetic stimulation may not have a difference in efficacy when compared to Dual transcranial direct current stimulation for improving muscle strength.	1	Miu et al. (2020)
1b	Neuronavigated Continuous Theta Burst Stimulation may not have a difference in efficacy when compared to Sham for improving muscle strength.	1	Nicolo et al. (2018)
1b	Neuronavigated Continuous Theta Burst Stimulation may not have a difference in efficacy when compared to Cathodal -transcranial direct current stimulation for improving muscle strength.	1	Nicolo et al. (2018)
1b	Low Frequency repetitive transcranial magnetic stimulation may result in lesser improvements in muscle strength when compared to ANodal transcranial direct current stimulation or Low Frequency repetitive transcranial magnetic stimulation with ANodal transcranial direct current stimulation.	1	Takeuchi et al. (2012)
1b	Robot-Assisted Therapy (RAT) with dual transcranial direct current stimulation may not have a difference in efficacy when compared to Robot-Assisted Therapy (RAT) with sham transcranial direct current stimulation for improving muscle strength.	1	Morone et al. (2022)
1b	Intermittent theta burst stimulation with high definition transcranial direct current stimulation and rehabilitation may produce greater improvements in muscle strength than Sham intermittent theta burst stimulation and transcranial direct current stimulation with rehabilitation.	1	Bian et al. (2024)
1b	Intermittent theta burst stimulation with high definition transcranial direct current stimulation and rehabilitation may not have a difference in efficacy when compared to sham transcranial direct current stimulation with intermittent theta burst stimulation and rehabilitation for improving muscle strength.	1	Bian et al. (2024)
1b	Bilateral transcranial direct current stimulation with Robotic training may not have a difference in efficacy when compared to Sham transcranial direct current stimulation with Robotic training for improving muscle strength.	1	Bernal-Jiménez et al. (2024)
1b	Bimanual motor skill learning with robot-assisted training and transcranial direct current stimulation may not have a difference in efficacy when compared to bimanual motor skill learning with sham stimulation for improving muscle strength.	1	De Laet et al. (2022)
1b	Anodal tDCS with Modified CIMT may not have a difference in efficacy when compared to Sham tDCS with CIMT for improving muscle strength.	1	Rocha et al. (2016)
2	Dual tDCS with Mirror therapy may produce greater improvements in muscle strength than tDCS with Sham mirror.	1	Cho & Cha (2015)
1b	Real bilateral tDCS with resistance training exercise may not have a difference in efficacy when compared to sham tDCS with resistance training exercise for improving muscle strength.	1	Beaulieu et al. (2019)
1b	Virtual reality with aNodal tDCS may not have a difference in efficacy when compared to virtual reality with sham for improving muscle strength.	1	Viana et al. (2014)

1b	Bilateral tDCS and CIMT may not have a difference in efficacy when compared to Sham tDCS with CIMT for improving muscle strength.	1	Bolognini et al. (2011)
1b	Anodal tDCS Ipsilesional PMC with CIMT may produce greater improvements in muscle strength than Anodal tDCS Ipsilesional M1 with CIMT.	1	Andrade et al. (2017)
1b	Anodal tDCS Ipsilesional PMC with CIMT may produce greater improvements in muscle strength than Sham Stimulation with cMIT.	1	Andrade et al. (2017)
1b	Cathodal tDCS with Modified CIMT may not have a difference in efficacy when compared to Sham tDCS with CIMT for improving muscle strength.	1	Rocha et al. (2016)

SPASTICITY			
LoE	**Conclusion Statement**	**RCTs**	**References**
1a	Transcranial direct current stimulation may not have a difference in efficacy when compared to sham for improving spasticity.	2	Choi & Nam (2020); DelFelice et al. (2016)
1b	Unilateral Hemisphere transcranial direct current stimulation may not have a difference in efficacy when compared to Dual Hemisphere transcranial direct current stimulation for improving spasticity.	1	Choi & Nam (2020)
1a	There is conflicting evidence about the effect of Anodal transcranial direct current stimulation when compared to sham for improving spasticity.	2	Cordes D. et al. (2024); Zeng et al. (2024)
1b	HD-transcranial direct current stimulation with Conventional therapy may not have a difference in efficacy when compared to a-transcranial direct current stimulation with Conventional therapy for improving spasticity.	1	Zeng et al. (2024)
1a	Dual transcranial direct current stimulation may not have a difference in efficacy when compared to sham for improving spasticity.	3	Zhang et al. (2024a); Koh et al. (2017); Goodwill et al. (2016)
2	Robot assisted therapy (InMotion WRIST Robot) with Anodal transcranial direct current stimulation may not have a difference in efficacy when compared to Robot assisted therapy with sham transcranial direct current stimulation for improving spasticity.	1	Mazzoleni et al. (2019)
1b	Anodal transcranial direct current stimulation with Robot-Assisted Arm Training may not have a difference in efficacy when compared to Sham stimulation with Robot-Asssited Arm Training for improving spasticity.	1	Hesse et al. (2011b)
1a	There is conflicting evidence about the effect of Cathodal transcranial direct current stimulation when compared to sham for improving spasticity.	2	Boasquevisque et al. (2021); Wu et al. (2013c)
1b	Anodal transcranial direct current stimulation on affected hemisphere with robot assisted arm training may produce greater improvements in spasticity than Cathodal transcranial direct current stimulation on unaffected hemisphere with robot assisted arm training.	1	Ochi et al. (2013)
1b	Dual transcranial direct current stimulation combined with other interventions may not have a difference in efficacy when compared to sham or fes for improving spasticity.	1	Shaheiwola et al. (2018)
1b	Bilateral transcranial direct current stimulation with neuromuscular electrical stimulation and coventional care may not have a difference in efficacy when compared to Sham transcranial direct current stimulation and neuromuscular electrical stimulation with conventional care for improving spasticity.	1	Wei et al. (2022)
1b	There is conflicting evidence about the effect of Dual transcranial direct current stimulation combined with other interventions when compared to sham or exercise and custom physiotherapy protocols for improving spasticity.	1	Youssef et al. (2023)

1b	Bihemispheric transcranial direct current stimulation with Custum physiotherapy protocol may not have a difference in efficacy when compared to Unihemispheric transcranial direct current stimulation with Custum physiotherapy protocol for improving spasticity.	1	Youssef et al. (2023)
1b	Bihemispheric transcranial direct current stimulation with Repetitive Peripheral Nerve Stimulation and Conventional Therapy may not have a difference in efficacy when compared to Sham transcranial direct current stimulation with Repetitive Peripheral Nerve Stimulation and Conventional Therapy for improving spasticity.	1	Yague et al. (2023)
1b	Anodal transcranial direct current stimulation with functional electrical stimulation may produce greater improvements in spasticity than Sham transcranial direct current stimulation with functional electrical stimulation.	1	Halakoo et al. (2020)
1b	Robot-Assisted Therapy (RAT) with dual transcranial direct current stimulation may not have a difference in efficacy when compared to Robot-Assisted Therapy (RAT) with sham transcranial direct current stimulation for improving spasticity.	1	Morone et al. (2022)
1b	Intermittent theta burst stimulation with high definition transcranial direct current stimulation and rehabilitation may not have a difference in efficacy when compared to Sham intermittent theta burst stimulation and transcranial direct current stimulation with rehabilitation for improving spasticity.	1	Bian et al. (2024)
1b	Intermittent theta burst stimulation with high definition transcranial direct current stimulation and rehabilitation may not have a difference in efficacy when compared to sham transcranial direct current stimulation with intermittent theta burst stimulation and rehabilitation for improving spasticity.	1	Bian et al. (2024)
1b	Bilateral transcranial direct current stimulation with Robotic training may not have a difference in efficacy when compared to Sham transcranial direct current stimulation with Robotic training for improving spasticity.	1	Bernal-Jiménez et al. (2024)
1b	There is conflicting evidence about the effect of High-definition tDCS with EMG-driven robotic hand (EMG-RH) when compared to Sham tDCS with EMG-RH for improving spasticity.	1	Hu et al. (2024)
1b	There is conflicting evidence about the effect of Anodal tDCS combined with other interventions when compared to sham for improving spasticity.	1	Huang et al. (2022b)
1b	Cathodal tDCS with VR may not have a difference in efficacy when compared to VR: for improving spasticity.	1	Lee et al. (2014b)
1b	Cathodal tDCS with VR may not have a difference in efficacy when compared to Cathodal tDCS for improving spasticity.	1	Lee et al. (2014b)
1b	Cathodal tDCS may not have a difference in efficacy when compared to VR: for improving spasticity.	1	Lee et al. (2014b)
1b	Real bilateral tDCS with resistance training exercise may not have a difference in efficacy when compared to sham tDCS with resistance training exercise for improving spasticity.	1	Beaulieu et al. (2019)
1b	Virtual reality with aNodal tDCS may not have a difference in efficacy when compared to virtual reality with sham for improving spasticity.	1	Viana et al. (2014)
1b	Anodal tDCS Ipsilesional PMC with CIMT may produce greater improvements in spasticity than Anodal tDCS Ipsilesional M1 with CIMT.	1	Andrade et al. (2017)
1b	Anodal tDCS Ipsilesional PMC with CIMT may produce greater improvements in spasticity than Sham Stimulation with cMIT.	1	Andrade et al. (2017)

RANGE OF MOTION			
LoE	**Conclusion Statement**	**RCTs**	**References**
1b	Anodal transcranial direct current stimulation may not have a difference in efficacy when compared to sham for improving range of motion.	1	de Souza et al. (2021)
1b	Cathodal transcranial direct current stimulation may produce greater improvements in range of motion than sham.	1	Nair et al. (2011)
1b	Active repetitive peripheral nerve sensory stimulation (RPPS) with sham transcranial direct current stimulation may not have a difference in efficacy when compared to Sham RRPS with sham transcranial direct current stimulation for improving range of motion.	1	Menezes et al. (2018)
1b	Active repetitive peripheral nerve sensory stimulation (RPPS) with sham transcranial direct current stimulation may not have a difference in efficacy when compared to Sham RRPS with Anodal transcranial direct current stimulation or Active RRPS and active transcranial direct current stimulation for improving range of motion.	1	Menezes et al. (2018)
1b	Dual transcranial direct current stimulation combined with other interventions may not have a difference in efficacy when compared to sham or fes for improving range of motion.	1	Salazar et al. (2020)
1b	Anodal transcranial direct current stimulation with Upper extremity strength training may not have a difference in efficacy when compared to Sham transcranial direct current stimulation with Upper extremity strength training for improving range of motion.	1	Palimeris et al. (2022)
1b	Personalized reach training (active control-restricted range) with anodal transcranial direct current stimulation and Virtual reality games may not have a difference in efficacy when compared to Personal reach training (active control-restricted range) with Sham transcranial direct current stimulation and video games for improving range of motion.	1	Levin et al. (2023)

PROPRIOCEPTION			
LoE	**Conclusion Statement**	**RCTs**	**References**
1a	Anodal transcranial direct current stimulation may not have a difference in efficacy when compared to sham for improving proprioception.	3	Cordes D. et al. (2024); Salazar et al. (2024); Bornheim et al. (2020)
1b	Anodal transcranial direct current stimulation with virtual reality-based therapy and conventional physical therapy may produce greater improvements in proprioception than conventional physiotherapy.	1	Llorens et al. (2021)
1b	Dual transcranial direct current stimulation with Sensorimotor training may produce greater improvements in proprioception than Sham transcranial direct current stimulation with Sensorimotor training.	1	Li et al. (2024c)
1b	Simultaneous cathodal tDCS with 10hz rTMS may produce greater improvements in proprioception than rTMS 10Hz with Sham tDCS.	1	Kwon et al. (2016)
1b	Simultaneous anodal tDCS with 10hz rTMS may not have a difference in efficacy when compared to rTMS 10Hz with Sham tDCS for improving proprioception.	1	Kwon et al. (2016)
1b	Preconditioning cathodal tCDS with 10hz rTMS may not have a difference in efficacy when compared to rTMS 10Hz with Sham tDCS for improving proprioception.	1	Kwon et al. (2016)
1b	Preconditioning anodal tDCS with 10hz rTMS may not have a difference in efficacy when compared to rTMS 10Hz with Sham tDCS for improving proprioception.	1	Kwon et al. (2016)

2. Activities

ACTIVITIES OF DAILY LIVING			
LoE	**Conclusion Statement**	**RCTs**	**References**
1a	Transcranial direct current stimulation may not have a difference in efficacy when compared to sham for improving performance of activities of daily living.	3	DelFelice et al. (2016); Khedr et al. (2013); Kim et al. (2010)
1a	Anodal transcranial direct current stimulation may produce greater improvements in performance of activities of daily living than sham.	4	Cordes D. et al. (2024); Zeng et al. (2024); de Souza et al. (2021); Bornheim et al. (2020)
1b	HD-transcranial direct current stimulation with Conventional therapy may not have a difference in efficacy when compared to a-transcranial direct current stimulation with Conventional therapy for improving performance of activities of daily living.	1	Zeng et al. (2024)
1a	Dual transcranial direct current stimulation may not have a difference in efficacy when compared to sham for improving performance of activities of daily living.	4	Pinto et al. (2021); Bolognini et al. (2020); Koh et al. (2017); Goodwill et al. (2016)
1b	Anodal transcranial direct current stimulation with Robot-Assisted Arm Training may not have a difference in efficacy when compared to Sham stimulation with Robot-Asssited Arm Training for improving performance of activities of daily living.	1	Hesse et al. (2011b)
1b	Cathodal transcranial direct current stimulation with virtual reality may produce greater improvements in performance of activities of daily living than Sham transcranial direct current stimulation with virtual reality.	1	Yao et al. (2020)
1a	Cathodal transcranial direct current stimulation may not have a difference in efficacy when compared to sham for improving performance of activities of daily living.	5	Boasquevisque et al. (2021); Alisar et al. (2020); Rabadi et al. (2017); Fusco et al. (2014a); Wu et al. (2013c)
1b	Anodal transcranial direct current stimulation on affected hemisphere with robot assisted arm training may not have a difference in efficacy when compared to Cathodal transcranial direct current stimulation on unaffected hemisphere with robot assisted arm training for improving performance of activities of daily living.	1	Ochi et al. (2013)
1b	Bilateral transcranial direct current stimulation with neuromuscular electrical stimulation and coventional care may not have a difference in efficacy when compared to Sham transcranial direct current stimulation and neuromuscular electrical stimulation with conventional care for improving performance of activities of daily living.	1	Wei et al. (2022)
1b	Anodal transcranial direct current stimulation with Upper extremity strength training may not have a difference in efficacy when compared to Sham transcranial direct current stimulation with Upper extremity strength training for improving performance of activities of daily living.	1	Palimeris et al. (2022)
1b	Bilateral transcranial direct current stimulation with modified constraint-induced movement therapy and conventional rehab may produce greater improvements in performance of activities of daily living than Sham transcranial direct current stimulation with modified constraint-induced movement therapy and conventional rehab.	1	Garrido et al. (2023)
1b	Dual transcranial direct current stimulation with Sensorimotor training may produce greater improvements in performance of activities of daily living than Sham transcranial direct current stimulation with Sensorimotor training.	1	Li et al. (2024c)

1b	Repetitive transcranial magnetic stimulation may not have a difference in efficacy when compared to Dual transcranial direct current stimulation for improving performance of activities of daily living.	1	Miu et al. (2020)
1b	Neuronavigated Continuous Theta Burst Stimulation may not have a difference in efficacy when compared to Sham for improving performance of activities of daily living.	1	Nicolo et al. (2018)
1b	Neuronavigated Continuous Theta Burst Stimulation may not have a difference in efficacy when compared to Cathodal -transcranial direct current stimulation for improving performance of activities of daily living.	1	Nicolo et al. (2018)
1b	Robot-Assisted Therapy (RAT) with dual transcranial direct current stimulation may not have a difference in efficacy when compared to Robot-Assisted Therapy (RAT) with sham transcranial direct current stimulation for improving performance of activities of daily living.	1	Morone et al. (2022)
1b	Intermittent theta burst stimulation with high definition transcranial direct current stimulation and rehabilitation may produce greater improvements in performance of activities of daily living than Sham intermittent theta burst stimulation and transcranial direct current stimulation with rehabilitation.	1	Bian et al. (2024)
1b	Intermittent theta burst stimulation with high definition transcranial direct current stimulation and rehabilitation may not have a difference in efficacy when compared to sham transcranial direct current stimulation with intermittent theta burst stimulation and rehabilitation for improving performance of activities of daily living.	1	Bian et al. (2024)
1b	Bilateral transcranial direct current stimulation with Robotic training may not have a difference in efficacy when compared to Sham transcranial direct current stimulation with Robotic training for improving performance of activities of daily living.	1	Bernal-Jiménez et al. (2024)
1b	Dual transcranial direct current stimulation with bimanual cooperative task training may not have a difference in efficacy when compared to sham dual tDCS with bimanual cooperative task training for improving performance of activities of daily living.	1	Doost et al. (2019)
1b	There is conflicting evidence about the effect of Dual tDCS combined with other interventions when compared to sham or cimt for improving performance of activities of daily living.	1	Kim et al. (2021)
1b	Sequential Combination of Anodal tDCS with Mirror Therapy may produce greater improvements in performance of activities of daily living than Sham tDCS with Mirror Therapy.	1	Liao et al. (2020)
1b	There is conflicting evidence about the effect of dual-tDCS combined with PNMES with CIMT when compared to CIMT for improving performance of activities of daily living.	1	Takebayashi et al. (2017)
1b	Cathodal tDCS with VR may not have a difference in efficacy when compared to VR: for improving performance of activities of daily living.	1	Lee et al. (2014b)
1b	Cathodal tDCS with VR may not have a difference in efficacy when compared to Cathodal tDCS for improving performance of activities of daily living.	1	Lee et al. (2014b)
1b	Cathodal tDCS may not have a difference in efficacy when compared to VR: for improving performance of activities of daily living.	1	Lee et al. (2014b)
1b	Real bilateral tDCS with resistance training exercise may not have a difference in efficacy when compared to sham tDCS with resistance training exercise for improving performance of activities of daily living.	1	Beaulieu et al. (2019)

1b	Robot-assisted therapy with dual tDCS may not have a difference in efficacy when compared to Robot-assisted therapy with sham tDCS for improving performance of activities of daily living.	1	Straudi et al. (2016)
1b	Anodal tDCS with CIMT may not have a difference in efficacy when compared to sham tDCS with CIMT for improving performance of activities of daily living.	1	Cunningham et al. (2015)
1b	Bilateral tDCS and CIMT may not have a difference in efficacy when compared to Sham tDCS with CIMT for improving performance of activities of daily living.	1	Bolognini et al. (2011)
1b	Anodal tDCS Ipsilesional PMC with CIMT may produce greater improvements in performance of activities of daily living than Sham Stimulation with cMIT.	1	Andrade et al. (2017)
1b	Anodal tDCS Ipsilesional M1 with CIMT may produce greater improvements in performance of activities of daily living than Sham Stimulation with cMIT.	1	Andrade et al. (2017)
1b	Concurrent Combination of tDCS with Mirror Therapy may not have a difference in efficacy when compared to Sham tDCS with Mirror Therapy for improving performance of activities of daily living.	1	Liao et al. (2020)

DEXTERITY			
LoE	**Conclusion Statement**	**RCTs**	**References**
1b	There is conflicting evidence about the effect of Transcranial direct current stimulation when compared to sham for improving dexterity.	2	Au-Yeung et al. (2014a); Fusco et al. (2013)
1a	There is conflicting evidence about the effect of Anodal transcranial direct current stimulation when compared to sham for improving dexterity.	5	Cordes D. et al. (2024); Midha & Arumugam (2024); Achacheluee et al. (2018); Fusco et al. (2014b); Kim et al. (2009)
2	Anodal transcranial direct current stimulation at M1 and DLPFC may produce greater improvements in dexterity than Anodal transcranial direct current stimulation at M1 only.	1	Achacheluee et al. (2018)
1a	There is conflicting evidence about the effect of Dual transcranial direct current stimulation when compared to sham for improving dexterity.	2	van der Vliet et al. (2017); Lefebvre et al. (2014)
1b	Short lasting bilateral transcranial direct current stimulation online (during motor training) may not have a difference in efficacy when compared to Long lasting bilateral transcranial direct current stimulation offline (incongruent with motor training) or Short lasting transcranial direct current stimulation offline (incongruent with motor training) for improving dexterity.	1	van der Vliet et al. (2017)
2	Robot assisted therapy (InMotion WRIST Robot) with Anodal transcranial direct current stimulation may not have a difference in efficacy when compared to Robot assisted therapy with sham transcranial direct current stimulation for improving dexterity.	1	Mazzoleni et al. (2019)
1b	Anodal transcranial direct current stimulation with Robot-Assisted Arm Training may not have a difference in efficacy when compared to Sham stimulation with Robot-Asssited Arm Training for improving dexterity.	1	Hesse et al. (2011b)
1b	Dual transcranial direct current stimulation may not have a difference in efficacy when compared to Electroacupuncture for improving dexterity.	1	Hathaiareerug & Vearasilp (2019)
1b	Anodal transcranial direct current stimulation with visuomotor gripforce tracking task may not have a difference in efficacy when compared to Sham transcranial direct current stimulation with visuomotor gripforce tracking task for improving dexterity.	1	Pavlova et al. (2017)

1b	Cathodal transcranial direct current stimulation may not have a difference in efficacy when compared to sham for improving dexterity.	1	Fusco et al. (2014a)
1b	Dual transcranial direct current stimulation combined with other interventions may produce greater improvements in dexterity than sham or motor relearning programmes.	2	Lefebvre et al. (2015); Lefebvre et al. (2013)
2	Anodal transcranial direct current stimulation with Repetitive Functional Task-Oriented Programme (RFTOP) may produce greater improvements in dexterity than Repetitive Functional Task Oriented Programme.	1	Adeagbo et al. (2021)
1b	Anodal transcranial direct current stimulation with Virtual Reality may produce greater improvements in dexterity than sham transcranial direct current stimulation with Virtual Reality.	1	Lee & Cha (2022)
1b	Anodal transcranial direct current stimulation with Upper extremity strength training may not have a difference in efficacy when compared to Sham transcranial direct current stimulation with Upper extremity strength training for improving dexterity.	1	Palimeris et al. (2022)
1b	Dual transcranial direct current stimulation with Sensorimotor training may produce greater improvements in dexterity than Sham transcranial direct current stimulation with Sensorimotor training.	1	Li et al. (2024c)
1b	Repetitive transcranial magnetic stimulation may not have a difference in efficacy when compared to Dual transcranial direct current stimulation for improving dexterity.	1	Miu et al. (2020)
1b	Neuronavigated Continuous Theta Burst Stimulation may not have a difference in efficacy when compared to Sham for improving dexterity.	1	Nicolo et al. (2018)
1b	Neuronavigated Continuous Theta Burst Stimulation may not have a difference in efficacy when compared to Cathodal -transcranial direct current stimulation for improving dexterity.	1	Nicolo et al. (2018)
1b	Dual transcranial direct current stimulation with robot-assisted upper limb therapy may not have a difference in efficacy when compared to Sham dual-transcranial direct current stimulation with robot-assisted upper limb therapy for improving dexterity.	1	Dehem et al. (2018)
1a	There is conflicting evidence about the effect of Anodal tDCS combined with other interventions when compared to sham for improving dexterity.	2	Huang et al. (2022b); Chen et al. (2021f)
1b	Bilateral tDCS before mirror therapy may not have a difference in efficacy when compared to tDCS during mirror therapy for improving dexterity.	1	Jin et al. (2019)
1b	Bilateral tDCS before mirror therapy may not have a difference in efficacy when compared to Sham tDCS with mirror therapy for improving dexterity.	1	Jin et al. (2019)
1b	TDCS during mirror therapy may not have a difference in efficacy when compared to Sham tDCS with mirror therapy for improving dexterity.	1	Jin et al. (2019)
2	Dual tDCS with Mirror therapy may produce greater improvements in dexterity than tDCS with Sham mirror.	1	Cho & Cha (2015)
1b	Cathodal tDCS with VR may not have a difference in efficacy when compared to VR: for improving dexterity.	1	Lee et al. (2014b)
1b	Cathodal tDCS with VR may not have a difference in efficacy when compared to Cathodal tDCS for improving dexterity.	1	Lee et al. (2014b)
1b	Cathodal tDCS may not have a difference in efficacy when compared to VR: for improving dexterity.	1	Lee et al. (2014b)

2	Dual tDCS with methylphenidate may produce greater improvements in dexterity than tDCS with placebo.	1	Wang et al. (2014c)
2	Dual tDCS with methylphenidate may produce greater improvements in dexterity than Sham tDCS with methylphenidate.	1	Wang et al. (2014c)
1b	Real bilateral tDCS with resistance training exercise may not have a difference in efficacy when compared to sham tDCS with resistance training exercise for improving dexterity.	1	Beaulieu et al. (2019)
1b	Robot-assisted therapy with dual tDCS may not have a difference in efficacy when compared to Robot-assisted therapy with sham tDCS for improving dexterity.	1	Straudi et al. (2016)
1b	Anodal tDCS with CIMT may not have a difference in efficacy when compared to sham tDCS with CIMT for improving dexterity.	1	Cunningham et al. (2015)
1b	Anodal tDCS Ipsilesional PMC with CIMT may produce greater improvements in dexterity than Anodal tDCS Ipsilesional M1 with CIMT.	1	Andrade et al. (2017)
1b	Anodal tDCS Ipsilesional PMC with CIMT may produce greater improvements in dexterity than Sham Stimulation with cMIT.	1	Andrade et al. (2017)

Key Points

- Transcranial direct current stimulation may not be beneficial for improving motor function, stroke severity, muscle strength, spasticity, and performance of activities of daily living after stroke when compared to sham; the literature is mixed regarding dexterity.
- Anodal transcranial direct current stimulation with conventional physio may not be beneficial for improving muscle strength after stroke when compared to dual transcranial direct current stimulation with conventional physio.
- Anodal transcranial direct current stimulation with conventional physio may be less beneficial than dual transcranial direct current stimulation with conventional physio for improving motor function after stroke.
- Cathodal transcranial direct current stimulation with conventional physio may not be beneficial for improving motor function and muscle strength after stroke when compared to dual transcranial direct current stimulation with conventional physio.
- Unilateral Hemisphere transcranial direct current stimulation may not be beneficial for improving motor function, spasticity, and muscle strength after stroke when compared to Dual Hemisphere transcranial direct current stimulation.
- Anodal transcranial direct current stimulation with physical therapy and occupational therapy may not be beneficial for improving motor function after stroke when compared to Dual transcranial direct current stimulation with physical therapy and occupational therapy.
- Anodal transcranial direct current stimulation may be beneficial for improving performance of activities of daily living, but not motor function, stroke severity, muscle strength, range of motion, and proprioception, after stroke when compared to sham; the literature is mixed regarding spasticity and dexterity.
- HD-transcranial direct current stimulation with Conventional therapy may not be beneficial for improving motor function, performance of activities of daily living, and spasticity after stroke when compared to a-transcranial direct current stimulation with Conventional therapy.
- Anodal transcranial direct current stimulation at M1 and DLPFC may be beneficial for improving dexterity, but not motor function, after stroke when compared to Anodal transcranial direct current stimulation at M1 only.
- Dual transcranial direct current stimulation - on primary motor cortex and left dorsolateral prefrontal cortex (DLPFC) may be beneficial for improving motor function after stroke when compared to transcranial direct current stimulation on M1 and sham transcranial direct current stimulation on DLPFC.
- Dual transcranial direct current stimulation may be beneficial for improving motor function and stroke severity, but not muscle strength, spasticity, and performance of activities of daily living, after stroke when compared to sham; the literature is mixed regarding dexterity.

- Robot assisted therapy (InMotion WRIST Robot) with Anodal transcranial direct current stimulation may not be beneficial for improving motor function, dexterity, spasticity, and muscle strength after stroke when compared to Robot assisted therapy with sham transcranial direct current stimulation.
- Anodal transcranial direct current stimulation with Robot-Assisted Arm Training may not be beneficial for improving motor function, dexterity, performance of activities of daily living, spasticity, and muscle strength after stroke when compared to Sham stimulation with Robot-Asssited Arm Training.
- Dual transcranial direct current stimulation may not be beneficial for improving motor function, dexterity, and muscle strength after stroke when compared to Electroacupuncture.
- Cathodal transcranial direct current stimulation with virtual reality may be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Sham transcranial direct current stimulation with virtual reality.
- Anodal transcranial direct current stimulation with visuomotor gripforce tracking task may not be beneficial for improving motor function and dexterity after stroke when compared to Sham transcranial direct current stimulation with visuomotor gripforce tracking task.
- Cathodal transcranial direct current stimulation may be beneficial for improving motor function and range of motion, but not stroke severity, muscle strength, performance of activities of daily living, and dexterity, after stroke when compared to sham; the literature is mixed regarding spasticity.
- Anodal transcranial direct current stimulation on affected hemisphere with robot assisted arm training may be beneficial for improving spasticity, but not motor function and performance of activities of daily living, after stroke when compared to Cathodal transcranial direct current stimulation on unaffected hemisphere with robot assisted arm training.
- Bilateral transcranial direct current stimulation with motor imagery brain-computer interface may not be beneficial for improving motor function after stroke when compared to Sham transcranial direct current stimulation with motor imagery brain-computer interface.
- The literature is mixed regarding the effect of Dual transcranial direct current stimulation combined with other interventions on improvement of motor function after stroke when compared to sham or task-specific training.
- Anodal transcranial direct current stimulation with occupational therapy may not be beneficial for improving muscle strength after stroke when compared to Sham with occupational therapy; the literature is mixed regarding motor function.
- Dual transcranial direct current stimulation combined with other interventions may be beneficial for improving muscle strength, but not spasticity and range of motion, after stroke when compared to sham or fes; the literature is mixed regarding motor function.
- Anodal transcranial direct current stimulation with virtual reality-based therapy and conventional physical therapy may be beneficial for improving motor function and proprioception after stroke when compared to conventional physiotherapy.
- Anodal transcranial direct current stimulation with Repetitive Functional Task-Oriented Programme (RFTOP) may be beneficial for improving dexterity, but not motor function, after stroke when compared to Repetitive Functional Task Oriented Programme.
- The literature is mixed regarding the effect of Visuo-Motor Grip Force Tracking Task Training of the paretic hand with Anodal Unilateral transcranial direct current stimulation on improvement of motor function after stroke when compared to Visuo-Motor Grip Force Tracking Task Training of the paretic hand with Placebo transcranial direct current stimulation.
- Visuo-Motor Grip Force Tracking Task Training of the paretic hand with Anodal Unilateral transcranial direct current stimulation may not be beneficial for improving motor function after stroke when compared to Visuo-Motor Grip Force Tracking Task Training of the paretic hand with Bilateral transcranial direct current stimulation.
- Anodal transcranial direct current stimulation with motor imagery and upper-limb functional training may be beneficial for improving motor function after stroke when compared to sham tCDS with motor imagery and upper-limb functional training.
- Anodal transcranial direct current stimulation with Virtual Reality may be beneficial for improving dexterity, but not motor function, after stroke when compared to sham transcranial direct current stimulation with Virtual Reality.

- Bilateral transcranial direct current stimulation with trunk restraint or training and Conventional physical therapy may be beneficial for improving motor function after stroke when compared to Conventional physical therapy.
- Bilateral transcranial direct current stimulation with trunk restraint or training and Conventional physical therapy may be beneficial for improving motor function after stroke when compared to Sham transcranial direct current stimulation with trunk restraint or training and Conventional physical therapy.
- Bilateral transcranial direct current stimulation with neuromuscular electrical stimulation and coventional care may not be beneficial for improving motor function, performance of activities of daily living, and spasticity after stroke when compared to Sham transcranial direct current stimulation and neuromuscular electrical stimulation with conventional care.
- Anodal transcranial direct current stimulation with Upper extremity strength training may not be beneficial for improving motor function, dexterity, performance of activities of daily living, range of motion, and muscle strength after stroke when compared to Sham transcranial direct current stimulation with Upper extremity strength training.
- Dual transcranial direct current stimulation combined with other interventions may be beneficial for improving motor function, but not muscle strength, after stroke when compared to sham or exercise and custom physiotherapy protocols; the literature is mixed regarding spasticity.
- Bihemispheric transcranial direct current stimulation with Custum physiotherapy protocol may not be beneficial for improving motor function and spasticity after stroke when compared to Unihemispheric transcranial direct current stimulation with Custum physiotherapy protocol.
- Bilateral transcranial direct current stimulation with modified constraint-induced movement therapy and conventional rehab may be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Sham transcranial direct current stimulation with modified constraint-induced movement therapy and conventional rehab.
- Anodal transcranial direct current stimulation with conventional may not be beneficial for improving motor function after stroke when compared to Sham transcranial direct current stimulation with conventional rehab.
- Anodal tDCS with CIMT may not be beneficial for improving motor function, muscle strength, performance of activities of daily living, and dexterity after stroke when compared to sham tDCS with CIMT.
- Bihemispheric transcranial direct current stimulation with Repetitive Peripheral Nerve Stimulation and Conventional Therapy may not be beneficial for improving motor function and spasticity after stroke when compared to Sham transcranial direct current stimulation with Repetitive Peripheral Nerve Stimulation and Conventional Therapy.
- Dual transcranial direct current stimulation with Sensorimotor training may be beneficial for improving motor function, dexterity, performance of activities of daily living, and proprioception after stroke when compared to Sham transcranial direct current stimulation with Sensorimotor training.
- High frequency repetitive transcranial magnetic stimulation with cathodal transcranial direct current stimulation may be beneficial for improving motor function after stroke when compared to High frequency repetitive transcranial magnetic stimulation.
- Repetitive transcranial magnetic stimulation may not be beneficial for improving motor function, dexterity, performance of activities of daily living, and muscle strength after stroke when compared to Dual transcranial direct current stimulation.
- Neuronavigated Continuous Theta Burst Stimulation may not be beneficial for improving motor function, dexterity, performance of activities of daily living, and muscle strength after stroke when compared to Sham.
- Neuronavigated Continuous Theta Burst Stimulation may not be beneficial for improving motor function, dexterity, performance of activities of daily living, and muscle strength after stroke when compared to Cathodal -transcranial direct current stimulation.
- Anodal transcranial direct current stimulation with robot assited arm training may not be beneficial for improving motor function after stroke when compared to robot assisted arm training with sham.
- Robot-Assisted Therapy (RAT) with dual transcranial direct current stimulation may not be beneficial for improving motor function, performance of activities of daily living, spasticity, stroke severity, and muscle strength after stroke when compared to Robot-Assisted Therapy (RAT) with sham transcranial direct current stimulation.

- Smart hand joint training device with bilateral transcranial direct current stimulation may be beneficial for improving motor function and stroke severity after stroke when compared to Smart hand joint training device.
- Personalized reach training (active control-restricted range) with anodal transcranial direct current stimulation and Virtual reality games may not be beneficial for improving motor function and range of motion after stroke when compared to Personal reach training (active control-restricted range) with Sham transcranial direct current stimulation and video games.
- Intermittent theta burst stimulation with high definition transcranial direct current stimulation and rehabilitation may be beneficial for improving performance of activities of daily living and muscle strength, but not spasticity, after stroke when compared to Sham intermittent theta burst stimulation and transcranial direct current stimulation with rehabilitation; the literature is mixed regarding motor function.
- Intermittent theta burst stimulation with high definition transcranial direct current stimulation and rehabilitation may not be beneficial for improving motor function, performance of activities of daily living, spasticity, and muscle strength after stroke when compared to sham transcranial direct current stimulation with intermittent theta burst stimulation and rehabilitation.
- Bilateral transcranial direct current stimulation with Robotic training may not be beneficial for improving motor function, performance of activities of daily living, spasticity, and muscle strength after stroke when compared to Sham transcranial direct current stimulation with Robotic training.
- Short lasting bilateral transcranial direct current stimulation online (during motor training) may not be beneficial for improving dexterity and muscle strength after stroke when compared to Long lasting bilateral transcranial direct current stimulation offline (incongruent with motor training) or Short lasting transcranial direct current stimulation offline (incongruent with motor training).
- Dual transcranial direct current stimulation combined with other interventions may be beneficial for improving dexterity, but not muscle strength, after stroke when compared to sham or motor relearning programmes.
- Dual transcranial direct current stimulation with robot-assisted upper limb therapy may not be beneficial for improving dexterity after stroke when compared to Sham dual-transcranial direct current stimulation with robot-assisted upper limb therapy.
- Dual transcranial direct current stimulation with bimanual cooperative task training may not be beneficial for improving performance of activities of daily living after stroke when compared to sham dual tDCS with bimanual cooperative task training.
- Anodal transcranial direct current stimulation with functional electrical stimulation may be beneficial for improving spasticity after stroke when compared to Sham transcranial direct current stimulation with functional electrical stimulation.
- Active repetitive peripheral nerve sensory stimulation (RPPS) with sham transcranial direct current stimulation may not be beneficial for improving range of motion and muscle strength after stroke when compared to Sham RRPS with sham transcranial direct current stimulation.
- Active repetitive peripheral nerve sensory stimulation (RPPS) with sham transcranial direct current stimulation may not be beneficial for improving range of motion and muscle strength after stroke when compared to Sham RRPS with Anodal transcranial direct current stimulation or Active RRPS and active transcranial direct current stimulation.
- Low Frequency repetitive transcranial magnetic stimulation may be less beneficial than ANodal transcranial direct current stimulation or Low Frequency repetitive transcranial magnetic stimulation with ANodal transcranial direct current stimulation for improving muscle strength after stroke.
- Bimanual motor skill learning with robot-assisted training and transcranial direct current stimulation may not be beneficial for improving muscle strength after stroke when compared to bimanual motor skill learning with sham stimulation.
- The literature is mixed regarding the effect of High-definition tDCS with EMG-driven robotic hand (EMG-RH) on motor function and spasticity after stroke when compared to Sham tDCS with EMG-RH.
- Sequential Combination of Anodal tDCS with Mirror Therapy may be beneficial for improving performance of activities of daily living, but not motor function, after stroke when compared to Sham tDCS with Mirror Therapy.
- Bilateral tDCS before mirror therapy may not be beneficial for improving dexterity after stroke when compared to tDCS during mirror therapy.

- Bilateral tDCS before mirror therapy may not be beneficial for improving motor function and dexterity after stroke when compared to Sham tDCS with mirror therapy.
- TDCS during mirror therapy may not be beneficial for improving dexterity after stroke when compared to Sham tDCS with mirror therapy; the literature is mixed regarding motor function.
- Dual-tDCS combined with PNMES with CIMT may be beneficial for improving motor function after stroke when compared to CIMT; the literature is mixed regarding performance of activities of daily living.
- Anodal tDCS with Modified CIMT may not be beneficial for improving muscle strength after stroke when compared to Sham tDCS with CIMT; the literature is mixed regarding motor function.
- Dual tDCS with Mirror therapy may be beneficial for improving muscle strength and dexterity, but not motor function, after stroke when compared to tDCS with Sham mirror.
- Cathodal tDCS with physical therapy may be beneficial for improving motor function after stroke when compared to Physical therapy.
- Cathodal tDCS with VR may be beneficial for improving motor function, but not spasticity, performance of activities of daily living, and dexterity, after stroke when compared to VR:.
- Cathodal tDCS with VR may be beneficial for improving motor function, but not spasticity, performance of activities of daily living, and dexterity, after stroke when compared to Cathodal tDCS.
- Cathodal tDCS may be beneficial for improving motor function, but not spasticity, performance of activities of daily living, and dexterity, after stroke when compared to VR:.
- Dual tDCS with methylphenidate may be beneficial for improving dexterity after stroke when compared to tDCS with placebo.
- Dual tDCS with methylphenidate may be beneficial for improving dexterity after stroke when compared to Sham tDCS with methylphenidate.
- Anodal tDCS combined with other interventions may not be beneficial for improving motor function after stroke when compared to sham; the literature is mixed regarding spasticity and dexterity.
- Dual tDCS combined with other interventions may not be beneficial for improving motor function after stroke when compared to sham or cimt; the literature is mixed regarding performance of activities of daily living.
- Active rTMS with cathodal tDCS may be beneficial for improving motor function after stroke when compared to sham rTMS with sham cathodal tDCS.
- Real bilateral tDCS with resistance training exercise may not be beneficial for improving motor function, muscle strength, spasticity, performance of activities of daily living, and dexterity after stroke when compared to sham tDCS with resistance training exercise.
- Robot-assisted therapy with dual tDCS may not be beneficial for improving motor function, performance of activities of daily living, and dexterity after stroke when compared to Robot-assisted therapy with sham tDCS.
- Virtual reality with aNodal tDCS may not be beneficial for improving motor function, muscle strength, and spasticity after stroke when compared to virtual reality with sham.
- Bilateral tDCS and CIMT may not be beneficial for improving muscle strength and performance of activities of daily living after stroke when compared to Sham tDCS with CIMT; the literature is mixed regarding motor function.
- Different approaches to anodal tDCS combined with peripheral nerve stimulation and robot-assisted training may not have a difference in efficacy when compared with one another for improving motor function.
- Bilateral tDCS before mirror therapy may be less beneficial than tDCS during mirror therapy for improving motor function after stroke.
- Anodal tDCS Ipsilesional PMC with CIMT may be beneficial for improving motor function, muscle strength, spasticity, and dexterity after stroke when compared to Anodal tDCS Ipsilesional M1 with CIMT.
- Anodal tDCS Ipsilesional PMC with CIMT may be beneficial for improving motor function, muscle strength, spasticity, performance of activities of daily living, and dexterity after stroke when compared to Sham Stimulation with cMIT.
- Anodal tDCS Ipsilesional M1 with CIMT may be beneficial for improving performance of activities of daily living after stroke when compared to Sham Stimulation with cMIT.

- Concurrent Combination of tDCS with Mirror Therapy may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Sham tDCS with Mirror Therapy.
- Cathodal tDCS with Modified CIMT may not be beneficial for improving motor function and muscle strength after stroke when compared to Sham tDCS with CIMT.
- Simultaneous cathodal tDCS with 10hz rTMS may be beneficial for improving proprioception after stroke when compared to rTMS 10Hz with Sham tDCS.
- Simultaneous anodal tDCS with 10hz rTMS may not be beneficial for improving proprioception after stroke when compared to rTMS 10Hz with Sham tDCS.
- Preconditioning cathodal tCDS with 10hz rTMS may not be beneficial for improving proprioception after stroke when compared to rTMS 10Hz with Sham tDCS.
- Preconditioning anodal tDCS with 10hz rTMS may not be beneficial for improving proprioception after stroke when compared to rTMS 10Hz with Sham tDCS.

Summary of Key Points: Transcranial Direct Current Stimulation (tDCS)

Intervention	Control(s)	Function domain(s)	Effect
Transcranial direct current stimulation	sham	Motor function, stroke severity, muscle strength, spasticity, performance of activities of daily living	-
Transcranial direct current stimulation	sham	Dexterity	=
Anodal transcranial direct current stimulation with conventional physio	dual transcranial direct current stimulation with conventional physio	Motor function, muscle strength	-
Cathodal transcranial direct current stimulation with conventional physio	dual transcranial direct current stimulation with conventional physio	Motor function, muscle strength	-
Unilateral Hemisphere transcranial direct current stimulation	Dual Hemisphere transcranial direct current stimulation	Motor function, spasticity, muscle strength	-
Anodal transcranial direct current stimulation with physical therapy and occupational therapy	Dual transcranial direct current stimulation with physical therapy and occupational therapy	Motor function	-
Anodal transcranial direct current stimulation	sham	Performance of activities of daily living	+
Anodal transcranial direct current stimulation	sham	Motor function, stroke severity, muscle strength, range of motion, proprioception	-
Anodal transcranial direct current stimulation	sham	Spasticity, dexterity	=
HD-transcranial direct current stimulation with Conventional therapy	a-transcranial direct current stimulation with Conventional therapy	Motor function, performance of activities of daily living, spasticity	-
Anodal transcranial direct current stimulation at M1 and DLPFC	Anodal transcranial direct current stimulation at M1 only	Dexterity	+
Anodal transcranial direct current stimulation at M1 and DLPFC	Anodal transcranial direct current stimulation at M1 only	Motor function	-
Dual transcranial direct current stimulation - on primary motor cortex and left dorsolateral prefrontal cortex (DLPFC)	transcranial direct current stimulation on M1 and sham transcranial direct current stimulation on DLPFC	Motor function	+
Dual transcranial direct current stimulation	sham	Motor function, stroke severity	+

Dual transcranial direct current stimulation	sham	Muscle strength, spasticity, performance of activities of daily living	−
Dual transcranial direct current stimulation	sham	Dexterity	=
Robot assisted therapy (InMotion WRIST Robot) with Anodal transcranial direct current stimulation	Robot assisted therapy with sham transcranial direct current stimulation	Motor function, dexterity, spasticity, muscle strength	−
Anodal transcranial direct current stimulation with Robot-Assisted Arm Training	Sham stimulation with Robot-Asssited Arm Training	Motor function, dexterity, performance of activities of daily living, spasticity, muscle strength	−
Dual transcranial direct current stimulation	Electroacupuncture	Motor function, dexterity, muscle strength	−
Cathodal transcranial direct current stimulation with virtual reality	Sham transcranial direct current stimulation with virtual reality	Motor function, performance of activities of daily living	+
Anodal transcranial direct current stimulation with visuomotor gripforce tracking task	Sham transcranial direct current stimulation with visuomotor gripforce tracking task	Motor function, dexterity	−
Cathodal transcranial direct current stimulation	sham	Motor function, range of motion	+
Cathodal transcranial direct current stimulation	sham	Stroke severity, muscle strength, performance of activities of daily living, dexterity	−
Cathodal transcranial direct current stimulation	sham	Spasticity	=
Anodal transcranial direct current stimulation on affected hemisphere with robot assisted arm training	Cathodal transcranial direct current stimulation on unaffected hemisphere with robot assisted arm training	Spasticity	+
Anodal transcranial direct current stimulation on affected hemisphere with robot assisted arm training	Cathodal transcranial direct current stimulation on unaffected hemisphere with robot assisted arm training	Motor function, performance of activities of daily living	−
Bilateral transcranial direct current stimulation with motor imagery brain-computer interface	Sham transcranial direct current stimulation with motor imagery brain-computer interface	Motor function	−
Dual transcranial direct current stimulation combined with other interventions	sham or task-specific training	Motor function	=
Anodal transcranial direct current stimulation with occupational therapy	Sham with occupational therapy	Muscle strength	−
Anodal transcranial direct current stimulation with occupational therapy	Sham with occupational therapy	Motor function	=
Dual transcranial direct current stimulation combined with other interventions	sham or fes	Muscle strength	+
Dual transcranial direct current stimulation combined with other interventions	sham or fes	Spasticity, range of motion	−
Anodal transcranial direct current stimulation with virtual reality-based therapy and conventional physical therapy	conventional physiotherapy	Motor function, proprioception	+

Anodal transcranial direct current stimulation with Repetitive Functional Task-Oriented Programme (RFTOP)	Repetitive Functional Task Oriented Programme	Dexterity	+
Anodal transcranial direct current stimulation with Repetitive Functional Task-Oriented Programme (RFTOP)	Repetitive Functional Task Oriented Programme	Motor function	−
Visuo-Motor Grip Force Tracking Task Training of the paretic hand with Anodal Unilateral transcranial direct current stimulation	Visuo-Motor Grip Force Tracking Task Training of the paretic hand with Placebo transcranial direct current stimulation	Motor function	=
Visuo-Motor Grip Force Tracking Task Training of the paretic hand with Anodal Unilateral transcranial direct current stimulation	Visuo-Motor Grip Force Tracking Task Training of the paretic hand with Bilateral transcranial direct current stimulation	Motor function	−
Anodal transcranial direct current stimulation with motor imagery and upper-limb functional training	sham tCDS with motor imagery and upper-limb functional training	Motor function	+
Anodal transcranial direct current stimulation with Virtual Reality	sham transcranial direct current stimulation with Virtual Reality	Dexterity	+
Anodal transcranial direct current stimulation with Virtual Reality	sham transcranial direct current stimulation with Virtual Reality	Motor function	−
Bilateral transcranial direct current stimulation with trunk restraint or training and Conventional physical therapy	Conventional physical therapy	Motor function	+
Bilateral transcranial direct current stimulation with trunk restraint or training and Conventional physical therapy	Sham transcranial direct current stimulation with trunk restraint or training and Conventional physical therapy	Motor function	+
Bilateral transcranial direct current stimulation with neuromuscular electrical stimulation and coventional care	Sham transcranial direct current stimulation and neuromuscular electrical stimulation with conventional care	Motor function, performance of activities of daily living, spasticity	−
Anodal transcranial direct current stimulation with Upper extremity strength training	Sham transcranial direct current stimulation with Upper extremity strength training	Motor function, dexterity, performance of activities of daily living, range of motion, muscle strength	−
Dual transcranial direct current stimulation combined with other interventions	sham or exercise and custom physiotherapy protocols	Motor function	+
Dual transcranial direct current stimulation combined with other interventions	sham or exercise and custom physiotherapy protocols	Muscle strength	−
Dual transcranial direct current stimulation combined with other interventions	sham or exercise and custom physiotherapy protocols	Spasticity	=
Bihemispheric transcranial direct current stimulation with Custum physiotherapy protocol	Unihemispheric transcranial direct current stimulation with Custum physiotherapy protocol	Motor function, spasticity	−
Bilateral transcranial direct current stimulation with modified constraint-induced movement therapy and conventional rehab	Sham transcranial direct current stimulation with modified constraint-induced movement therapy and conventional rehab	Motor function, performance of activities of daily living	+

Anodal transcranial direct current stimulation with conventional	Sham transcranial direct current stimulation with conventional rehab	Motor function	−
Anodal tDCS with CIMT	sham tDCS with CIMT	Motor function, muscle strength, performance of activities of daily living, dexterity	−
Bihemispheric transcranial direct current stimulation with Repetitive Peripheral Nerve Stimulation and Conventional Therapy	Sham transcranial direct current stimulation with Repetitive Peripheral Nerve Stimulation and Conventional Therapy	Motor function, spasticity	−
Dual transcranial direct current stimulation with Sensorimotor training	Sham transcranial direct current stimulation with Sensorimotor training	Motor function, dexterity, performance of activities of daily living, proprioception	+
High frequency repetitive transcranial magnetic stimulation with cathodal transcranial direct current stimulation	High frequency repetitive transcranial magnetic stimulation	Motor function	+
Repetitive transcranial magnetic stimulation	Dual transcranial direct current stimulation	Motor function, dexterity, performance of activities of daily living, muscle strength	−
Neuronavigated Continuous Theta Burst Stimulation	Sham	Motor function, dexterity, performance of activities of daily living, muscle strength	−
Neuronavigated Continuous Theta Burst Stimulation	Cathodal -transcranial direct current stimulation	Motor function, dexterity, performance of activities of daily living, muscle strength	−
Anodal transcranial direct current stimulation with robot assited arm training	robot assisted arm training with sham	Motor function	−
Robot-Assisted Therapy (RAT) with dual transcranial direct current stimulation	Robot-Assisted Therapy (RAT) with sham transcranial direct current stimulation	Motor function, performance of activities of daily living, spasticity, stroke severity, muscle strength	−
Smart hand joint training device with bilateral transcranial direct current stimulation	Smart hand joint training device	Motor function, stroke severity	+
Personalized reach training (active control-restricted range) with anodal transcranial direct current stimulation and Virtual reality games	Personal reach training (active control-restricted range) with Sham transcranial direct current stimulation and video games	Motor function, range of motion	−
Intermittent theta burst stimulation with high definition transcranial direct current stimulation and rehabilitation	Sham intermittent theta burst stimulation and transcranial direct current stimulation with rehabilitation	Performance of activities of daily living, muscle strength	+
Intermittent theta burst stimulation with high definition transcranial direct current stimulation and rehabilitation	Sham intermittent theta burst stimulation and transcranial direct current stimulation with rehabilitation	Spasticity	−
Intermittent theta burst stimulation with high definition transcranial direct current stimulation and rehabilitation	Sham intermittent theta burst stimulation and transcranial direct current stimulation with rehabilitation	Motor function	=
Intermittent theta burst stimulation with high definition transcranial direct current stimulation and rehabilitation	sham transcranial direct current stimulation with intermittent theta burst stimulation and rehabilitation	Motor function, performance of activities of daily living, spasticity, muscle strength	−

Bilateral transcranial direct current stimulation with Robotic training	Sham transcranial direct current stimulation with Robotic training	Motor function, performance of activities of daily living, spasticity, muscle strength	–
Anodal tDCS combined with peripheral nerve stimulation and robot-assisted training	One another (different approaches compared)	Motor function	–
Short lasting bilateral transcranial direct current stimulation online (during motor training)	Long lasting bilateral transcranial direct current stimulation offline (incongruent with motor training) or Short lasting transcranial direct current stimulation offline (incongruent with motor training)	Dexterity, muscle strength	–
Dual transcranial direct current stimulation combined with other interventions	sham or motor relearning programmes	Dexterity	+
Dual transcranial direct current stimulation combined with other interventions	sham or motor relearning programmes	Muscle strength	–
Dual transcranial direct current stimulation with robot-assisted upper limb therapy	Sham dual-transcranial direct current stimulation with robot-assisted upper limb therapy	Dexterity	–
Dual transcranial direct current stimulation with bimanual cooperative task training	sham dual tDCS with bimanual cooperative task training	Performance of activities of daily living	–
Anodal transcranial direct current stimulation with functional electrical stimulation	Sham transcranial direct current stimulation with functional electrical stimulation	Spasticity	+
Active repetitive peripheral nerve sensory stimulation (RPPS) with sham transcranial direct current stimulation	Sham RRPS with sham transcranial direct current stimulation	Range of motion, muscle strength	–
Active repetitive peripheral nerve sensory stimulation (RPPS) with sham transcranial direct current stimulation	Sham RRPS with Anodal transcranial direct current stimulation or Active RRPS and active transcranial direct current stimulation	Range of motion, muscle strength	–
Low Frequency repetitive transcranial magnetic stimulation	ANodal transcranial direct current stimulation or Low Frequency repetitive transcranial magnetic stimulation with ANodal transcranial direct current stimulation	Muscle strength	–
Bimanual motor skill learning with robot-assisted training and transcranial direct current stimulation	bimanual motor skill learning with sham stimulation	Muscle strength	–
High-definition tDCS with EMG-driven robotic hand (EMG-RH)	Sham tDCS with EMG-RH	Motor function, spasticity	=
Sequential Combination of Anodal tDCS with Mirror Therapy	Sham tDCS with Mirror Therapy	Performance of activities of daily living	+
Sequential Combination of Anodal tDCS with Mirror Therapy	Sham tDCS with Mirror Therapy	Motor function	–
Bilateral tDCS before mirror therapy	tDCS during mirror therapy	Motor function, dexterity	–
Bilateral tDCS before mirror therapy	Sham tDCS with mirror therapy	Motor function, dexterity	–

TDCS during mirror therapy	Sham tDCS with mirror therapy	Dexterity	−
TDCS during mirror therapy	Sham tDCS with mirror therapy	Motor function	=
Dual-tDCS combined with PNMES with CIMT	CIMT	Motor function	+
Dual-tDCS combined with PNMES with CIMT	CIMT	Performance of activities of daily living	=
Anodal tDCS with Modified CIMT	Sham tDCS with CIMT	Muscle strength	−
Anodal tDCS with Modified CIMT	Sham tDCS with CIMT	Motor function	=
Dual tDCS with Mirror therapy	tDCS with Sham mirror	Muscle strength, dexterity	+
Dual tDCS with Mirror therapy	tDCS with Sham mirror	Motor function	−
Cathodal tDCS with physical therapy	Physical therapy	Motor function	+
Cathodal tDCS with VR	VR:	Motor function	+
Cathodal tDCS with VR	VR:	Spasticity, performance of activities of daily living, dexterity	−
Cathodal tDCS with VR	Cathodal tDCS	Motor function	+
Cathodal tDCS with VR	Cathodal tDCS	Spasticity, performance of activities of daily living, dexterity	−
Cathodal tDCS	VR:	Motor function	+
Cathodal tDCS	VR:	Spasticity, performance of activities of daily living, dexterity	−
Dual tDCS with methylphenidate	tDCS with placebo	Dexterity	+
Dual tDCS with methylphenidate	Sham tDCS with methylphenidate	Dexterity	+
Anodal tDCS combined with other interventions	sham	Motor function	−
Anodal tDCS combined with other interventions	sham	Spasticity, dexterity	=
Dual tDCS combined with other interventions	sham or cimt	Motor function	−
Dual tDCS combined with other interventions	sham or cimt	Performance of activities of daily living	=
Active rTMS with cathodal tDCS	sham rTMS with sham cathodal tDCS	Motor function	+
Real bilateral tDCS with resistance training exercise	sham tDCS with resistance training exercise	Motor function, muscle strength, spasticity, performance of activities of daily living, dexterity	−
Robot-assisted therapy with dual tDCS	Robot-assisted therapy with sham tDCS	Motor function, performance of activities of daily living, dexterity	−
Virtual reality with aNodal tDCS	virtual reality with sham	Motor function, muscle strength, spasticity	−

Bilateral tDCS and CIMT	Sham tDCS with CIMT	Muscle strength, performance of activities of daily living	–
Bilateral tDCS and CIMT	Sham tDCS with CIMT	Motor function	=
Dual transcranial direct current stimulation combined with other interventions	sham or fes	Motor function	=
Anodal tDCS Ipsilesional PMC with CIMT	Anodal tDCS Ipsilesional M1 with CIMT	Motor function, muscle strength, spasticity, dexterity	+
Anodal tDCS Ipsilesional PMC with CIMT	Sham Stimulation with cMIT	Motor function, muscle strength, spasticity, performance of activities of daily living, dexterity	+
Anodal tDCS Ipsilesional M1 with CIMT	Sham Stimulation with cMIT	Performance of activities of daily living	+
Concurrent Combination of tDCS with Mirror Therapy	Sham tDCS with Mirror Therapy	Motor function, performance of activities of daily living	–
Cathodal tDCS with Modified CIMT	Sham tDCS with CIMT	Motor function, muscle strength	–
Simultaneous cathodal tDCS with 10hz rTMS	rTMS 10Hz with Sham tDCS	Proprioception	+
Simultaneous anodal tDCS with 10hz rTMS	rTMS 10Hz with Sham tDCS	Proprioception	–
Preconditioning cathodal tCDS with 10hz rTMS	rTMS 10Hz with Sham tDCS	Proprioception	–
Preconditioning anodal tDCS with 10hz rTMS	rTMS 10Hz with Sham tDCS	Proprioception	–

Other Non-Invasive Brain Stimulation Methods



Adapted from: https://unsplash.com/photos/a-picture-of-a-human-brain-on-a-blue-background-GLsixBKx-8A

Beyond repetitive transcranial magnetic stimulation and transcranial direct current stimulation, additional non-invasive brain stimulation approaches investigated after stroke include transcranial random noise stimulation, transcranial laser photobiomodulation, and electromagnetic field therapies.

A total of five RCTs was found that evaluated other Non-Invasive brain stimulation methods for upper extremity motor rehabilitation. One RCT compared transcranial laser photobiomodulation combined with other interventions with sham or neuromuscular electrical stimulation (Paolillo et al. (2023)). One RCT compared transcranial Random Noise stimulation (tRNS) combined with other interventions with sham or FES (Sethi et al. (2023)). One RCT compared electromagnetic Network Targeting Field therapy with sham (Weisinger B. et al. (2022)). One RCT compared transcranial Random Noise stimulation (tRNS) combined with other interventions with sham or graded

repetitive arm supplementary program (Arnao et al. (2019)). One RCT compared transcranial Random Noise stimulation (tRNS) combined with other interventions with sham or reaching and reach-to-grasp task training (Hayward et al. (2017)).

The methodological details and results of the one RCT are presented in Table 32.

Table 32. RCTs Evaluating Other Non-Invasive Brain Stimulation Methods for Upper Extremity Motor Rehabilitation

Authors (Year) Study Design (PEDro Score) Sample Size start Sample Size end Time post stroke category Study design	Interventions Duration: Session length, frequency per week for total number of weeks	Outcome Measures Result (direction of effect)
Transcranial laser photobiomodulation combined with other interventions compared to sham or neuromuscular electrical stimulation		
Paolillo et al. (2023) RCT (7) NStart=18 NEnd=18 TPS=Chronic A + B vs A/B *Also in Table 22 (Neuromuscular Electrical Stimulation (NMES))*	E: Transcranial laser photobiomodulation + NMES C: Sham transcranial laser photobiomodulation + NMES Duration: 30min/d, 1d/wk for 3mo	E vs C: grip strength (no-between group result) Box and Block Test (no-between group result) TUG (no-between group result) modified Ashworth scale (no-between group result) VAS-pain (+exp) MMSE (+exp) FIM (no-between group result) WHOQoL-BREF (no-between group result) Subjective Well-Being Scale (no-between group result)
Transcranial Random Noise stimulation (tRNS) combined with other interventions compared to sham or FES		
Sethi et al. (2023) Pilot RCT (7) NStart=14 NEnd=14 TPS=Chronic A + B vs A/B *Also in Table 22 (Neuromuscular Electrical Stimulation (NMES))*	E: Transcranial Random Noise stimulation (tRNS) + FES C: Sham-tRNS + active FES Duration: 30min/d, 3d/wk, 6wks	E vs C: FMA-UE (+exp) SIS-H (+exp) Grip strength/force (-) WMFT (-)
Electromagnetic Network Targeting Field therapy compared to sham		
Weisinger B. et al. (2022) Pilot RCT (8) NStart=24 NEnd=21 TPS=Acute A vs 0	E: BCI-based, Low-Frequency, Frequency-Tuned Electromagnetic Network Targeting Field (ENTF) Therapy (BCI-EMF) + conventional therapy C: Sham BCI-EMF + conventional therapy Duration: 100min/d(40min electrical stimulation, 60min conventional), 5d/wk, 8wks	E vs C: FMA-UE (+exp) mRS (+exp) BBT affected hand (+exp) non affected hand (+exp) ARAT (-) grasp (-) grip (-) pinch (+exp) gross movement (-) NIHSS (+exp) PROMIS10

		physical health (-) mental health (-) FMA-LE (+exp)
Transcranial Random Noise stimulation (tRNS) combined with other interventions compared to sham or graded repetitive arm supplementary program		
Arnao et al. (2019) Pilot RCT (8) NStart=18 NEnd=18 TPS=Acute A + B vs A/B *Also in Table 3 (Exercise and Strength Training)*	E: tNRS+GRASP C: Sham tRNS+GRASP Duration: 20min/d, for 5d	E vs C: FMA-UE (+exp) NIHSS (-) mRS (-) BI (-) BDI (no stats)
Transcranial Random Noise stimulation (tRNS) combined with other interventions compared to sham or reaching and reach-to-grasp task training		
Hayward et al. (2017) Pilot RCT (7) NStart=4 NEnd=4 TPS=Chronic A + B vs A/B *Also in Table 4 (Task-Specific Training)*	E: Transcranial Random Noise Sitmulation (tRNS) + Reaching Training C: Sham tRNS + Reaching task Duration: 45min, 3d/wk, 4wks	E vs C: Motor Assessment Scale Upper Arm () Hand () Advanced Hand () Strength; - Trciceps () Carpi Radialis () Modified Ashworth Scale () Tardieu Scale () Richie Articular Index () Rating of Everyday Arm Use in the Community and Home () - all No STATS

Abbreviations and table notes: C=control group; D=days; E=experimental group; H=hours; Min=minutes; RCT=randomized controlled trial; TPS=time post stroke category (Acute: less than 30 days, Subacute: more than 1 month but less than 6 months, Chronic: over 6 months); Wk=weeks.

+exp indicates a statistically significant between groups difference at α=0.05 in favour of the experimental group

+exp1/+exp2/+exp3 indicates a statistically significant between groups difference at α=0.05 in favour of the first, second or third experimental group

+con indicates a statistically significant between groups difference at α=0.05 in favour of the control group

- indicates no statistically significant between groups differences at α=0.05

1. Body Functions and Structures

MOTOR FUNCTION			
LoE	**Conclusion Statement**	**RCTs**	**References**
1b	There is conflicting evidence about the effect of Transcranial Random Noise stimulation (tRNS) with FES when compared to Sham-tRNS with active FES for improving motor function.	1	Sethi et al. (2023)
1b	BCI-based, Low-Frequency, Frequency-Tuned Electromagnetic Network Targeting Field (ENTF) Therapy (BCI-EMF) with conventional therapy may not have a difference in efficacy when compared to Sham BCI-EMF with conventional therapy for improving motor function.	1	Weisinger B. et al. (2022)
1b	TNRS with GRASP may produce greater improvements in motor function than Sham tRNS with GRASP.	1	Arnao et al. (2019)

STROKE SEVERITY			
LoE	**Conclusion Statement**	**RCTs**	**References**
1b	BCI-based, Low-Frequency, Frequency-Tuned Electromagnetic Network Targeting Field (ENTF) Therapy (BCI-EMF) with conventional therapy may produce greater improvements in stroke severity than Sham BCI-EMF with conventional therapy.	1	Weisinger B. et al. (2022)
1b	TNRS with GRASP may not have a difference in efficacy when compared to Sham tRNS with GRASP for improving stroke severity.	1	Arnao et al. (2019)

MUSCLE STRENGTH			
LoE	**Conclusion Statement**	**RCTs**	**References**
1b	Transcranial Random Noise stimulation (tRNS) with FES may not have a difference in efficacy when compared to Sham-tRNS with active FES for improving muscle strength.	1	Sethi et al. (2023)

2. Activities

ACTIVITIES OF DAILY LIVING			
LoE	**Conclusion Statement**	**RCTs**	**References**
1b	TNRS with GRASP may not have a difference in efficacy when compared to Sham tRNS with GRASP for improving performance of activities of daily living.	1	Arnao et al. (2019)

DEXTERITY			
LoE	**Conclusion Statement**	**RCTs**	**References**
1b	BCI-based, Low-Frequency, Frequency-Tuned Electromagnetic Network Targeting Field (ENTF) Therapy (BCI-EMF) with conventional therapy may produce greater improvements in dexterity than Sham BCI-EMF with conventional therapy.	1	Weisinger B. et al. (2022)

Key Points

- Transcranial Random Noise stimulation (tRNS) with FES may not be beneficial for improving muscle strength after stroke when compared to Sham-tRNS with active FES; the literature is mixed regarding motor function.
- BCI-based, Low-Frequency, Frequency-Tuned Electromagnetic Network Targeting Field (ENTF) Therapy (BCI-EMF) with conventional therapy may be beneficial for improving stroke severity and dexterity, but not motor function, after stroke when compared to Sham BCI-EMF with conventional therapy.
- TNRS with GRASP may be beneficial for improving motor function, but not stroke severity and performance of activities of daily living, after stroke when compared to Sham tRNS with GRASP.

Summary of Key Points: Other Non-Invasive Brain Stimulation Methods

Intervention	Control(s)	Function domain(s)	Effect
Transcranial Random Noise stimulation (tRNS) with FES	Sham-tRNS with active FES	Muscle strength	−
Transcranial Random Noise stimulation (tRNS) with FES	Sham-tRNS with active FES	Motor function	=
BCI-based, Low-Frequency, Frequency-Tuned Electromagnetic Network Targeting Field (ENTF)	Sham BCI-EMF with conventional therapy	Stroke severity, dexterity	+

Therapy (BCI-EMF) with conventional therapy			
BCI-based, Low-Frequency, Frequency-Tuned Electromagnetic Network Targeting Field (ENTF) Therapy (BCI-EMF) with conventional therapy	Sham BCI-EMF with conventional therapy	Motor function	–
TNRS with GRASP	Sham tRNS with GRASP	Motor function	+
TNRS with GRASP	Sham tRNS with GRASP	Stroke severity, performance of activities of daily living	–

Pharmaceuticals

Botulinum Toxin



Adapted from: http://www.theinvestor.co.kr/view.php?ud=20180104000712

A total of 66 RCTs were found that evaluated botulinum toxin for upper extremity motor rehabilitation. 32 RCTs compared botulinum toxin (botox) with sham (de Melo Carvalho Rocha et al. (2023); Tan & Jia (2021); Masakado et al. (2020); Wallace et al. (2020); Prazeres et al. (2018); Rosales et al. (2018); Elovic et al. (2016); Gracies et al. (2015); Gracies et al. (2014); Ward et al. (2014); Marciniak et al. (2012); Rosales et al. (2012); Wolf et al. (2012); Cousins et al. (2010); Kaji et al. (2010); Kaňovský et al. (2009); McCrory et al. (2009); Meythaler et al. (2009); deBoer et al. (2008); Jahangir et al. (2007); Kong et al. (2007); Yelnik et al. (2007); Suputtitada & Suwanwela (2005); Brashear et al. (2004); Childers et al. (2004); Brashear et al. (2002); Bakheit et al. (2001); Bakheit et al. (2000); Bhakta et al. (2000); Richardson et al. (2000); Smith et al. (2000); Simpson et al. (1996)). One RCT compared botulinum toxin (botox) combined with other interventions with task-specific training (Umar et al. (2018)). Thirteen RCTs compared different approaches to botulinum toxin (botox) (Ye et al. (2023); Lee et al. (2022); Abo et al. (2020); Lee et al. (2020c); Rekand et al. (2019); Do et al. (2017); Nam et al. (2015); Seo et al. (2015); Picelli et al. (2014); Santamato et al. (2014); Barnes et al. (2010); Gracies et al. (2009); Francisco et al. (2002)). One RCT compared botulinum toxin (botox) combined with other interventions with sham (Simpson et al. (2009)). One RCT compared botulinum toxin (botox) combined with other interventions with botulinum toxin (botox) or stretching and positioning programs (Santamato et al. (2015)). One RCT compared botulinum toxin (botox) combined with other interventions with sham or neuromuscular electrical stimulation (Lindsay et al. (2020)). One RCT compared botulinum toxin (botox) combined with other interventions with steroids (Lim et al. (2008)). Two RCTs compared botulinum toxin (botox) combined with other interventions with botulinum toxin (botox) or conventional therapy (Giray et al. (2020); Sun et al. (2010)). Five RCTs compared botulinum toxin (botox) combined with other interventions with botulinum toxin (botox) (Lee & Yang (2024); Kosem M. et al. (2022); Maulet et al. (2021); Nasb et al. (2019); Devier et al. (2017)). One RCT compared botulinum toxin (botox) combined with other interventions with conventional therapy (Abramovich et al. (2020)). One RCT compared botulinum toxin (botox) with no treatment (Zeuner et al. (2017)). One RCT compared botulinum toxin (botox) combined with other interventions with nerve

block (Kasapoglu-Aksoy et al. (2020)). One RCT compared botulinum toxin (botox) combined with other interventions with botulinum toxin (botox) or exercise and custom physiotherapy protocols (Lannin et al. (2020)). Two RCTs compared botulinum toxin (botox) with conventional therapy (Hesse et al. (2012); Shaw et al. (2010)). One RCT compared botulinum toxin (botox) combined with other interventions with stretching and positioning programs (Hwang et al. (2024)). One RCT compared botulinum toxin (botox) with antispastic medications (Turcu-Stiolica et al. (2021)). One RCT compared botulinum toxin (botox) combined with other interventions with exercise and custom physiotherapy protocols or botulinum toxin (botox) (Lannin et al. (2018)).

In addition, 11 RCTs in which botulinum toxin formed part of a combined or comparative intervention are cross-referenced at the end of Table 33; their primary listings appear in other tables.

The methodological details and results of all 66 RCTs are presented in Table 33.

Table 33. RCTs Evaluating Botulinum Toxin for Upper Extremity Motor Rehabilitation

Authors (Year) **Study Design (PEDro Score)** **Sample Size start** **Sample Size end** **Time post stroke category** **Study design**	**Interventions** **Duration: Session length, frequency per week for total number of weeks**	**Outcome Measures** **Result (direction of effect)**
Botulinum toxin (botox) compared to sham		
de Melo Carvalho Rocha et al. (2023) RCT (7) NStart=24 NEnd=20 TPS=Acute A vs 0	E: Botulinum toxin A (200U) C: Placebo Duration: Single injection, 4 months	E vs C: Pain-VAS (-) PROM/AROM (-) MAS (-) FMA (-)
Tan & Jia (2021) RCT (9) NStart=36 NEnd=36 TPS=Subacute A vs 0	E: Ultrasound-Guided BoNT-A Injection Into the Subscapularis + PT C: Placebo + PT Duration: single injection, PT: 30mins/d, 2d/wk, 4wks	E vs C: Pain VAS (+exp) StrokeSpecific Quality-of-Life (+exp) FMA -UE (-) MAS shoulder external rotation (+exp) shoulder abduction (-), PROM shoulder external rotation (+exp) shoulder abduction (-)
Masakado et al. (2020) RCT (6) NStart=100 NEnd=90 TPS=Not Reported A1 vs A2 vs 0	E1: Incobotulinumtoxin A 400U E2: Incobotulinumtoxin A 250U C: Placebo (High dose and low dose) Duration: 12wks	E1/E2 vs C: MAS wrist (+exp1/2) finger flexors (+exp1/2) elbow flexors (+exp1/2) forearm pronators (+exp1) thumb-in palm (+exp1) Disability assessment scale (+exp1/2) investigator clinical global impression (+exp1) patient clinical global impression (+exp1/2)
Wallace et al. (2020) RCT (8) NStart=28 NEnd=27 TPS=Chronic A vs 0	E: onabotulinumtoxinA + standardized upper-limb physiotherapy C: placebo + standardized upper-limb physiotherapy Duration: single dose injection & 45min-1.5hrs, 10x over 4wk PT	E vs C: Functional grasp and release task- time: (-) Wrist and finger stiffness (-) Modified Ashworth Scale (-) Wrist and finger extension strength (-) Grip strength (-)

		Active Range of Motion: wrist extension (-) wrist flexion (-) finger flexion (-) Nine Hole Peg Test (-) Action Research Arm Test (-)
Prazeres et al. (2018) RCT (10) NStart=40 NEnd=36 TPS=Chronic A vs 0	E: Botulinum toxin A + Physiotherapy C: Placebo + Physiotherapy Duration: 30min, 2x/wk, 6mo (therapy)	E vs C: Timed up and Go test (TUG lower limb) (-) walking test (-) FMA UE (+exp) mod Ashworth scale (+exp)
Rosales et al. (2018) Pilot RCT (7) NStart=42 NEnd=40 TPS=Subacute A vs 0	E: Abobotulinumtoxin A - 500 U C: Placebo Duration: Not Reported	E vs C: Modified ashworth scale (+exp) FMA (-) global assessment of change for spasticity
Elovic et al. (2016) RCT (7) NStart=317 NEnd=259 TPS=Chronic A vs 0	E: Botox (400U) C: Placebo Duration: 12wk	E vs C: Ashworth scale (+exp) Global impression of change (+exp) disability assessment scale (+exp)
Gracies et al. (2015) RCT (9) NStart=243 NEnd=238 TPS=Chronic A1 vs A2 vs 0	E1: Single 500U AbobotulinumtoxinA E2: Single 1000U AbobotulinumtoxinA C: Placebo Duration: Injection once	E1/E2 vs C: modified Ashworth Scale (+exp1,+exp2) DAS (-) Physician global assessment (+exp1, +exp2)
Ward et al. (2014) RCT (8) NStart=274 NEnd=253 TPS=Chronic A vs 0	E: onabotulinumtoxinA + standard of care C: placebo + standard of care Duration: Max 800U, single dose, optional second dose at 12-24wk botox	E vs C: Principal active functional goal achievement (measured by Goal Attainment Scale) (-) Resistance to passive movement-REPAS (no between stat) Pain Numeric Rating Scale (+exp)
Gracies et al. (2014) Pilot RCT (8) NStart=24 NEnd=24 TPS=Chronic A1 vs A2 vs 0	E1: Botox (BoNT-B) 10000U into elbow flexors E2: Botox (BoNT-B) 15000U into elbow flexors C: Placebo Duration: single dose	E1/E2 vs C: Passive range of motion (-) Active range of motion (+exp1, +exp2) Modified Frenchay scale (-) Global self assessment; -pain (-); -stiffness (+exp2; +exp1); -function (-); -total (+exp1; +exp2) Tardieu scale (-); Ashworth scale (-)
Marciniak et al. (2012) RCT (9) NStart=21 NEnd=21 TPS=Chronic A vs 0	E: 100-150U of botulinum toxin type A (BTX-A) into the pectoralis major and teres major muscles C: placebo (saline) Duration: 1x injection at baseline	E vs C: mAS (-) PROM (-) FMA (-) FIM (-) DAS hygiene (+exp) dressing (-) pain (-)

		cosmesis (-) BDI (-) worst pain (-) best pain (-) pain with dressing (-) pain interfering with sleep (-) McGill pain questionnaire (-)
Rosales et al. (2012) RCT (8) NStart=163 NEnd=153 TPS=Subacute A vs 0	E: BoNT-A (Dysport) 500U injection + unstructured rehabilitation C: placebo injection + unstructured rehabilitation Duration: 1x	E vs C: Modified Ashworth Scale: (+exp) Motor assessment scale (no stat) Barthel index (no stat) Modified Rankin scale (no stat) global pain scale VAS (+exp) AROM elbow (no stat) wrist (no stat) finger (+exp) PROM: elbow (+exp) wrist (+exp) finger (no stat)
Wolf et al. (2012) Pilot RCT (8) NStart=25 NEnd=25 TPS=Not Reported A vs 0	E: Botox A+ standardized exercise protocol C: placebo+standardized exercise protocol Duration: 3x/wk, 12-16 x exercise sessions	E vs C: Wolf Motor Function Test (-) proximal joint task times (+exp) Functional Ability Score (-) Modified Ashworth Scale (+exp) Stroke Impact Scale (-) emotional domain (+exp) active range of motion (-) Hand Grip Strength (-)
Kaji et al. (2010) RCT (7) NStart=109 NEnd=104 TPS=Chronic A1 vs A2 vs 0	E1: 120 U Botox E2: 200 U Botox C: Placebo Duration: 12wk	E1 vs C: Modified Ashworth Scale (-) Disability Assessment Scale (+exp1) E2 vs C: Modified Ashworth Scale (+exp2) Disability Assessment Scale (+exp2) Clinical Global Impression of functional disability
Cousins et al. (2010) Pilot RCT (6) NStart=30 NEnd=23 TPS=Acute A1 vs A2 vs 0	E1: Half dose botulinum toxin injection E2: Quarter dose botulinum toxin injection C: Saline injection Duration: Single injection	E1/E2 vs C: Action Research Arm Test (-) Grip Strength (-) Isometric Muscle Strength Elbow (-) Wrist (-) Active and Passive Range of Motion Elbow (-) Wrist (-) EMG Spasticity (-)
Kaňovský et al. (2009) RCT (6) NStart=148 NEnd=145 TPS=Chronic A vs 0	E: Botulinum neurotoxin NT 201 intramuscular injection C: Placebo injection Duration: 12wks (max 400U btx)	E vs C: Ashworth Scale -wrist (+exp) fist (-) thumb (+exp) elbow (-) forearm (-)

		Disability Assessment Scale (+exp) Carer Burden Scale + Global assessment of treatment benefit
McCrory et al. (2009) RCT (10) NStart=96 NEnd=90 TPS=Chronic A vs 0	E: BoNT injections into the principal spastic muscles of the distal upper limb C: equivalent placebo into the spastic principle spastic muscles Duration: 750-1000 btu at baseline; 500-100 btu at week 12 in response to initial dose	E vs C: Assessment Quality of Life (-) Visual Analogue Scale - Pain (-) Hospital Anxiety and Depression Rating scale (-) Goal Attainment Scaling (-) Modified Ashworth Scale across all joints (+exp) Modified Motor Assessment Scale (-) Patient Disability Scale (-) Carer Burden Scale (-) Patient Functional Outcome Measure (-) Global Assessment of Benefit (-)
Meythaler et al. (2009) RCT Crossover (6) NStart=21 NEnd=18 TPS=Chronic A vs 0	E: 100 U Botox (BTX-A) + Occupational therapy C: Saline injection + Occupational therapy Duration: 300-400 units BTX-A once in 24 weeks	E vs C: Motor Activity Log (-) Klein- Bell Activities of Daily Living Scale (-) MOS 35 item short form health status survey (-) Ashworth Scale (-) Barthel Index (+exp) Deep Tendon Reflexes (-) Active Range of Motion (elbow and wrist) (-) Passive Range of Motion (Elbow and Wrist) (-) Motor Strength (elbow, wrist, fingers) (-) Motor grip strength (-) Motor pinch strength Pain-NRS (-)
deBoer et al. (2008) RCT (6) NStart=22 NEnd=21 TPS=Chronic A vs 0	E: 2 Suprascapular BtxA injections (2x50U) C: Placebo 1mL 0.9% saline Duration: Not Reported	E vs C: Pain Visual Analogue Scale (-) Humerus external rotation (-)
Jahangir et al. (2007) RCT (6) NStart=52 NEnd=52 TPS=Chronic A vs 0	E: Botulinum toxin A (80u) + Regular PT C: Placebo + Regular PT Duration: 60min/d, 2d/wk, for 3mo Regular PT	E vs C: Modified Ashworth scale (+exp) Barthel Index (-) EQ-5d (-) EQ-VAS (-)
Kong et al. (2007) RCT (7) NStart=17 NEnd=16 TPS=Chronic A vs 0	E: Botulinum toxin A (500u) in to pectoralis major and biceps brachii on hemiplegic side C: Placebo Injections Duration: One-time injection (500u)	E vs C: Visual analogue scale of shoulder pain (-) Ashworth scale-shoulder (+exp) Ashworth scale-flexor (+exp) Passive range of motion of shoulder (-)
Yelnik et al. (2007) RCT (5) NStart=20	E: Botox C: Placebo Duration: Single injection of 500U	E vs C: Resistance to passive lateral rotation (+exp)

NEnd=20 TPS=Chronic A vs 0		Resistance to passive abduction (-) Modified Ashworth Scale (-) Finger flexor (+exp) Visual Analog Scale - Pain (+exp)
Suputtitada & Suwanwela (2005) RCT (8) NStart=50 NEnd=50 TPS=Chronic A1 vs A2 vs 0	E1: 350U BTX-A E2: 500U BTX-A E3: 1000U BTX-A C: Placebo Duration: 6mon	E1/E2/E3 vs C: Modified Ashworth Scale (+exp, +exp2, +exp3) E2/E3 vs C: Action Research Arm Test (+exp2, +exp3) E1/E2 vs C: Barthel Index (+exp, +exp2) Pain VAS Scale
Brashear et al. (2004) RCT (7) NStart=15 NEnd=13 TPS=Chronic A vs 0	E: BTX-B injection C: Placebo Duration: Single injection	E vs C: Ashworth scale elbow (-) wrist (+exp) finger (-) thumb (-)' Global assessment of change physician (-) patient (-) therapist (+exp)
Childers et al. (2004) RCT (6) NStart=91 NEnd=67 TPS=Chronic A1 vs A2 vs 0	E1: 90U; BTX E2: 180U BTX E3: 360U BTX C: Placebo Duration: Injections: owks, 12wks	E1 vs E2 vs E3 vs C: E1/2/3 v C: modified Ashworth scale (+exp2/3) FIM (-) SF-36(-) Pain-NRS (-) Functional disability assessments (-)
Brashear et al. (2002) RCT (7) NStart=126 NEnd=122 TPS=Chronic A vs 0	E: Botulinum Toxin A injection (200 - 400 units) C: Placebo Duration: Single injection	E vs C: Ashworth Scale (+exp) Global Assessment Scale (+exp) Disability Assessment Scale (+exp)
Bakheit et al. (2001) RCT (7) NStart=59 NEnd=58 TPS=Subacute A vs 0	E: 1000u BTxA injection C: Placebo injection Duration: Single injection	E vs C: Modified Ashworth Scale (+exp) Barthel Index (-) Goal Attainment Scale (-) Active Range of Motion (-) Passive Range of Motion (-)
Bakheit et al. (2000) RCT (6) NStart=82 NEnd=82 TPS=Not Reported A1 vs A2 vs 0	E1: 500U BTxA E2: 1000U BtxA E3: 1500U BtxA C: Placebo injection Duration: Single injection	E1/E2/E3 vs C: Modified Ashworth Scale Elbow (+exp1, +exp2) Wrist (+exp1, +exp2, +exp3) Fingers (+exp2) Rivermead Motor Assessment Arm (-) Barthel Index (-) Active Range of Motion Elbow (-) Wrist (-) Fingers (-)

		Passive Range of Motion Elbow (-) Wrist (-) Fingers (-) pain (-)
Bhakta et al. (2000) RCT (6) NStart=40 NEnd=40 TPS=Chronic A vs 0	E: 1000 MU Botulinum toxin type A C: Placebo Duration: 1000 MU/session, 1 session BT-A/Placebo Injections	E vs C: Modified Ashworth Scale (+exp) Grip strength (+exp) Patient disability (+exp) Carer burden (+exp) Active ROM (-) Passive elbow extension (-) Passive wrist dorsiflexin (+exp) Medical Research Council muscle power grading (-) associated reactions (limb movement) reduction (+exp)
Richardson et al. (2000) RCT (8) NStart=52 NEnd=52 TPS=Chronic A vs 0	E: Botulinum Toxin (100U) C: Placebo Duration: 1 injection	E vs C: Modified Ashworth Scale (+exp) Range of Movement (-) Rivermead Motor Assessment Scale: Trunk (-) Upper Limb (-) subjective rating of problem severity (+exp) ten meter walk test (-) nine hole peg test (no stat)
Smith et al. (2000) RCT (7) NStart=25 NEnd=25 TPS=Chronic A1 vs A2 vs 0	E1: 500 U of botulinum toxin E2: 1000 U of botulinum toxin E3: 1500 U of botulinum toxin C: placebo Duration: single dose and follow up at 2, 6 and 12wk	E1+E2+E3 (combined) vs C: Modified Ashworth elbow (-) wrist (+exp) finger (+exp) PROM elbow (-) wrist (+exp) finger (-) AROM elbow (-) wrist (-) finger (-) Dressing time (-) Postural alignment, Acromion -Styloid distance (-) Frenchay Arm Test (-) Finger curl distance rest (+exp) active (-) passive (-) E1/E2/E3 vs C: Modified Ashworth elbow (-) wrist (+exp1) finger (-) PROM elbow (+exp3)

		wrist (-) finger (-) AROM elbow (-) wrist (-) finger (-) Dressing time (-) Postural alignment (-) Frenchay Arm Test (-) Finger curl rest (+exp) active (-) passive (-)
Simpson et al. (1996) RCT (6) NStart=39 NEnd=37 TPS=Chronic A1 vs A2 vs 0	E1: low dose (75U) BTX-A E2: Medium dose (150U) BTX-A E3: High dose (300U) BTXA C: Placebo Duration: single injection	E1/E2/E3 vs C: Ashworth Scale wrist (+exp3) elbow (+exp3) Functional Independence Measure (-) Fugl-Meyer Assessment Scale (-) Grip strength (-) caregiver dependency scale (-) function and pain assessment (-) motor/function task rating scale (-) 36-Item Health Survey (-) Physiological parameters (-)
Botulinum toxin (botox) combined with other interventions compared to task-specific training		
Umar et al. (2018) RCT (7) NStart=46 NEnd=41 TPS=Chronic A + B vs A/B *Also in Table 4 (Task-Specific Training)*	E: Botulinum Toxin A + Task Specific Training C: Task-Specific Training Duration: single dose injection, 1wk rest, 1hr, 3x/wk, 8wk training	E vs C: Fugl-Meyer Assessment- upper limb (-) Motor Assessment Scale (-)
Different approaches to botulinum toxin (botox) compared against one another		
Ye et al. (2023) RCT (9) NStart=198 NEnd=195 TPS=Chronic A1 vs A2	E: Liztox + Conventional therapy C: Botox + Conventional therapy Duration: Single injection	E vs C: Modified Ashworth Scale wrist flexor (-) elbow flexor (-) finger flexor (-) DAS Total (-) Hand hygiene (-) Dressing (-) Limb position (-) Pain (-) Global assessment of treatment Investigator (-) Participant/Caregiver (-) Cargegiver burden scale cleaning the palm (-) cutting fingernails (-) dressing (-)

		cleaning under the armpits (-)
Lee et al. (2022) Pilot RCT (9) NStart=30 NEnd=30 TPS=Chronic A1 vs A2	E: MT10107 (Coretox, 312.0±59.31 U) C: OnabotulinumtoxinA (310.3±62.58 U) Duration: single injection, assessment after 4wks	E vs C: MAS (-) DAS (-) global assessment of treatment (-)
Abo et al. (2020) RCT (8) NStart=124 NEnd=113 TPS=Not Reported A1 vs A2	E: 400 U Botulinum Toxin C: 240 U Botulinum Toxin + 160 U placebo Duration: Up to 3 injections over 48wk.	E vs C: Modified Ashworth Scale (-) Disability Assessment Scale (-)
Lee et al. (2020c) RCT (9) NStart=220 NEnd=219 TPS=Chronic A1 vs A2	E: MT10107 (Coretox®) (Botox Formulation) C: Onabotulinum toxin A Duration: Single Injection of Coretox or Botox, assessed at 4,8,12 weeks	E vs C: Modified Ashworth Scale Wrist Flexor (-) Finger Flexor (-) Elbow flexor (-) Disability Assessment Scale (-)
Rekand et al. (2019) RCT (7) NStart=88 NEnd=56 TPS=Chronic A1 vs A2	E1: Botox neuromuscular junction targeting E2: Standard Botox Duration: Injections: 0wks, 4wks, 12wks	E1 vs E2: Modified Ashworth scale (-) Goal attainment scale (-)
Do et al. (2017) RCT (7) NStart=187 NEnd=169 TPS=Chronic A1 vs A2	E1: Letibotulinumtoxin (Botulax) E2: onabotuliNomtoxin (Botox) Duration: assessment at 4wk, 8wk, 12wk	E1 vs E2: modified Ashworth (-) Global assessment in spasticity (-) Disability assessment scale (-)
Nam et al. (2015) RCT (8) NStart=197 NEnd=188 TPS=Chronic A1 vs A2	E: Botulinum toxin type A (NABOTA) up to 360 U depending on degree of spasticity and muscle group C: Onabotulinum toxin A (Botox) up to 360 U depending on degree of spasticity and muscle group Duration: Not Reported	E vs C: Modified Ashworth Scale (-) Disability Assessment Scale (-)
Seo et al. (2015) RCT (9) NStart=196 NEnd=192 TPS=Chronic A1 vs A2	E1: Neu-BoNT-A (Neuronox) E2: Botox Duration: 1x	E1 vs E2: Modified Ashworth Scale Wrist Flexor (-) elbow flexor (-) finger flexor (-) thumb flexor (-) Disability Assessment Scale (-) Hygiene (-) Dressing (-) Limb position (-) pain (-) Carer Burden Scale Cleaning the palm (-) Cutting fingernails (-)

		Putting the arm through a sleeve (-) Cleaning under the armpit (-) Global Assessment of the Treatment Benefit physician (-) patient/caregiver (-) response rate
Picelli et al. (2014) RCT (7) NStart=60 NEnd=60 TPS=Chronic A1 vs A2	E1: Botox A Injections (500u) under sonographic guidance E2: Botox A Injection (500u) using electrical stimulation guidance E3: Botox A Injection (500u) using manual needle placement Duration: Single injection, follow up at 4 weeks	E1 vs C: Modified Ashworth Scale (+exp) Tardieu Spasticity angle (+exp) Passive range of motion (+exp) E2 vs C: Modified Ashworth Scale (wrist): (+exp2) Tardieu Spasticity angle (+exp2) Passive range of motion (+exp2) E1 vs E2: Modified Ashworth Scale (-) Tardieu Spasticity angle (-) Passive range of motion (-)
Santamato et al. (2014) RCT (8) NStart=30 NEnd=30 TPS=Chronic A1 vs A2	E: Botulinum Toxin Type-A injection (Ultrasound guided) C: Botulinum Toxin-A injection (Manual) Duration: Dosages determined by investigator	E vs C: Modified Ashworth Scale wrist (+exp) finger (+exp) Fingers position at rest (+exp)
Barnes et al. (2010) RCT (5) NStart=192 NEnd=165 TPS=Chronic A1 vs A2	E1: 50U/ml NT 201 dilution Botox E2: 20U/ml NT 201 dilution Botox Duration: 1 dose of injection; 4wk and 12wk post injection assessment	E1 vs E2: Disability Assessment Scale (no stats) Ashworth Scale (no stats)
Gracies et al. (2009) RCT (8) NStart=21 NEnd=21 TPS=Chronic A1 vs A2	E1: Non-Targeted High Volume Botulinum Toxin (160MU - 20MU/ml) E2: Endplate-Targeted Low Volume Botulinum Toxin (160MU - 100MU/mL) E3: Non-Targeted Low Volume Botulinum Toxin (160MU - 100MU/mL) Duration: 4mo	E1 vs E2 vs E3: Maximum Relative Voltage Antagonist (exp1>exp3) Agonist (-) Maximum Voluntary Power (-) Tardieu Scale (-) Active Range of Motion (exp2 > exp3)
Francisco et al. (2002) RCT (8) NStart=15 NEnd=13 TPS=Chronic A1 vs A2	E1: High-volume BTX-A injection (50 unit/1mL) E2: Low-volume BTX-A injection (100unit/1mL) Duration: Single injection, 4, 8, 12 wks follow up	E1 vs E2: Modified Ashworth Scale (-) Global rating scale for spasticity (-)
Botulinum toxin (botox) combined with other interventions compared to sham		
Simpson et al. (2009) RCT (8) NStart=60 NEnd=56 TPS=Not Reported A vs B vs 0	E1: intramuscular BoNT E2: oral tizanidine C: Placebo Duration: 2-36 mg/d, 2x/d TZD or placebo 18wk & single dose injection of botox or placebo	E1/E2 vs C: Modified Ashworth Scale wrist flexor (+exp1) finger flexor (+exp1) finger flexor tone (+exp1) elbow flexor (-) pronators (-)

Also in Table 34 (Antispastic Medications)		shoulder extensors (-) Disability Assessment Scale dressing (-) hygiene (-) cosmesis (+exp1) pain (-) Modified Frenchay Scale (no stat) 10 Meter walking speed (-) contralateral grip strength (-) finger tap test (-) Epworth Sleepiness Scale (-) Geriatric Depression Scale (-) Questionnaire and Letter–Number Sequence (-)
Botulinum toxin (botox) combined with other interventions compared to botulinum toxin (botox) or stretching and positioning programs		
Santamato et al. (2015) RCT (8) NStart=70 NEnd=70 TPS=Chronic A + B vs A + C *Also in Table 9 (Orthotics and Taping); Table 8 (Stretching Programs)*	E: Botox-A + adhesive taping C: Botox-A + Manual Stretching (with splint to maintain maximum stretching) Duration: E: 15-30min/d, 10d; C: 60min/d, 10d	E vs C: Modified Ashworth Scale wrist (+exp) finger (+exp) Disability Assessment Scale (-) fingers position at rest (+exp)
Botulinum toxin (botox) combined with other interventions compared to sham or neuromuscular electrical stimulation		
Lindsay et al. (2020) RCT (9) NStart=97 NEnd=93 TPS=Acute A + B vs A/B *Also in Table 22 (Neuromuscular Electrical Stimulation (NMES))*	E: Botulinum Toxin A injection + NMES C: Placebo + NMES Duration: 1x injection, NMES 7d/wk for 90d	E vs C: ARAT (+exp) EMG at slow stretch for spasticity elbow (+exp) wrist (-) Stiffness at slow stretch elbow (-) wrist (-) PROM slow stretch elbow (+exp) wrist (-)
Botulinum toxin (botox) combined with other interventions compared to steroids		
Lim et al. (2008) RCT (9) NStart=29 NEnd=25 TPS=Chronic A vs B *Also in Table 36 (Steroids)*	E: Intramuscular botulinum toxin A (100U) + standard physiotherapy C: Intra-articular triamcinolone acetonide injection (40mg) + standard physiotherapy Duration: 1 injection + minimum 2 sessions/week for 6 weeks physiotherapy	E vs C: Pain NRS (-) FMA (-) Modified Ashworth scale (-) Passive RoM (-) Physicians global rating scale for therapeutic goal (-)
Botulinum toxin (botox) combined with other interventions compared to botulinum toxin (botox) or conventional therapy		
Giray et al. (2020) Pilot RCT (8) NStart=20 NEnd=20 TPS=Chronic	E: Botulinum toxin A injection + Lycra splint orthotic + upper-limb rehabilitation C: Botulinum toxin-A injection + rehab Duration: 8h/d, 5d/wk, 3wk Orthotic, 2h/d, 5d/wk, 3wks Upper Rehab	E vs C: Fugl-Meyer Assessment Upper Extremity (-) Motricity index (-) modified Ashworth Scale (-)

A + B vs A/B *Also in Table 9 (Orthotics and Taping)*		Box and Block Test (-) Stroke Impact Scale (-) Semmes-Weinstein monofilaments (-)
Sun et al. (2010) RCT (7) NStart=32 NEnd=29 TPS=Chronic A + B vs A/B *Also in Table 6 (Constraint-Induced Movement Therapy (CIMT))*	E: BtxA (Dysport) + mCIMT C: BtxA (Dysport) + conventional rehabilitation Duration: 1000 units botox & 2hr, 3d/wk, 3mo mCIMT and conventional therapy	E vs C: Modified Ashworth Scale (-) Motor Activity Log AOU (+exp) QOM (+exp) Action Research Arm Test (+exp)
Botulinum toxin (botox) combined with other interventions compared to botulinum toxin (botox)		
Lee & Yang (2024) RCT (6) NStart=16 NEnd=16 TPS=Chronic A + B vs A/B *Also in Table 26 (Extracorporeal Shockwave Therapy)*	E: Botulinum toxin injection + Extracorporeal shock wave therapy (ESWT) C: Botulinum toxin injection Duration: 1x/d for 5d	E vs C: modified Ashworth Scale elbow flexors (-) wrist flexors (-) finger flexors (-) modified Tardieu Scale elbow flexors (-) wrist flexors (-) finger flexors (-) FMA-UE (-) mBI (-) ARAT (-)
Kosem M. et al. (2022) RCT (5) NStart=30 NEnd=30 TPS=Chronic A + B vs A/B *Also in Table 44 (Acupuncture)*	E: Botox + dry needling + conventional rehab C: Botox + conventionalrehab Duration: Dry needling conducted in 3d intervals for 4 times total starting immediately after injection	E vs C: MAS (+exp) MTS (+exp) FMA-UE (+exp)
Maulet et al. (2021) RCT (8) NStart=33 NEnd=33 TPS=Chronic A + B vs A/B *Also in Table 3 (Exercise and Strength Training)*	E: Botulinum toxin injection + self-rehabilitation C: BTI Duration: 30min/d, 5ds/wk, 4wks	E vs C: WMFT (-) ARAT (-) EuroQol-visual analogue scale (-) Fatigue Severity Scale (-) Motor Activity Log (-)
Nasb et al. (2019) RCT (6) NStart=64 NEnd=54 TPS=Subacute A + B vs A/B *Also in Table 6 (Constraint-Induced Movement Therapy (CIMT))*	E: Botox + mCIMT C: Botox + Conventional therapy (high dose) Duration: 1hr, 6x/wk, 4wks rehab (glove 3hr total for mCIMT)	E vs C: Modified Ashworth Scale (-) Barthel Index (+exp) Fugl-Meyers Upper Extremity (+exp)
Devier et al. (2017) RCT (5) NStart=31 NEnd=29 TPS=Chronic A + B vs A/B	E: OnabotulinumtoxinA with upper limb rehabilitation C: OnabotulinumtoxinA Duration: 2 injections, 24wk follow-up	E vs C: FMA (+exp) DAS (-) mAS (-)

Also in Table 3 (Exercise and Strength Training)		
Botulinum toxin (botox) combined with other interventions compared to conventional therapy		
Abramovich et al. (2020) RCT (3) NStart=96 NEnd=96 TPS=Subacute A + B vs A vs B vs 0 *Also in Table 23 (Transcutaneous Electrical Nerve Stimulation (TENS))*	E1: Botulinumtoxin therapy in combination with dynamic electric neurostimulation (the explanation is consistent with TENS) and basic therapy, including massage and therapeutic exercises E2: Botulinum toxin therapy and basic therapy E3: Dynamic electric neurostimulation and basic therapy C: Basic Therapy Duration: 30-60min/d for 20 sessions over 2 weeks	E1 vs C: mAS distal sections of UE (+exp1) proximal sections of UE (+exp1) Rivermead Motor Assessment (+exp1) amplitude of voluntary movements shoulder (-) elbow (+exp1) wrist (+exp1) E1 vs E2: mAS distal sections of UE (+exp1) proximal sections of UE (+exp1) Rivermead Motor Assessment (+exp1) amplitude of voluntary movements shoulder (-) elbow (+exp1) wrist (+exp1) E1 vs E3: mAS distal sections of UE (+exp1) proximal sections of UE (+exp1) Rivermead Motor Assessment (+exp1) amplitude of voluntary movements shoulder (-) elbow (+exp1) wrist (+exp1)
Botulinum toxin (botox) compared to no treatment		
Zeuner et al. (2017) RCT Crossover (6) NStart=30 NEnd=23 TPS=Chronic A1 vs A2 vs 0	E1: Ultrasound guided BotulinumToxin A Injections E2: EMG Guided Botulinum Toxin A Injections C: No treatment Duration: 1x/wk, 4 wk	E1 vs E2 vs C: Modified Ashworth Scale (-) Barthel Index (-) Disability Assessment Scale (-) EQ-5D (-)
Botulinum toxin (botox) combined with other interventions compared to nerve block		
Kasapoglu-Aksoy et al. (2020) RCT (5) NStart=60 NEnd=57 TPS=Chronic A vs B *Also in Table 35 (Nerve Block)*	E: Onabotulinumtoxin-A (100-150 units into pectoralis major and 40-60 units into teres major) C: Suprascapular Nerve Block (9ml lidocaine + 1ml triamciNolone hexacetonide) Duration: Injection and 6wks of shoulder rehabilitation	E vs C: Shoulder Modified Ashworth Scale (+exp) Visual Analogue Scale Motion (+exp) Rest (+exp) Angle of Pain in abduction and external rotation (+exp) Passive abduction and external rotation (+exp) Fugl-Meyer Assessment Upper Extremity (+exp)
Botulinum toxin (botox) combined with other interventions compared to botulinum toxin (botox) or exercise and custom physiotherapy protocols		
Lannin et al. (2020)	E: Botox+movement training	E vs C:

RCT (8) NStart=140 NEnd=139 TPS=Chronic A + B1 vs A + B2 *Also in Table 3 (Exercise and Strength Training)*	C: Botox plus excercise handout Duration: 60min/d, 7d/wk, 10wk. Botox 1/x10 wk.	goal attainment scale (-) BBT (-) passive range of motion wrist (-) grip strength (+exp) pain VAS (-) EuroQol-5D (+exp) Tardieu scale (-)
Botulinum toxin (botox) compared to conventional therapy		
Hesse et al. (2012) Pilot RCT (8) NStart=18 NEnd=18 TPS=Subacute A vs 0	E: Botox BTX-A + conventional treatment C: Conventional treatment Duration: E: 150 units BTX-A + 1.25hrs/d for 4wks Therapy; C: 1.25hrs/d for 4 wks	E vs C: FMA (-) REPAS (+exp) Mod Ashworth Scale: Finger (+exp) Disability Scale (+exp)
Shaw et al. (2010) RCT (8) NStart=333 NEnd=322 TPS=Chronic A vs 0	E: botulinum toxin type A injection + programme of upper limb therapy C: upper limb therapy programme Duration: 1hr, 2x/wk, 4wk therapy program & 100-200 U botox injection(s)	E vs C: Action Research Arm Test (-) Modified Ashworth Scale-elbow (+exp) Motricity index- arm (-) Grip strength (-) 9-Hole Peg Test (-) Barthel ADL Index (-) pain score (-) description (-) EQ5D (-) SIS (-) upper limb functional activities oxford handicap scale
Botulinum toxin (botox) combined with other interventions compared to stretching and positioning programs		
Hwang et al. (2024) RCT (7) NStart=44 NEnd=43 TPS=Subacute A + B vs A/B *Also in Table 8 (Stretching Programs)*	E: Botulinum toxin A injection + structured stretching exercises + conventional rehabilitation C: Self-stretching exercises + conventional rehabilitation Duration: 20min/d, 5d/wk for 6mo stretching exercises	E vs C: modified Ashworth Scale elbow (+exp) wrist (+exp) fingers (+exp) VAS-pain (+exp) Korean modified Barthel Index (+exp) FMA-UE (-) EQ-5D (+exp) EMG signals - root mean square flexion (+exp) extension (+exp)
Botulinum toxin (botox) compared to antispastic medications		
Turcu-Stiolica et al. (2021) Pilot RCT (4) NStart=34 NEnd=34 TPS=Not Reported A vs B *Also in Table 34 (Antispastic Medications)*	E: Bot toxin A + physiotherapy C: baclofenum +physiotherapy Duration: E: 2 injections over 6 months C: daily for 6 months	E vs C: MAS (-) Tardieu (-) Frenchay Activity Index (-) BI (-) Muscle Strength (-) MMSE (+exp) HRQOL (+exp)

Botulinum toxin (botox) combined with other interventions compared to exercise and custom physiotherapy protocols or botulinum toxin (botox)		
Lannin et al. (2018) Pilot RCT (8) NStart=37 NEnd=36 TPS=Chronic A + B vs A vs B *Also in Table 3 (Exercise and Strength Training)*	E: Botox+ intensive rehabilitation program C1: Botox C2: Intensive therapy Duration: 60min/session, for 6wks (12 sessions total) clinic rehabilitation, 3x60min/d, 5d/wk, for 6wks (90h total) self-directed practice, Single dose (max 500U) Botox	E vs C1 vs C2: goal attainment scale (-) BBT (-) 6min walk test (-) Tardieu scale (-)
Cross-Referenced RCTs: Combined or Comparative Interventions Involving Botulinum Toxin (results included in this table's levels of evidence)		
Hokazono et al. (2022) RCT (7) NStart=40 NEnd=40 TPS=Chronic A + B vs A/B *Primary listing: Table 1 (Neurodevelopmental Techniques)*	E: repetitive facilitative exercise (RFE) + BoNT-A injection + conventional self-training + conventional rehab C: repetitive facilitative exercise (RFE) + conventional self-training + conventional rehab Duration: 40min/d, 6d/wk, 4wks RFE	E vs C: FMA (+exp) ARAT (+exp) BBT (+exp) AROM; elbow, wrist (+exp) MAS; elbow (+exp) wrist (-) finger (-)
Hung et al. (2022) Pilot RCT (7) NStart=37 NEnd=37 TPS=Chronic A + B vs A + C vs A *Primary listing: Table 16 (Robotics)*	E1: Robot-assisted training (Bi-Manu-Track BMT robotic arm) + BoNT-A injection + functional practice E2: Mirror therapy + BoNT-A injection + functional practice C: conventional task-oriented movement training + BoNT-A injection + functional practice Duration: 75min/d (45min active, 30min functional practice), 3d/wk, 8 wks	E1 vs E2 vs C: FMA-UE (-) proximal (-) distal (-)], [MAS; -elbow flexor (-); -forearm pronator (-); -wrist flexor (-); -finger PIP flexor (-) MAL (-)
Hung et al. (2021) RCT (8) NStart=36 NEnd=36 TPS=Chronic A + B1 vs A + B2 *Primary listing: Table 16 (Robotics)*	E: Condensed Robot-assisted training + BTX + Functional training C: Distributed robot-assisted training + BTX + Functional training Duration: Condensed: 45min, 4d/wk, 6wks; distributed: 45min, 2d/wk, 12 wks; followed by 30mins functional training(every session, both groups)	E vs C: FMA-UE (-) WMFT (-) MAL (-) mAS (-) SSEQ (-)
Gandolfi et al. (2019) RCT (8) NStart=32 NEnd=32 TPS=Chronic A + B vs A/B *Primary listing: Table 16 (Robotics)*	E: Robot assisted training+ Botox C: Conventional treatment+Botox Duration: 45min/session; 2session/wk; 5wk	E vs C: Modified AS (+exp) FMA-UE (+exp) Medical research councils scale (+exp) Medical Research Council Scale Total UL strength Shoulder abduction shoulder external rotation elbow flexion elbow extension forearm supination wrist flexion wrist extension
Wu et al. (2018) RCT (7) NStart=42	E: Extracorpeal shockwave C: Botox Duration: 1x/wk, 3wk	E vs C: Modified Ashworth Scale- wrist (-) Modified Ashworth Scale- elbow (-)

NEnd=40 TPS=Chronic A vs B *Primary listing: Table 26 (Extracorporeal Shockwave Therapy)*		Tardieu wrist: (-) Tardieu elbow: (-) Fugl Meyer Upper Extremity: (+exp) Passive Range of Motion (+exp)
Pennati et al. (2015) Pilot RCT (6) NStart=15 NEnd=15 TPS=Chronic A + B vs A/B *Primary listing: Table 16 (Robotics)*	E: Botulinum toxin A + robotic training C: Robotic training Duration: 60min/session, 10sessions, 2-3d/wk	E vs C: FMA UE (-) BBT (+exp1) FIM (-) Mod Ashworth scale (+exp2) Euro-QoL (-) EMG parameters
Santamato et al. (2013) RCT (6) NStart=32 NEnd=32 TPS=Chronic A + B vs A + C *Primary listing: Table 26 (Extracorporeal Shockwave Therapy)*	E: Botolinum Toxin-A + Extracorporeal shock wave therapy (ESWT) C: BTX-A + electrical stimulation (ES) Duration: E: single dose BTX-A + 1x/d, 5d ESWT; C: single dose BTX-A + 30min, 2x/d, 5d ES	E vs C: modified Ashworth scale (+exp) spasm frequency scale (+exp) visual analogue scale (+exp) PAIN vas (+EXP)
Weber et al. (2010) Pilot RCT (6) NStart=23 NEnd=18 TPS=Chronic A + B + C vs A/A + B *Primary listing: Table 22 (Neuromuscular Electrical Stimulation (NMES))*	E: FES + botulinum toxin-A + home based task-oriented exercise C: Botulinum toxin-A + home-based exercise program Duration: 1hr/d, 5d/wk, 4 wk	E vs C: Motor Activity Log observation (-) self-reported (-) Action Research Arm Test (-)
Lai et al. (2009) Pilot RCT (2) NStart=36 NEnd=30 TPS=Chronic A + B vs A/B *Primary listing: Table 9 (Orthotics and Taping)*	E: Orthotic splint (Dyna-splint) + Standard care (Boutulinum toxin type A & Manual therapy) C: Standard care (Boutulinum toxin type A & Manual therapy) Duration: 1d/wk, 16wks Usual care, 6-8h/night dyna-splint for 14wks (670h+ total)	E vs C: AROM (No Stats) MAS (No Stats)
Marco et al. (2007) RCT (10) NStart=31 NEnd=29 TPS=Chronic A + B vs A/B *Primary listing: Table 23 (Transcutaneous Electrical Nerve Stimulation (TENS))*	E: TENS + BTA infiltration C: TENS + Placebo 2.5mL saline Duration: 6 week period	E vs C: VAS pain (+exp) Mod Ashforth scale (-) Shoulder range of motion flexion (-) abduction (-) external rotation (+exp) MEP amplitude (+exp) MEP latency (-)
Hesse et al. (1998) RCT (5) NStart=24 NEnd=24 TPS=Chronic A + B vs A vs B vs 0 *Primary listing: Table 22 (Neuromuscular Electrical Stimulation (NMES))*	E1: Botox 1000u + cyclic NMES E2: Botox 1000u E3: Placebo + cyclic NMES C: Placebo Duration: 1 injection ; 30min/d, 3d/wk, 12 wks stimulation	E1 vs E2 vs E3 vs C: modified Ashworth scale (-) Global Pain Assessment Score (no stats) ADL (+exp1) Limb position (-)

Abbreviations and table notes: C=control group; D=days; E=experimental group; H=hours; Min=minutes; RCT=randomized controlled trial; TPS=time post stroke category (Acute: less than 30 days, Subacute: more than 1 month but less than 6 months, Chronic: over 6 months); Wk=weeks.

+exp indicates a statistically significant between groups difference at α=0.05 in favour of the experimental group

+exp1/+exp2/+exp3 indicates a statistically significant between groups difference at α=0.05 in favour of the first, second or third experimental group

+con indicates a statistically significant between groups difference at α=0.05 in favour of the control group

- indicates no statistically significant between groups differences at α=0.05

1. Body Functions and Structures

MOTOR FUNCTION			
LoE	**Conclusion Statement**	**RCTs**	**References**
1a	Botulinum toxin (botox) may not have a difference in efficacy when compared to sham for improving motor function.	12	de Melo Carvalho Rocha et al. (2023); Tan & Jia (2021); Wallace et al. (2020); Prazeres et al. (2018); Rosales et al. (2018); Marciniak et al. (2012); Wolf et al. (2012); Cousins et al. (2010); Suputtitada & Suwanwela (2005); Bakheit et al. (2000); Richardson et al. (2000); Simpson et al. (1996)
1b	Botulinum Toxin A with Task Specific Training may not have a difference in efficacy when compared to Task-Specific Training for improving motor function.	1	Umar et al. (2018)
1b	Botulinum Toxin A injection with neuromuscular electrical stimulation may produce greater improvements in motor function than Placebo with neuromuscular electrical stimulation.	1	Lindsay et al. (2020)
1b	Intramuscular botulinum toxin A with physiotherapy may not have a difference in efficacy when compared to Intra-articular triamcinolone acetonide injection with physiotherapy for improving motor function.	1	Lim et al. (2008)
1b	BtxA (Dysport) with modified constraint-induced movement therapy may produce greater improvements in motor function than BtxA (Dysport) with conventional rehabilitation.	1	Sun et al. (2010)
1a	Botulinum toxin (botox) combined with other interventions may produce greater improvements in motor function than botulinum toxin (botox).	5	Lee & Yang (2024); Kosem M. et al. (2022); Maulet et al. (2021); Nasb et al. (2019); Devier et al. (2017)
2	Botulinumtoxin therapy in combination with dynamic electric neurostimulation (the explanation is consistent with transcutaneous electrical nerve stimulation) and basic therapy, including massage and therapeutic exercises may produce greater improvements in motor function than Basic Therapy.	1	Abramovich et al. (2020)
2	Botulinumtoxin therapy in combination with dynamic electric neurostimulation (the explanation is consistent with transcutaneous electrical nerve stimulation) and basic therapy, including massage and therapeutic exercises may produce greater improvements in motor function than Botulinum toxin therapy and basic therapy.	1	Abramovich et al. (2020)
2	Botulinumtoxin therapy in combination with dynamic electric neurostimulation (the explanation is consistent with transcutaneous electrical nerve stimulation) and basic therapy, including massage and therapeutic exercises may produce greater improvements in motor function than Dynamic electric neurostimulation and basic therapy.	1	Abramovich et al. (2020)
2	Onabotulinumtoxin-A may produce greater improvements in motor function than Suprascapular Nerve Block.	1	Kasapoglu-Aksoy et al. (2020)

1b	Botulinum toxin type A injection with programme of upper limb therapy may not have a difference in efficacy when compared to upper limb therapy programme for improving motor function.	1	Shaw et al. (2010)
1b	Botulinum toxin A injection with structured stretching exercises and conventional rehabilitation may not have a difference in efficacy when compared to Self-stretching exercises with conventional rehabilitation for improving motor function.	1	Hwang et al. (2024)
1b	Robot assisted training with Botox may produce greater improvements in motor function than Conventional treatment with Botox.	1	Gandolfi et al. (2019)
1b	Extracorpeal shockwave may produce greater improvements in motor function than Botox.	1	Wu et al. (2018)
1b	Condensed Robot-assisted training with botulinum toxin A and Functional training may not have a difference in efficacy when compared to Distributed robot-assisted training with botulinum toxin A and Functional training for improving motor function.	1	Hung et al. (2021)
1b	Repetitive facilitative exercise (RFE) with botulinum toxin A injection, conventional self-training and conventional rehab may produce greater improvements in motor function than repetitive facilitative exercise (RFE) with conventional self-training and conventional rehab.	1	Hokazono et al. (2022)
1b	Botulinum toxin (botox) combined with other interventions may not have a difference in efficacy when compared to botulinum toxin (botox) or conventional therapy for improving motor function.	1	Giray et al. (2020)
1b	Botulinum toxin (botox) may not have a difference in efficacy when compared to conventional therapy for improving motor function.	1	Hesse et al. (2012)
1b	Robot-assisted training (Bi-Manu-Track BMT robotic arm) with BoNT-A injection and functional practice may not have a difference in efficacy when compared to conventional task-oriented movement training with BoNT-A injection and functional practice for improving motor function.	1	Hung et al. (2022)
1b	Mirror therapy with BoNT-A injection and functional practice may not have a difference in efficacy when compared to conventional task-oriented movement training with BoNT-A injection and functional practice for improving motor function.	1	Hung et al. (2022)
1b	Botulinum toxin A with robotic training may not have a difference in efficacy when compared to Robotic training for improving motor function.	1	Pennati et al. (2015)
1b	FES with botulinum toxin-A and home based task-oriented exercise may not have a difference in efficacy when compared to Botulinum toxin-A with home-based exercise program for improving motor function.	1	Weber et al. (2010)

MUSCLE STRENGTH			
LoE	**Conclusion Statement**	**RCTs**	**References**
1a	Botulinum toxin (botox) may not have a difference in efficacy when compared to sham for improving muscle strength.	6	Wallace et al. (2020); Wolf et al. (2012); Cousins et al. (2010); Meythaler et al. (2009); Bhakta et al. (2000); Simpson et al. (1996)
1b	Intramuscular botulinum toxin A may not have a difference in efficacy when compared to Placebo for improving muscle strength.	1	Simpson et al. (2009)
1b	Botox with movement training may produce greater improvements in muscle strength than Botox plus excercise handout.	1	Lannin et al. (2020)

1b	Botulinum toxin type A injection with programme of upper limb therapy may not have a difference in efficacy when compared to upper limb therapy programme for improving muscle strength.	1	Shaw et al. (2010)
1b	Robot assisted training with Botox may produce greater improvements in muscle strength than Conventional treatment with Botox.	1	Gandolfi et al. (2019)
2	Bot toxin A with physiotherapy may not have a difference in efficacy when compared to baclofenum with physiotherapy for improving muscle strength.	1	Turcu-Stiolica et al. (2021)
1b	Botulinum toxin (botox) combined with other interventions may not have a difference in efficacy when compared to botulinum toxin (botox) or conventional therapy for improving muscle strength.	1	Giray et al. (2020)

SPASTICITY			
LoE	**Conclusion Statement**	**RCTs**	**References**
1a	Botulinum toxin (botox) may produce greater improvements in spasticity than sham.	30	de Melo Carvalho Rocha et al. (2023); Tan & Jia (2021); Masakado et al. (2020); Wallace et al. (2020); Prazeres et al. (2018); Rosales et al. (2018); Elovic et al. (2016); Gracies et al. (2015); Gracies et al. (2014); Ward et al. (2014); Marciniak et al. (2012); Rosales et al. (2012); Wolf et al. (2012); Kaji et al. (2010); Kaňovský et al. (2009); McCrory et al. (2009); Meythaler et al. (2009); Jahangir et al. (2007); Kong et al. (2007); Yelnik et al. (2007); Suputtitada & Suwanwela (2005); Brashear et al. (2004); Childers et al. (2004); Brashear et al. (2002); Bakheit et al. (2001); Bakheit et al. (2000); Bhakta et al. (2000); Richardson et al. (2000); Smith et al. (2000); Simpson et al. (1996)
1a	Different approaches to botulinum toxin (botox) may not have a difference in efficacy when compared with one another for improving spasticity.	10	Ye et al. (2023); Lee et al. (2022); Abo et al. (2020); Lee et al. (2020c); Rekand et al. (2019); Nam et al. (2015); Seo et al. (2015); Picelli et al. (2014); Santamato et al. (2014); Francisco et al. (2002)
1b	Letibotulinumtoxin (Botulax) may not have a difference in efficacy when compared to onabotuliNomtoxin (Botox) for improving spasticity.	1	Do et al. (2017)
1b	Non-Targeted High Volume Botulinum Toxin may not have a difference in efficacy when compared to Endplate-Targeted Low Volume Botulinum Toxin or Non-Targeted Low Volume Botulinum Toxin for improving spasticity.	1	Gracies et al. (2009)
1b	There is conflicting evidence about the effect of Intramuscular botulinum toxin A when compared to Placebo for improving spasticity.	1	Simpson et al. (2009)
1b	Botox-A with adhesive taping may produce greater improvements in spasticity than Botox-A with Manual Stretching (with splint to maintain maximum stretching).	1	Santamato et al. (2015)

1b	There is conflicting evidence about the effect of Botulinum Toxin A injection with neuromuscular electrical stimulation when compared to Placebo with neuromuscular electrical stimulation for improving spasticity.	1	Lindsay et al. (2020)
1b	Intramuscular botulinum toxin A with physiotherapy may not have a difference in efficacy when compared to Intra-articular triamcinolone acetonide injection with physiotherapy for improving spasticity.	1	Lim et al. (2008)
1b	BtxA (Dysport) with modified constraint-induced movement therapy may not have a difference in efficacy when compared to BtxA (Dysport) with conventional rehabilitation for improving spasticity.	1	Sun et al. (2010)
1a	Botulinum toxin (botox) combined with other interventions may not have a difference in efficacy when compared to botulinum toxin (botox) for improving spasticity.	4	Lee & Yang (2024); Kosem M. et al. (2022); Nasb et al. (2019); Devier et al. (2017)
2	Botulinumtoxin therapy in combination with dynamic electric neurostimulation (the explanation is consistent with transcutaneous electrical nerve stimulation) and basic therapy, including massage and therapeutic exercises may produce greater improvements in spasticity than Basic Therapy.	1	Abramovich et al. (2020)
2	Botulinumtoxin therapy in combination with dynamic electric neurostimulation (the explanation is consistent with transcutaneous electrical nerve stimulation) and basic therapy, including massage and therapeutic exercises may produce greater improvements in spasticity than Botulinum toxin therapy and basic therapy.	1	Abramovich et al. (2020)
2	Botulinumtoxin therapy in combination with dynamic electric neurostimulation (the explanation is consistent with transcutaneous electrical nerve stimulation) and basic therapy, including massage and therapeutic exercises may produce greater improvements in spasticity than Dynamic electric neurostimulation and basic therapy.	1	Abramovich et al. (2020)
1b	Ultrasound guided BotulinumToxin A Injections may not have a difference in efficacy when compared to No treatment for improving spasticity.	1	Zeuner et al. (2017)
2	Onabotulinumtoxin-A may produce greater improvements in spasticity than Suprascapular Nerve Block.	1	Kasapoglu-Aksoy et al. (2020)
1b	Botox with movement training may not have a difference in efficacy when compared to Botox plus excercise handout for improving spasticity.	1	Lannin et al. (2020)
1b	Botulinum toxin type A injection with programme of upper limb therapy may produce greater improvements in spasticity than upper limb therapy programme.	1	Shaw et al. (2010)
1b	Botulinum toxin A injection with structured stretching exercises and conventional rehabilitation may produce greater improvements in spasticity than Self-stretching exercises with conventional rehabilitation.	1	Hwang et al. (2024)
2	Botox 1000u with cyclic neuromuscular electrical stimulation may not have a difference in efficacy when compared to Placebo for improving spasticity.	1	Hesse et al. (1998)
1b	Botolinum Toxin-A with Extracorporeal shock wave therapy (extracorporeal shockwave therapy) may produce greater improvements in spasticity than botulinum toxin A with electrical stimulation (ES).	1	Santamato et al. (2013)
1b	Transcutaneous electrical nerve stimulation with BTA infiltration may not have a difference in efficacy when compared to transcutaneous electrical nerve stimulation with Placebo 2.5mL saline for improving spasticity.	1	Marco et al. (2007)

1b	Extracorpeal shockwave may not have a difference in efficacy when compared to Botox for improving spasticity.	1	Wu et al. (2018)
1b	Condensed Robot-assisted training with botulinum toxin A and Functional training may not have a difference in efficacy when compared to Distributed robot-assisted training with botulinum toxin A and Functional training for improving spasticity.	1	Hung et al. (2021)
1b	Repetitive facilitative exercise (RFE) with botulinum toxin A injection, conventional self-training and conventional rehab may not have a difference in efficacy when compared to repetitive facilitative exercise (RFE) with conventional self-training and conventional rehab for improving spasticity.	1	Hokazono et al. (2022)
2	Bot toxin A with physiotherapy may not have a difference in efficacy when compared to baclofenum with physiotherapy for improving spasticity.	1	Turcu-Stiolica et al. (2021)
1b	Botulinum toxin (botox) combined with other interventions may not have a difference in efficacy when compared to botulinum toxin (botox) or conventional therapy for improving spasticity.	1	Giray et al. (2020)
1b	Botox with intensive rehabilitation program may not have a difference in efficacy when compared to Botox for improving spasticity.	1	Lannin et al. (2018)
1b	Botulinum toxin (botox) may produce greater improvements in spasticity than conventional therapy.	1	Hesse et al. (2012)
1b	Botulinum toxin A with robotic training may produce greater improvements in spasticity than Robotic training.	1	Pennati et al. (2015)
1b	Robot assisted training with Botox may produce greater improvements in spasticity than Conventional treatment with Botox.	1	Gandolfi et al. (2019)

RANGE OF MOTION			
LoE	**Conclusion Statement**	**RCTs**	**References**
1a	Botulinum toxin (botox) may not have a difference in efficacy when compared to sham for improving range of motion.	15	de Melo Carvalho Rocha et al. (2023); Tan & Jia (2021); Wallace et al. (2020); Gracies et al. (2014); Marciniak et al. (2012); Rosales et al. (2012); Wolf et al. (2012); Cousins et al. (2010); Meythaler et al. (2009); Kong et al. (2007); Bakheit et al. (2001); Bakheit et al. (2000); Bhakta et al. (2000); Richardson et al. (2000); Smith et al. (2000)
1b	Botulinum toxin (botox): some approaches may produce greater improvements in range of motion than others.	1	Picelli et al. (2014)
1b	There is conflicting evidence about the effect of Botulinum Toxin A injection with neuromuscular electrical stimulation when compared to Placebo with neuromuscular electrical stimulation for improving range of motion.	1	Lindsay et al. (2020)
1b	Intramuscular botulinum toxin A with physiotherapy may not have a difference in efficacy when compared to Intra-articular triamcinolone acetonide injection with physiotherapy for improving range of motion.	1	Lim et al. (2008)
1b	Botox with movement training may not have a difference in efficacy when compared to Botox plus excercise handout for improving range of motion.	1	Lannin et al. (2020)
1b	Transcutaneous electrical nerve stimulation with BTA infiltration may not have a difference in efficacy when compared to transcutaneous	1	Marco et al. (2007)

	electrical nerve stimulation with Placebo 2.5mL saline for improving range of motion.		
1b	Extracorpeal shockwave may produce greater improvements in range of motion than Botox.	1	Wu et al. (2018)
1b	Repetitive facilitative exercise (RFE) with botulinum toxin A injection, conventional self-training and conventional rehab may produce greater improvements in range of motion than repetitive facilitative exercise (RFE) with conventional self-training and conventional rehab.	1	Hokazono et al. (2022)
1b	Suprascapular botulinum toxin A injections may not have a difference in efficacy when compared to placebo for improving range of motion.	1	deBoer et al. (2008)

PROPRIOCEPTION			
LoE	**Conclusion Statement**	**RCTs**	**References**
2	Botox 1000u with cyclic neuromuscular electrical stimulation may not have a difference in efficacy when compared to Placebo for improving proprioception.	1	Hesse et al. (1998)
1b	Botulinum toxin (botox) combined with other interventions may not have a difference in efficacy when compared to botulinum toxin (botox) or conventional therapy for improving proprioception.	1	Giray et al. (2020)

2. Activities

ACTIVITIES OF DAILY LIVING			
LoE	**Conclusion Statement**	**RCTs**	**References**
1a	Botulinum toxin (botox) may not have a difference in efficacy when compared to sham for improving performance of activities of daily living.	21	Masakado et al. (2020); Elovic et al. (2016); Gracies et al. (2015); Gracies et al. (2014); Ward et al. (2014); Marciniak et al. (2012); Rosales et al. (2012); Kaji et al. (2010); Kaňovský et al. (2009); McCrory et al. (2009); Meythaler et al. (2009); Jahangir et al. (2007); Suputtitada & Suwanwela (2005); Childers et al. (2004); Brashear et al. (2002); Bakheit et al. (2001); Bakheit et al. (2000); Bhakta et al. (2000); Richardson et al. (2000); Smith et al. (2000); Simpson et al. (1996)
1b	Botulinum Toxin A with Task Specific Training may not have a difference in efficacy when compared to Task-Specific Training for improving performance of activities of daily living.	1	Umar et al. (2018)
1a	Different approaches to botulinum toxin (botox) may not have a difference in efficacy when compared with one another for improving performance of activities of daily living.	7	Ye et al. (2023); Lee et al. (2022); Abo et al. (2020); Lee et al. (2020c); Rekand et al. (2019); Nam et al. (2015); Seo et al. (2015)
1b	Letibotulinumtoxin (Botulax) may not have a difference in efficacy when compared to onabotuliNomtoxin (Botox) for improving performance of activities of daily living.	1	Do et al. (2017)
1b	Intramuscular botulinum toxin A may not have a difference in efficacy when compared to Placebo for improving performance of activities of daily living.	1	Simpson et al. (2009)

1b	There is conflicting evidence about the effect of Botox-A with adhesive taping when compared to Botox-A with Manual Stretching (with splint to maintain maximum stretching) for improving performance of activities of daily living.	1	Santamato et al. (2015)
1b	BtxA (Dysport) with modified constraint-induced movement therapy may produce greater improvements in performance of activities of daily living than BtxA (Dysport) with conventional rehabilitation.	1	Sun et al. (2010)
1a	Botulinum toxin (botox) combined with other interventions may not have a difference in efficacy when compared to botulinum toxin (botox) for improving performance of activities of daily living.	4	Lee & Yang (2024); Maulet et al. (2021); Nasb et al. (2019); Devier et al. (2017)
1b	Ultrasound guided BotulinumToxin A Injections may not have a difference in efficacy when compared to No treatment for improving performance of activities of daily living.	1	Zeuner et al. (2017)
1b	Botox with movement training may not have a difference in efficacy when compared to Botox plus excercise handout for improving performance of activities of daily living.	1	Lannin et al. (2020)
1b	Botulinum toxin A injection with structured stretching exercises and conventional rehabilitation may produce greater improvements in performance of activities of daily living than Self-stretching exercises with conventional rehabilitation.	1	Hwang et al. (2024)
1b	Condensed Robot-assisted training with botulinum toxin A and Functional training may not have a difference in efficacy when compared to Distributed robot-assisted training with botulinum toxin A and Functional training for improving performance of activities of daily living.	1	Hung et al. (2021)
1b	Botulinum toxin type A injection with programme of upper limb therapy may not have a difference in efficacy when compared to upper limb therapy programme for improving performance of activities of daily living.	1	Shaw et al. (2010)
2	Botox 1000u with cyclic neuromuscular electrical stimulation may produce greater improvements in performance of activities of daily living than Placebo.	1	Hesse et al. (1998)
2	Bot toxin A with physiotherapy may not have a difference in efficacy when compared to baclofenum with physiotherapy for improving performance of activities of daily living.	1	Turcu-Stiolica et al. (2021)
1b	Botox with intensive rehabilitation program may not have a difference in efficacy when compared to Botox for improving performance of activities of daily living.	1	Lannin et al. (2018)
1b	Botulinum toxin (botox) may produce greater improvements in performance of activities of daily living than conventional therapy.	1	Hesse et al. (2012)
1b	Robot-assisted training (Bi-Manu-Track BMT robotic arm) with BoNT-A injection and functional practice may not have a difference in efficacy when compared to conventional task-oriented movement training with BoNT-A injection and functional practice for improving performance of activities of daily living.	1	Hung et al. (2022)
1b	Mirror therapy with BoNT-A injection and functional practice may not have a difference in efficacy when compared to conventional task-oriented movement training with BoNT-A injection and functional practice for improving performance of activities of daily living.	1	Hung et al. (2022)
1b	Botulinum toxin A with robotic training may not have a difference in efficacy when compared to Robotic training for improving performance of activities of daily living.	1	Pennati et al. (2015)
1b	FES with botulinum toxin-A and home based task-oriented exercise may not have a difference in efficacy when compared to Botulinum	1	Weber et al. (2010)

	toxin-A with home-based exercise program for improving performance of activities of daily living.		

DEXTERITY			
LoE	**Conclusion Statement**	**RCTs**	**References**
1a	Botulinum toxin (botox) may not have a difference in efficacy when compared to sham for improving dexterity.	2	Wallace et al. (2020); Richardson et al. (2000)
1b	Botox with movement training may not have a difference in efficacy when compared to Botox plus excercise handout for improving dexterity.	1	Lannin et al. (2020)
1b	Botulinum toxin type A injection with programme of upper limb therapy may not have a difference in efficacy when compared to upper limb therapy programme for improving dexterity.	1	Shaw et al. (2010)
1b	Repetitive facilitative exercise (RFE) with botulinum toxin A injection, conventional self-training and conventional rehab may produce greater improvements in dexterity than repetitive facilitative exercise (RFE) with conventional self-training and conventional rehab.	1	Hokazono et al. (2022)
1b	Botulinum toxin (botox) combined with other interventions may not have a difference in efficacy when compared to botulinum toxin (botox) or conventional therapy for improving dexterity.	1	Giray et al. (2020)
1b	Botox with intensive rehabilitation program may not have a difference in efficacy when compared to Botox for improving dexterity.	1	Lannin et al. (2018)
1b	Botulinum toxin A with robotic training may produce greater improvements in dexterity than Robotic training.	1	Pennati et al. (2015)

Key Points

- Botulinum toxin (botox): some approaches may be more beneficial than others for improving range of motion; different approaches to botulinum toxin (botox) may not have a difference in efficacy when compared with one another for improving spasticity and performance of activities of daily living.
- Botulinum Toxin A with Task Specific Training may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Task-Specific Training.
- Botulinum Toxin A injection with neuromuscular electrical stimulation may be beneficial for improving motor function after stroke when compared to Placebo with neuromuscular electrical stimulation; the literature is mixed regarding spasticity and range of motion.
- Intramuscular botulinum toxin A with physiotherapy may not be beneficial for improving motor function, spasticity, and range of motion after stroke when compared to Intra-articular triamcinolone acetonide injection with physiotherapy.
- BtxA (Dysport) with modified constraint-induced movement therapy may be beneficial for improving motor function and performance of activities of daily living, but not spasticity, after stroke when compared to BtxA (Dysport) with conventional rehabilitation.
- Botulinum toxin (botox) combined with other interventions may be beneficial for improving motor function, but not spasticity and performance of activities of daily living, after stroke when compared to botulinum toxin (botox).
- Botulinumtoxin therapy in combination with dynamic electric neurostimulation (the explanation is consistent with transcutaneous electrical nerve stimulation) and basic therapy, including massage and therapeutic exercises may be beneficial for improving motor function and spasticity after stroke when compared to Basic Therapy.
- Botulinumtoxin therapy in combination with dynamic electric neurostimulation (the explanation is consistent with transcutaneous electrical nerve stimulation) and basic therapy, including massage and therapeutic exercises may be beneficial for improving motor function and spasticity after stroke when compared to Botulinum toxin therapy and basic therapy.

- Botulinumtoxin therapy in combination with dynamic electric neurostimulation (the explanation is consistent with transcutaneous electrical nerve stimulation) and basic therapy, including massage and therapeutic exercises may be beneficial for improving motor function and spasticity after stroke when compared to Dynamic electric neurostimulation and basic therapy.
- Onabotulinumtoxin-A may be beneficial for improving motor function and spasticity after stroke when compared to Suprascapular Nerve Block.
- Botulinum toxin type A injection with programme of upper limb therapy may be beneficial for improving spasticity, but not motor function, dexterity, performance of activities of daily living, and muscle strength, after stroke when compared to upper limb therapy programme.
- Botulinum toxin A injection with structured stretching exercises and conventional rehabilitation may be beneficial for improving performance of activities of daily living and spasticity, but not motor function, after stroke when compared to Self-stretching exercises with conventional rehabilitation.
- Robot assisted training with Botox may be beneficial for improving motor function, muscle strength, and spasticity after stroke when compared to Conventional treatment with Botox.
- Extracorpeal shockwave may be beneficial for improving motor function and range of motion, but not spasticity, after stroke when compared to Botox.
- Condensed Robot-assisted training with botulinum toxin A and Functional training may not be beneficial for improving motor function, performance of activities of daily living, and spasticity after stroke when compared to Distributed robot-assisted training with botulinum toxin A and Functional training.
- Repetitive facilitative exercise (RFE) with botulinum toxin A injection, conventional self-training and conventional rehab may be beneficial for improving motor function, dexterity, and range of motion, but not spasticity, after stroke when compared to repetitive facilitative exercise (RFE) with conventional self-training and conventional rehab.
- Botox with movement training may be beneficial for improving muscle strength, but not dexterity, performance of activities of daily living, spasticity, and range of motion, after stroke when compared to Botox plus excercise handout.
- Letibotulinumtoxin (Botulax) may not be beneficial for improving performance of activities of daily living and spasticity after stroke when compared to onabotuliNomtoxin (Botox).
- Intramuscular botulinum toxin A may not be beneficial for improving performance of activities of daily living and muscle strength after stroke when compared to Placebo; the literature is mixed regarding spasticity.
- Botox-A with adhesive taping may be beneficial for improving spasticity after stroke when compared to Botox-A with Manual Stretching (with splint to maintain maximum stretching); the literature is mixed regarding performance of activities of daily living.
- Ultrasound guided BotulinumToxin A Injections may not be beneficial for improving performance of activities of daily living and spasticity after stroke when compared to No treatment.
- Botox 1000u with cyclic neuromuscular electrical stimulation may be beneficial for improving performance of activities of daily living, but not spasticity and proprioception, after stroke when compared to Placebo.
- Non-Targeted High Volume Botulinum Toxin may not be beneficial for improving spasticity after stroke when compared to Endplate-Targeted Low Volume Botulinum Toxin or Non-Targeted Low Volume Botulinum Toxin.
- Botolinum Toxin-A with Extracorporeal shock wave therapy (extracorporeal shockwave therapy) may be beneficial for improving spasticity after stroke when compared to botulinum toxin A with electrical stimulation (ES).
- Transcutaneous electrical nerve stimulation with BTA infiltration may not be beneficial for improving spasticity and range of motion after stroke when compared to transcutaneous electrical nerve stimulation with Placebo 2.5mL saline.
- Suprascapular botulinum toxin A injections may not be beneficial for improving range of motion after stroke when compared to placebo.
- Bot toxin A with physiotherapy may not be beneficial for improving muscle strength, spasticity, and performance of activities of daily living after stroke when compared to baclofenum with physiotherapy.
- Botox with intensive rehabilitation program may not be beneficial for improving spasticity, performance of activities of daily living, and dexterity after stroke when compared to Botox.

- Botulinum toxin (botox) combined with other interventions may not be beneficial for improving motor function, muscle strength, spasticity, proprioception, and dexterity after stroke when compared to botulinum toxin (botox) or conventional therapy.
- Botulinum toxin (botox) may be beneficial for improving spasticity, but not motor function, muscle strength, range of motion, performance of activities of daily living, and dexterity, after stroke when compared to sham.
- Botulinum toxin (botox) may be beneficial for improving spasticity and performance of activities of daily living, but not motor function, after stroke when compared to conventional therapy.
- Robot-assisted training (Bi-Manu-Track BMT robotic arm) with BoNT-A injection and functional practice may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to conventional task-oriented movement training with BoNT-A injection and functional practice.
- Mirror therapy with BoNT-A injection and functional practice may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to conventional task-oriented movement training with BoNT-A injection and functional practice.
- Botulinum toxin A with robotic training may be beneficial for improving spasticity and dexterity, but not motor function and performance of activities of daily living, after stroke when compared to Robotic training.
- FES with botulinum toxin-A and home based task-oriented exercise may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Botulinum toxin-A with home-based exercise program.

Summary of Key Points: Botulinum Toxin

Intervention	Control(s)	Function domain(s)	Effect
Botulinum toxin (botox)	sham	Spasticity	+
Botulinum toxin (botox)	sham	Motor function, muscle strength, range of motion, performance of activities of daily living, dexterity	–
Botulinum Toxin A with Task Specific Training	Task-Specific Training	Motor function, performance of activities of daily living	–
Botulinum Toxin A injection with neuromuscular electrical stimulation	Placebo with neuromuscular electrical stimulation	Motor function	+
Botulinum Toxin A injection with neuromuscular electrical stimulation	Placebo with neuromuscular electrical stimulation	Spasticity, range of motion	=
Intramuscular botulinum toxin A with physiotherapy	Intra-articular triamcinolone acetonide injection with physiotherapy	Motor function, spasticity, range of motion	–
BtxA (Dysport) with modified constraint-induced movement therapy	BtxA (Dysport) with conventional rehabilitation	Motor function, performance of activities of daily living	+
BtxA (Dysport) with modified constraint-induced movement therapy	BtxA (Dysport) with conventional rehabilitation	Spasticity	–
Botulinum toxin (botox) combined with other interventions	botulinum toxin (botox)	Spasticity, performance of activities of daily living	–
Botulinumtoxin therapy in combination with dynamic electric neurostimulation (the explanation is consistent with transcutaneous electrical nerve stimulation) and basic therapy, including massage and therapeutic exercises	Basic Therapy	Motor function, spasticity	+

Botulinumtoxin therapy in combination with dynamic electric neurostimulation (the explanation is consistent with transcutaneous electrical nerve stimulation) and basic therapy, including massage and therapeutic exercises	Botulinum toxin therapy and basic therapy	Motor function, spasticity	+
Botulinumtoxin therapy in combination with dynamic electric neurostimulation (the explanation is consistent with transcutaneous electrical nerve stimulation) and basic therapy, including massage and therapeutic exercises	Dynamic electric neurostimulation and basic therapy	Motor function, spasticity	+
Onabotulinumtoxin-A	Suprascapular Nerve Block	Motor function, spasticity	+
Botulinum toxin type A injection with programme of upper limb therapy	upper limb therapy programme	Spasticity	+
Botulinum toxin type A injection with programme of upper limb therapy	upper limb therapy programme	Motor function, dexterity, performance of activities of daily living, muscle strength	−
Botulinum toxin A injection with structured stretching exercises and conventional rehabilitation	Self-stretching exercises with conventional rehabilitation	Performance of activities of daily living, spasticity	+
Botulinum toxin A injection with structured stretching exercises and conventional rehabilitation	Self-stretching exercises with conventional rehabilitation	Motor function	−
Robot assisted training with Botox	Conventional treatment with Botox	Motor function, muscle strength, spasticity	+
Extracorpeal shockwave	Botox	Motor function, range of motion	+
Extracorpeal shockwave	Botox	Spasticity	−
Condensed Robot-assisted training with botulinum toxin A and Functional training	Distributed robot-assisted training with botulinum toxin A and Functional training	Motor function, performance of activities of daily living, spasticity	−
Repetitive facilitative exercise (RFE) with botulinum toxin A injection, conventional self-training and conventional rehab	repetitive facilitative exercise (RFE) with conventional self-training and conventional rehab	Motor function, dexterity, range of motion	+
Repetitive facilitative exercise (RFE) with botulinum toxin A injection, conventional self-training and conventional rehab	repetitive facilitative exercise (RFE) with conventional self-training and conventional rehab	Spasticity	−
Botox with movement training	Botox plus excercise handout	Muscle strength	+
Botox with movement training	Botox plus excercise handout	Dexterity, performance of activities of daily living, spasticity, range of motion	−
Botulinum toxin (botox)	One another (different approaches compared)	Spasticity, performance of activities of daily living	−
Letibotulinumtoxin (Botulax)	onabotuliNomtoxin (Botox)	Performance of activities of daily living, spasticity	−
Intramuscular botulinum toxin A	Placebo	Performance of activities of daily living, muscle strength	−

Intramuscular botulinum toxin A	Placebo	Spasticity	=
Botox-A with adhesive taping	Botox-A with Manual Stretching (with splint to maintain maximum stretching)	Spasticity	+
Botox-A with adhesive taping	Botox-A with Manual Stretching (with splint to maintain maximum stretching)	Performance of activities of daily living	=
Ultrasound guided BotulinumToxin A Injections	No treatment	Performance of activities of daily living, spasticity	–
Botox 1000u with cyclic neuromuscular electrical stimulation	Placebo	Performance of activities of daily living	+
Botox 1000u with cyclic neuromuscular electrical stimulation	Placebo	Spasticity, proprioception	–
Non-Targeted High Volume Botulinum Toxin	Endplate-Targeted Low Volume Botulinum Toxin or Non-Targeted Low Volume Botulinum Toxin	Spasticity	–
Botolinum Toxin-A with Extracorporeal shock wave therapy (extracorporeal shockwave therapy)	botulinum toxin A with electrical stimulation (ES)	Spasticity	+
Transcutaneous electrical nerve stimulation with BTA infiltration	transcutaneous electrical nerve stimulation with Placebo 2.5mL saline	Spasticity, range of motion	–
Botulinum toxin (botox)	One another (different approaches compared)	Range of motion	+
Suprascapular botulinum toxin A injections	placebo	Range of motion	–
Bot toxin A with physiotherapy	baclofenum with physiotherapy	Muscle strength, spasticity, performance of activities of daily living	–
Botox with intensive rehabilitation program	Botox	Spasticity, performance of activities of daily living, dexterity	–
Botulinum toxin (botox) combined with other interventions	botulinum toxin (botox) or conventional therapy	Motor function, muscle strength, spasticity, proprioception, dexterity	–
Botulinum toxin (botox)	conventional therapy	Spasticity, performance of activities of daily living	+
Botulinum toxin (botox)	conventional therapy	Motor function	–
Robot-assisted training (Bi-Manu-Track BMT robotic arm) with BoNT-A injection and functional practice	conventional task-oriented movement training with BoNT-A injection and functional practice	Motor function, performance of activities of daily living	–
Mirror therapy with BoNT-A injection and functional practice	conventional task-oriented movement training with BoNT-A injection and functional practice	Motor function, performance of activities of daily living	–
Botulinum toxin A with robotic training	Robotic training	Spasticity, dexterity	+
Botulinum toxin A with robotic training	Robotic training	Motor function, performance of activities of daily living	–
FES with botulinum toxin-A and home based task-oriented exercise	Botulinum toxin-A with home-based exercise program	Motor function, performance of activities of daily living	–
Botulinum toxin (botox) combined with other interventions	botulinum toxin (botox)	Motor function	+

Antispastic Medications



Adapted from: https://www.indiamart.com/proddetail/baclofen-ip-20249295097.html

Oral and injectable antispastic medications (such as baclofen, tizanidine and tolperisone) aim to reduce upper limb spasticity after stroke through systemic muscle relaxant effects.

A total of six RCTs were found that evaluated antispastic medications for upper extremity motor rehabilitation. Four RCTs compared antispastic medications with sham (Seo et al. (2011); Meythaler et al. (2001a); Meythaler et al. (2001b); Meythaler et al. (1999)). One RCT compared antispastic medications with conventional therapy (Creamer et al. (2018)). One RCT compared antispastic medications combined with other interventions with sham or robotic glove (Kamper et al. (2024)).

In addition, 3 RCTs in which antispastic medications formed part of a combined or comparative intervention are cross-referenced at the end of Table 34; their primary listings appear in other tables.

The methodological details and results of all six RCTs are presented in Table 34.

Table 34. RCTs Evaluating Antispastic Medications for Upper Extremity Motor Rehabilitation

Authors (Year) **Study Design (PEDro Score)** **Sample Size start** **Sample Size end** **Time post stroke category** **Study design**	**Interventions** **Duration: Session length, frequency per week for total number of weeks**	**Outcome Measures** **Result (direction of effect)**
Antispastic medications compared to sham		
Seo et al. (2011) RCT Crossover (4) NStart=13 NEnd=13 TPS=Chronic A vs 0	E: Cyproheptadine Hydrochloride (8mg Periactin oral) C: Placebo pill Duration: Single Dose - 1 wk washout	E vs C: Delay in Grip Relaxation (+exp) Delay in Grip Initiation (-) Grip Strength (-) Pinch Strength (-) Flexor Digitorum Superficialis EMG Magnitude (-) Extensor Digitorum Communis EMG Magnitude (-) Box and Block Test (-)

		Action Research Arm Test (-)
Meythaler et al. (2001a) RCT Crossover (6) NStart=17 NEnd=15 TPS=Chronic A vs 0	E: Tizanidine (36mg/d; oral) C: Placebo tablet Duration: 8wks, 1wk washout	E vs C: Ashworth Scale Upper (+exp) Lower (+exp) Motor Strength (-) Functional Independence Measure - Motor (-) Range of Motion (-) Craig Handiap Assessment and Reporting Technique (-) penn spasm frequency scale deep tendon reflex scores blood pressure, heart rate, liver enzymes, kidney function, glucose CBC
Meythaler et al. (2001b) RCT Crossover (6) NStart=22 NEnd=17 TPS=Chronic A vs 0	E: Intrathecal Baclofen (50 mg) injection C: Intrathecal Normal Saline injection Duration: Single Session & 24-36h of IntraveNous Fluids	E vs C: Upper Extremity Muscle Tone (+exp) Muscle Spasm (+exp) Muscle Reflex (+exp) Ashworth
Meythaler et al. (1999) RCT Crossover (6) NStart=6 NEnd=6 TPS=Chronic A vs 0	E: Intrathecal Baclofen C: Placebo Saline Injection Duration: 3mos, 48hr washout	E vs C: Modified Ashworth Scale Upper (+exp) Lower (+exp)
Antispastic medications compared to conventional therapy		
Creamer et al. (2018) RCT (6) NStart=60 NEnd=48 TPS=Chronic A vs 0	E: Intrathecal Baclofen C: Conventional Spasticity Management Duration: 6mos	E vs C: Ashworth Scale - Lower Extremity (+exp) Ashworth Scale - Upper Extremity (+exp) Functional Indepdendence Measure (-)
Antispastic medications combined with other interventions compared to sham or robotic glove		
Kamper et al. (2024) RCT (7) NStart=94 NEnd=88 TPS=Chronic A + B1 vs A + B2 vs C *Also in Table 16 (Robotics)*	E1: Cyproheptadine + EMG-controlled VAEDA glove E2: Cyproheptadine + Passive stretching with VAEDA glove C1: Placebo + EMG-controlled VAEDA glove C2: Placebo + passive stretching VAEDA with glove Duration: 50min/d 3d/wk for 6wks training with exoskeleton + 6wks cyproheptadine or placebo	E1/E2 vs C1/C2: Graded Wolf Motor Function Test (-) Epworth Sleepiness Scale (no between-group stat) Beck Depression Inventory-II (no between-group stat) grip strength (no between-group stat) BBT (no between-group stat) FMA-UE (no between-group stat) voluntary finger flexion torque (no between-group stat) stretch reflex torque (no between-group stat)
Cross-Referenced RCTs: Combined or Comparative Interventions Involving Antispastic Medications (results included in this table's levels of evidence)		
Turcu-Stiolica et al. (2021) Pilot RCT (4)	E: Bot toxin A + physiotherapy C: baclofenum +physiotherapy	E vs C: MAS (-)

NStart=34 NEnd=34 TPS=Not Reported A vs B *Primary listing: Table 33 (Botulinum Toxin)*	Duration: E: 2 injections over 6 months C: daily for 6 months	Tardieu (-) Frenchay Activity Index (-) BI (-) Muscle Strength (-) MMSE (+exp) HRQOL (+exp)
McPherson et al. (2018) RCT Crossover (7) NStart=20 NEnd=16 TPS=Chronic A vs B vs 0 *Primary listing: Table 39 (Statins and Antihypertensives)*	E1: Isradipine (2.5mg up to 10m/d) E2: Tizanidine (4mg up to 24mg/d) C: Placebo Duration: 5wks titration phase + 4wk active stabilization phase, 4wk washout period	E1/E2 vs C: Work Area (+exp2) Muscle Strength (-) E1 vs E2: Work Area (-) Muscle Strength (-)
Simpson et al. (2009) RCT (8) NStart=60 NEnd=56 TPS=Not Reported A vs B vs 0 *Primary listing: Table 33 (Botulinum Toxin)*	E1: intramuscular BoNT E2: oral tizanidine C: Placebo Duration: 2-36 mg/d, 2x/d TZD or placebo 18wk & single dose injection of botox or placebo	E1/E2 vs C: Modified Ashworth Scale wrist flexor (+exp1) finger flexor (+exp1) finger flexor tone (+exp1) elbow flexor (-) pronators (-) shoulder extensors (-) Disability Assessment Scale dressing (-) hygiene (-) cosmesis (+exp1) pain (-) Modified Frenchay Scale (no stat) 10 Meter walking speed (-) contralateral grip strength (-) finger tap test (-) Epworth Sleepiness Scale (-) Geriatric Depression Scale (-) Questionnaire and Letter–Number Sequence (-)

Abbreviations and table notes: C=control group; D=days; E=experimental group; H=hours; Min=minutes; RCT=randomized controlled trial; TPS=time post stroke category (Acute: less than 30 days, Subacute: more than 1 month but less than 6 months, Chronic: over 6 months); Wk=weeks.

+exp indicates a statistically significant between groups difference at α=0.05 in favour of the experimental group

+exp1/+exp2/+exp3 indicates a statistically significant between groups difference at α=0.05 in favour of the first, second or third experimental group

+con indicates a statistically significant between groups difference at α=0.05 in favour of the control group

- indicates no statistically significant between groups differences at α=0.05

1. Body Functions and Structures

MOTOR FUNCTION			
LoE	**Conclusion Statement**	**RCTs**	**References**
2	Antispastic medications may not have a difference in efficacy when compared to sham for improving motor function.	1	Seo et al. (2011)
1b	Cyproheptadine with EMG-controlled VAEDA glove may not have a difference in efficacy when compared to Placebo with EMG-controlled VAEDA glove or Placebo with passive stretching VAEDA with glove for improving motor function.	1	Kamper et al. (2024)

MUSCLE STRENGTH			
LoE	**Conclusion Statement**	**RCTs**	**References**
1b	Antispastic medications may not have a difference in efficacy when compared to sham for improving muscle strength.	2	Seo et al. (2011); Meythaler et al. (2001a)
1b	Intramuscular botulinum toxin A may not have a difference in efficacy when compared to Placebo for improving muscle strength.	1	Simpson et al. (2009)
1b	There is conflicting evidence about the effect of Isradipine when compared to Placebo for improving muscle strength.	1	McPherson et al. (2018)
1b	Isradipine may not have a difference in efficacy when compared to Tizanidine for improving muscle strength.	1	McPherson et al. (2018)
2	Bot toxin A with physiotherapy may not have a difference in efficacy when compared to baclofenum with physiotherapy for improving muscle strength.	1	Turcu-Stiolica et al. (2021)

SPASTICITY			
LoE	**Conclusion Statement**	**RCTs**	**References**
1a	Antispastic medications may produce greater improvements in spasticity than sham.	3	Meythaler et al. (2001a); Meythaler et al. (2001b); Meythaler et al. (1999)
1b	Intrathecal Baclofen may produce greater improvements in spasticity than Conventional Spasticity Management.	1	Creamer et al. (2018)
1b	There is conflicting evidence about the effect of Intramuscular botulinum toxin A when compared to Placebo for improving spasticity.	1	Simpson et al. (2009)
2	Bot toxin A with physiotherapy may not have a difference in efficacy when compared to baclofenum with physiotherapy for improving spasticity.	1	Turcu-Stiolica et al. (2021)

RANGE OF MOTION			
LoE	**Conclusion Statement**	**RCTs**	**References**
1b	Antispastic medications may not have a difference in efficacy when compared to sham for improving range of motion.	1	Meythaler et al. (2001a)

2. Activities

ACTIVITIES OF DAILY LIVING			
LoE	**Conclusion Statement**	**RCTs**	**References**
1b	Antispastic medications may not have a difference in efficacy when compared to sham for improving performance of activities of daily living.	1	Meythaler et al. (2001a)
1b	Intramuscular botulinum toxin A may not have a difference in efficacy when compared to Placebo for improving performance of activities of daily living.	1	Simpson et al. (2009)
2	Bot toxin A with physiotherapy may not have a difference in efficacy when compared to baclofenum with physiotherapy for improving performance of activities of daily living.	1	Turcu-Stiolica et al. (2021)
1b	Intrathecal Baclofen may not have a difference in efficacy when compared to Conventional Spasticity Management for improving performance of activities of daily living.	1	Creamer et al. (2018)

DEXTERITY			
LoE	**Conclusion Statement**	**RCTs**	**References**
2	Antispastic medications may not have a difference in efficacy when compared to sham for improving dexterity.	1	Seo et al. (2011)

Key Points

- Antispastic medications may be beneficial for improving spasticity, but not motor function, dexterity, performance of activities of daily living, range of motion, and muscle strength, after stroke when compared to sham.
- Cyproheptadine with EMG-controlled VAEDA glove may not be beneficial for improving motor function after stroke when compared to Placebo with EMG-controlled VAEDA glove or Placebo with passive stretching VAEDA with glove.
- Intramuscular botulinum toxin A may not be beneficial for improving performance of activities of daily living and muscle strength after stroke when compared to Placebo; the literature is mixed regarding spasticity.
- Intrathecal Baclofen may be beneficial for improving spasticity, but not performance of activities of daily living, after stroke when compared to Conventional Spasticity Management.
- The literature is mixed regarding the effect of Isradipine on improvement of muscle strength after stroke when compared to Placebo.
- Isradipine may not be beneficial for improving muscle strength after stroke when compared to Tizanidine.
- Bot toxin A with physiotherapy may not be beneficial for improving muscle strength, spasticity, and performance of activities of daily living after stroke when compared to baclofenum with physiotherapy.

Summary of Key Points: Antispastic Medications

Intervention	Control(s)	Function domain(s)	Effect
Antispastic medications	sham	Spasticity	+
Antispastic medications	sham	Motor function, dexterity, performance of activities of daily living, range of motion, muscle strength	–
Cyproheptadine with EMG-controlled VAEDA glove	Placebo with EMG-controlled VAEDA glove or Placebo with passive stretching VAEDA with glove	Motor function	–
Intramuscular botulinum toxin A	Placebo	Performance of activities of daily living, muscle strength	–
Intramuscular botulinum toxin A	Placebo	Spasticity	=
Intrathecal Baclofen	Conventional Spasticity Management	Spasticity	+
Intrathecal Baclofen	Conventional Spasticity Management	Performance of activities of daily living	–
Isradipine	Placebo	Muscle strength	=
Isradipine	Tizanidine	Muscle strength	–
Bot toxin A with physiotherapy	baclofenum with physiotherapy	Muscle strength, spasticity, performance of activities of daily living	–

Nerve Block



Adapted from: https://www.acnr.co.uk/2012/12/phenol-nerve-block-for-management-of-lower-limb-spasticity/

Nerve block procedures use chemical agents such as phenol, alcohol or local anaesthetics to interrupt nerve conduction to spastic muscles of the upper limb.

A total of seven RCTs were found that evaluated nerve block for upper extremity motor rehabilitation. Two RCTs compared different approaches to nerve block (Külcü et al. (2016); Yoo et al. (2012)). One RCT evaluated nerve block combined with other interventions (Boonsong et al. (2009)). One RCT compared nerve block with no treatment (Voller et al. (2006)). One RCT compared nerve block combined with other interventions with sham (Terlemez et al. (2020)). One RCT compared nerve block with sham (Adey-Wakeling et al. (2013)). One RCT compared nerve block combined with other interventions with conventional therapy (Yuan et al. (2023)).

In addition, 4 RCTs in which nerve block formed part of a combined or comparative intervention are cross-referenced at the end of Table 35; their primary listings appear in other tables.

The methodological details and results of all seven RCTs are presented in Table 35.

Table 35. RCTs Evaluating Nerve Block for Upper Extremity Motor Rehabilitation

Authors (Year) **Study Design (PEDro Score)** **Sample Size start** **Sample Size end** **Time post stroke category** **Study design**	**Interventions** **Duration: Session length, frequency per week for total number of weeks**	**Outcome Measures** **Result (direction of effect)**
Different approaches to nerve block compared against one another		
Külcü et al. (2016) Pilot RCT (8) NStart=26 NEnd=26 TPS=Chronic A1 vs A2	E: Blinded suprascapular nerve block C: Stimulator suprascapular nerve block Duration: Single dose	E vs C: Shoulder ROM; flexion (-) - abduction (-) - Internal rotation (-) - external rotation (-) Pain-VAS (-)
Yoo et al. (2012) RCT (5) NStart=42 NEnd=42 TPS=Subacute A1 vs A2	E1: Ultrasound guided Stellate ganglion block E2: Blind Stellate ganglion block Duration: 2x with 1wk interval	E1 vs E2: Visual Analogue Scale - Pain (+exp) Complex Regional Pain Syndrome Scale (-) Decreased Hand Swelling (-)
Nerve block combined with other interventions compared to control		
Boonsong et al. (2009) RCT (6) NStart=10 NEnd=10 TPS=Subacute	E1: Suprascapular nerve block E2: Ultrasound Duration: 2 sessions SSNB & 5d/wk ultrasound, 4wks	E1 vs E2: Passive range of motion of flexion (-) abduction (-) VAS score of pain (+exp1)

A vs B *Also in Table 27 (Additional Afferent and Peripheral Stimulation Methods)*		
Nerve block compared to no treatment		
Voller et al. (2006) RCT Crossover (5) NStart=11 NEnd=11 TPS=Chronic A1 vs A2 vs 0	E1: Anesthesia of Intact Hand E2: Anesthesia of Intact Foot C: No Anesthesia Duration: Single Session/condition, assessment after ~15min, 25hr washout	E1/E2 vs C: E1 vs E2/C: Grated Orientation Task Accuracy (+exp1)
Nerve block combined with other interventions compared to sham		
Terlemez et al. (2020) RCT (8) NStart=34 NEnd=30 TPS=Chronic A + B vs A/B vs 0 *Also in Table 36 (Steroids)*	E1: Lidocaine Injection (suprascapular nerve block) E2: 5ml Lidocaine AND betamethasone C: Placebo injection Duration: 1 injection	E1 vs C: Visual analog scale during passive range of motion (-) E2 vs C: Visual analog scale during passive range of motion (+exp) E1 vs E2: Visual analog scale during passive range of motion (-)
Nerve block compared to sham		
Adey-Wakeling et al. (2013) RCT (9) NStart=64 NEnd=57 TPS=Subacute A vs 0	E: Suprascapular nerve block (methylprednisone + bupivacaine hydrochloride) C: Placebo (saline injection) Duration: Single Injection	E vs C: Visual Analogue Scale - Pain (+exp) Modified Rankin Scale (-) Croft Disability Index (-) EuroQol Health Questionnaire (-)
Nerve block combined with other interventions compared to conventional therapy		
Yuan et al. (2023) RCT (4) NStart=60 NEnd=60 TPS=Subacute A + B vs A vs B vs 0 *Also in Table 26 (Extracorporeal Shockwave Therapy)*	E1: Ultrasound-guided stellate ganglion block + Conventional Therapy E2: Extracorporeal shock wave therapy + Conventional therapy E3: Ultrasound-guided stellate ganglion block + Extracorporeal shock wave therapy + Conventional therapy C: Conventional therapy Duration: E1: every 3 days for 1mo; E2: 1mo; C: once a day for 1mo	E1/ E2/E3 vs C: mBI (+exp1, +exp 2, +exp 3) FMA-UE (+exp1, +exp 2, +exp 3) Upper Limb Rehabilitation Robot Performance Score +exp1, +exp 2, +exp 3 E1 vs E3: mBI (-) FMA-UE (+exp3) Upper Limb Rehabilitation Robot Performance Score (+exp3) E2 vs E3: mBI (-) FMA-UE (+exp3) Upper Limb Rehabilitation Robot Performance Score (+exp3) E1 vs E2: mBI (-) FMA-UE (-) Upper Limb Rehabilitation Robot Performance Score (-)
Cross-Referenced RCTs: Combined or Comparative Interventions Involving Nerve Block (results included in this table's levels of evidence)		
Ersoy et al. (2023) RCT (4)	E: TENS + conventional rehab	E vs C: Pain-VAS (+exp)

NStart=25 NEnd=24 TPS=Chronic A vs B *Primary listing: Table 23 (Transcutaneous Electrical Nerve Stimulation (TENS))*	C: Suprascapular nerve block + conventional rehab Duration: 30min/d, 5d/wk, 3wks	PROM (-) MAS (-) MBI (-) SS-Qol (+exp)
Alanbay et al. (2020) RCT (8) NStart=30 NEnd=30 TPS=Not Reported A vs B *Primary listing: Table 27 (Additional Afferent and Peripheral Stimulation Methods)*	E: suprascapular nerve pulsed radiofrequency C: Suprascapular Nerve Block with lidocain Duration: 120sec at 42°C at 2 Hz, 20 ms, and 45 V PRF 1 session, SSNB; 1 injection of mL 2% lidocaine hydrochloride and 5 mL 0.9% NaCl isotonic saline solution	E vs C: Shoulder Range of Motion (+exp) Goal Assessment Scale (+exp) pain VAS (+exp)
Kasapoglu-Aksoy et al. (2020) RCT (5) NStart=60 NEnd=57 TPS=Chronic A vs B *Primary listing: Table 33 (Botulinum Toxin)*	E: Onabotulinumtoxin-A (100-150 units into pectoralis major and 40-60 units into teres major) C: Suprascapular Nerve Block (9ml lidocaine + 1ml triamciNolone hexacetonide) Duration: Injection and 6wks of shoulder rehabilitation	E vs C: Shoulder Modified Ashworth Scale (+exp) Visual Analogue Scale Motion (+exp) Rest (+exp) Angle of Pain in abduction and external rotation (+exp) Passive abduction and external rotation (+exp) Fugl-Meyer Assessment Upper Extremity (+exp)
Yasar et al. (2011) RCT (8) NStart=26 NEnd=26 TPS=Chronic A vs B *Primary listing: Table 36 (Steroids)*	E: Intra-Articular Steroid Injection (IASI) C: Suprascapular Nerve Block (SSNB) Duration: One injection	E vs C: Visual Analogue Scale Pain (-) Passive ROM (-)

Abbreviations and table notes: C=control group; D=days; E=experimental group; H=hours; Min=minutes; RCT=randomized controlled trial; TPS=time post stroke category (Acute: less than 30 days, Subacute: more than 1 month but less than 6 months, Chronic: over 6 months); Wk=weeks.

+exp indicates a statistically significant between groups difference at α=0.05 in favour of the experimental group

+exp1/+exp2/+exp3 indicates a statistically significant between groups difference at α=0.05 in favour of the first, second or third experimental group

+con indicates a statistically significant between groups difference at α=0.05 in favour of the control group

- indicates no statistically significant between groups differences at α=0.05

1. Body Functions and Structures

MOTOR FUNCTION			
LoE	**Conclusion Statement**	**RCTs**	**References**
2	Ultrasound-guided stellate ganglion block with Conventional Therapy may produce greater improvements in motor function than Conventional therapy.	1	Yuan et al. (2023)
2	Ultrasound-guided stellate ganglion block with Conventional Therapy may result in lesser improvements in motor function when compared to Ultrasound-guided stellate ganglion block with Extracorporeal shock wave therapy and Conventional therapy.	1	Yuan et al. (2023)

2	Extracorporeal shock wave therapy with Conventional therapy may result in lesser improvements in motor function when compared to Ultrasound-guided stellate ganglion block with Extracorporeal shock wave therapy and Conventional therapy.	1	Yuan et al. (2023)
2	Ultrasound-guided stellate ganglion block with Conventional Therapy may not have a difference in efficacy when compared to Extracorporeal shock wave therapy with Conventional therapy for improving motor function.	1	Yuan et al. (2023)
2	Onabotulinumtoxin-A may produce greater improvements in motor function than Suprascapular Nerve Block.	1	Kasapoglu-Aksoy et al. (2020)

STROKE SEVERITY			
LoE	**Conclusion Statement**	**RCTs**	**References**
1b	Suprascapular nerve block (methylprednisone with bupivacaine hydrochloride) may not have a difference in efficacy when compared to Placebo (saline injection) for improving stroke severity.	1	Adey-Wakeling et al. (2013)

SPASTICITY			
LoE	**Conclusion Statement**	**RCTs**	**References**
2	Onabotulinumtoxin-A may produce greater improvements in spasticity than Suprascapular Nerve Block.	1	Kasapoglu-Aksoy et al. (2020)
2	Transcutaneous electrical nerve stimulation with conventional rehab may not have a difference in efficacy when compared to Suprascapular nerve block with conventional rehab for improving spasticity.	1	Ersoy et al. (2023)

RANGE OF MOTION			
LoE	**Conclusion Statement**	**RCTs**	**References**
1b	Suprascapular nerve block may not have a difference in efficacy when compared to Ultrasound for improving range of motion.	1	Boonsong et al. (2009)
1b	There is conflicting evidence about the effect of Lidocaine Injection (suprascapular nerve block) when compared to Placebo injection for improving range of motion.	1	Terlemez et al. (2020)
1b	Lidocaine Injection (suprascapular nerve block) may not have a difference in efficacy when compared to 5ml Lidocaine AND betamethasone for improving range of motion.	1	Terlemez et al. (2020)
1b	Intra-Articular Steroid Injection (IASI) may not have a difference in efficacy when compared to Suprascapular Nerve Block (SSNB) for improving range of motion.	1	Yasar et al. (2011)
1b	Suprascapular nerve pulsed radiofrequency may produce greater improvements in range of motion than Suprascapular Nerve Block with lidocain.	1	Alanbay et al. (2020)
2	Transcutaneous electrical nerve stimulation with conventional rehab may not have a difference in efficacy when compared to Suprascapular nerve block with conventional rehab for improving range of motion.	1	Ersoy et al. (2023)
1b	Different approaches to nerve block may not have a difference in efficacy when compared with one another for improving range of motion.	1	Külcü et al. (2016)

2. Activities

ACTIVITIES OF DAILY LIVING			
LoE	**Conclusion Statement**	**RCTs**	**References**
2	Ultrasound-guided stellate ganglion block with Conventional Therapy may produce greater improvements in performance of activities of daily living than Conventional therapy.	1	Yuan et al. (2023)
2	Ultrasound-guided stellate ganglion block with Conventional Therapy may not have a difference in efficacy when compared to Ultrasound-guided stellate ganglion block with Extracorporeal shock wave therapy and Conventional therapy for improving performance of activities of daily living.	1	Yuan et al. (2023)
2	Extracorporeal shock wave therapy with Conventional therapy may not have a difference in efficacy when compared to Ultrasound-guided stellate ganglion block with Extracorporeal shock wave therapy and Conventional therapy for improving performance of activities of daily living.	1	Yuan et al. (2023)
2	Ultrasound-guided stellate ganglion block with Conventional Therapy may not have a difference in efficacy when compared to Extracorporeal shock wave therapy with Conventional therapy for improving performance of activities of daily living.	1	Yuan et al. (2023)
2	Transcutaneous electrical nerve stimulation with conventional rehab may not have a difference in efficacy when compared to Suprascapular nerve block with conventional rehab for improving performance of activities of daily living.	1	Ersoy et al. (2023)
1b	Suprascapular nerve pulsed radiofrequency may produce greater improvements in performance of activities of daily living than Suprascapular Nerve Block with lidocain.	1	Alanbay et al. (2020)
1b	Suprascapular nerve block (methylprednisone with bupivacaine hydrochloride) may not have a difference in efficacy when compared to Placebo (saline injection) for improving performance of activities of daily living.	1	Adey-Wakeling et al. (2013)

DEXTERITY			
LoE	**Conclusion Statement**	**RCTs**	**References**
2	Anesthesia of Intact Hand may produce greater improvements in dexterity than No Anesthesia.	1	Voller et al. (2006)

Key Points

- Ultrasound-guided stellate ganglion block with Conventional Therapy may be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Conventional therapy.
- Ultrasound-guided stellate ganglion block with Conventional Therapy may not be beneficial for improving performance of activities of daily living after stroke when compared to Ultrasound-guided stellate ganglion block with Extracorporeal shock wave therapy and Conventional therapy.
- Ultrasound-guided stellate ganglion block with Conventional Therapy may be less beneficial than Ultrasound-guided stellate ganglion block with Extracorporeal shock wave therapy and Conventional therapy for improving motor function after stroke.
- Extracorporeal shock wave therapy with Conventional therapy may not be beneficial for improving performance of activities of daily living after stroke when compared to Ultrasound-guided stellate ganglion block with Extracorporeal shock wave therapy and Conventional therapy.

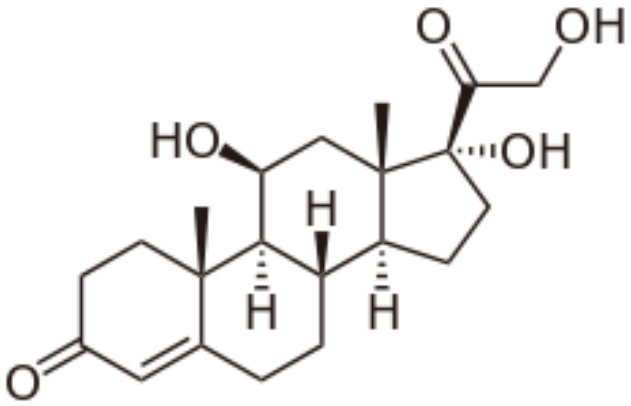
- Extracorporeal shock wave therapy with Conventional therapy may be less beneficial than Ultrasound-guided stellate ganglion block with Extracorporeal shock wave therapy and Conventional therapy for improving motor function after stroke.
- Ultrasound-guided stellate ganglion block with Conventional Therapy may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Extracorporeal shock wave therapy with Conventional therapy.
- Onabotulinumtoxin-A may be beneficial for improving motor function and spasticity after stroke when compared to Suprascapular Nerve Block.
- Anesthesia of Intact Hand may be beneficial for improving dexterity after stroke when compared to No Anesthesia.
- Transcutaneous electrical nerve stimulation with conventional rehab may not be beneficial for improving performance of activities of daily living, spasticity, and range of motion after stroke when compared to Suprascapular nerve block with conventional rehab.
- Suprascapular nerve pulsed radiofrequency may be beneficial for improving performance of activities of daily living and range of motion after stroke when compared to Suprascapular Nerve Block with lidocain.
- Suprascapular nerve block (methylprednisone with bupivacaine hydrochloride) may not be beneficial for improving performance of activities of daily living and stroke severity after stroke when compared to Placebo (saline injection).
- Suprascapular nerve block may not be beneficial for improving range of motion after stroke when compared to Ultrasound.
- The literature is mixed regarding the effect of Lidocaine Injection (suprascapular nerve block) on improvement of range of motion after stroke when compared to Placebo injection.
- Lidocaine Injection (suprascapular nerve block) may not be beneficial for improving range of motion after stroke when compared to 5ml Lidocaine AND betamethasone.
- Intra-Articular Steroid Injection (IASI) may not be beneficial for improving range of motion after stroke when compared to Suprascapular Nerve Block (SSNB).
- Different approaches to nerve block may not have a difference in efficacy when compared with one another for improving range of motion.

Summary of Key Points: Nerve Block

Intervention	Control(s)	Function domain(s)	Effect
Ultrasound-guided stellate ganglion block with Conventional Therapy	Conventional therapy	Motor function, performance of activities of daily living	+
Ultrasound-guided stellate ganglion block with Conventional Therapy	Ultrasound-guided stellate ganglion block with Extracorporeal shock wave therapy and Conventional therapy	Motor function, performance of activities of daily living	–
Extracorporeal shock wave therapy with Conventional therapy	Ultrasound-guided stellate ganglion block with Extracorporeal shock wave therapy and Conventional therapy	Motor function, performance of activities of daily living	–
Ultrasound-guided stellate ganglion block with Conventional Therapy	Extracorporeal shock wave therapy with Conventional therapy	Motor function, performance of activities of daily living	–
Onabotulinumtoxin-A	Suprascapular Nerve Block	Motor function, spasticity	+
Anesthesia of Intact Hand	No Anesthesia	Dexterity	+
Transcutaneous electrical nerve stimulation with conventional rehab	Suprascapular nerve block with conventional rehab	Performance of activities of daily living, spasticity, range of motion	–
Suprascapular nerve pulsed radiofrequency	Suprascapular Nerve Block with lidocain	Performance of activities of daily living, range of motion	+

Suprascapular nerve block (methylprednisone with bupivacaine hydrochloride)	Placebo (saline injection)	Performance of activities of daily living, stroke severity	–
Suprascapular nerve block	Ultrasound	Range of motion	–
Lidocaine Injection (suprascapular nerve block)	Placebo injection	Range of motion	=
Lidocaine Injection (suprascapular nerve block)	5ml Lidocaine AND betamethasone	Range of motion	–
Intra-Articular Steroid Injection (IASI)	Suprascapular Nerve Block (SSNB)	Range of motion	–
Nerve block	One another (different approaches compared)	Range of motion	–

Steroids



Adapted from: https://en.wikipedia.org/wiki/Corticosteroid

Corticosteroids have been used to treat pain and functional limitations in hemiplegic patients (Dogan et al. 2013). Patients suffering from stroke experience high rates of inflammation and corticosteroids are prescribed to lessen the inflammation (Yasar et al. 2011).

A total of eleven RCTs were found that evaluated steroids for upper extremity motor rehabilitation. One RCT compared steroids combined with other interventions with nerve block (Yasar et al. (2011)). Three RCTs compared steroids with sham (Rah et al. (2012); Snels et al. (2000); Braus et al. (1994)). Two RCTs compared steroids with conventional therapy (Chen et al. (2023b); Baykal et al. (2013)). One RCT compared steroids with steroids (Kalita et al. (2006)). One RCT compared steroids with no treatment (Kalita et al. (2016)). One RCT compared steroids combined with other interventions with transcutaneous electrical stimulation (tens) or conventional therapy (Lakse et al. (2009)). One RCT compared different approaches to steroids (Hou Y. et al. (2022)). One RCT evaluated steroids combined with other interventions (Zhang J. et al. (2023)).

In addition, 5 RCTs in which steroids formed part of a combined or comparative intervention are cross-referenced at the end of Table 36; their primary listings appear in other tables.

The methodological details and results of all eleven RCTs are presented in Table 36.

Table 36. RCTs Evaluating Steroids for Upper Extremity Motor Rehabilitation

Authors (Year) **Study Design (PEDro Score)** **Sample Size start** **Sample Size end**	**Interventions** **Duration: Session length, frequency per week for total number of weeks**	**Outcome Measures** **Result (direction of effect)**

Time post stroke category Study design		
Steroids combined with other interventions compared to nerve block		
Yasar et al. (2011) RCT (8) NStart=26 NEnd=26 TPS=Chronic A vs B *Also in Table 35 (Nerve Block)*	E: Intra-Articular Steroid Injection (IASI) C: Suprascapular Nerve Block (SSNB) Duration: One injection	E vs C: Visual Analogue Scale Pain (-) Passive ROM (-)
Steroids compared to sham		
Rah et al. (2012) RCT (8) NStart=60 NEnd=58 TPS=Chronic A vs 0	E: Triamcinolone injection (40mg) C: Placebo (Lidocaine injection) Duration: Single injection, 8 wks follow up	E vs C: VAS pain (+exp) mBI (no data) Shoulder disability questionnaire (+exp) active shoulder flexion (+exp) active shoulder external rotation (+exp) active shoulder internal rotation (+exp) active shoulder abduction (-)
Snels et al. (2000) RCT (8) NStart=37 NEnd=34 TPS=Subacute A vs 0	E: Intra-articular triamcinolone acetonide (40mg) C: Saline placebo Duration: Single Injection of Triamcinolone Acetonide (40mg)	E vs C: Visual Analogue Scale pain (-) Action Research Arm Test (-) Fugl-Meyer Assessment (-) Barthel Index (-) Rehabilitation Activities Profile (-) Passive external rotation of the shoulder (-)
Braus et al. (1994) RCT Crossover (3) NStart=36 NEnd=34 TPS=Subacute A vs 0	E: Oral Methylprednisolone (32mg/day)+ standard PT C: Oral Placebo Medication + standard PT Duration: 32mg/d, 14d, with 2wk tapering period	E vs C: Shoulder-Hand Syndrome Score (No stat)
Steroids compared to conventional therapy		
Chen et al. (2023b) RCT (4) NStart=72 NEnd=72 TPS=Subacute A vs 0	E: Injection of dexamethasone under ultrasound guidance C: Conventional comprehensive rehabilitation Duration: 105min/d, 5d/wk for 4wks	E vs C: VAS-pain (+exp) PROM forward flexion angle (+exp) abduction angle (+exp) external rotation angle (+exp) FMA-UE (+exp) modified Barthel Index (+exp) ADL-BI (+exp) serum levels IL-1B (+exp) IL-6 (+exp) NO (+exp)
Baykal et al. (2013) RCT (6) NStart=30 NEnd=30	E: Steroid Injection (40mg) + conventional physical therapy C: Conventional physical therapy	E vs C: Visual Analogue Scale - Pain (-) Range of Motion (-) Modified Ashworth Scale (-)

TPS=Chronic A vs 0	Duration: Single Injection (Triamcinolone Actonide, 40mg) + Conventional physiotherapy (60min/d, for 5d/wk)	Functional Independence Measure (-) Brunnstrom Recovery Stages (-) Motor Manual Muscle Test (no stats)
Steroids compared to steroids		
Kalita et al. (2006) RCT (6) NStart=60 NEnd=60 TPS=Acute A vs B	E: Oral Prednisolone (40mg) C: Oral Piroxicam (20mg) Duration: 1/d, 4wk	E vs C: Complex Regional Pain Syndrome Scale (+exp) Barthel Index (-)
Steroids compared to no treatment		
Kalita et al. (2016) RCT Crossover (6) NStart=52 NEnd=52 TPS=Subacute A vs 0	E: Oral Prednisolone (10mg) C: Discontinued Prednisone Duration: 10mg/d for 4wk	E vs C: Complex Regional Pain Syndrome Scale (+exp) Pain Score (+exp) Autonomic (+exp) Abduction (+exp) External rotation (-) Visual Analgue Scale - Pain (+exp) Modified Rankin Scale (-) Barthel Index (-)
Steroids combined with other interventions compared to transcutaneous electrical stimulation (tens) or conventional therapy		
Lakse et al. (2009) RCT (6) NStart=38 NEnd=38 TPS=Chronic A + B vs A/B *Also in Table 23 (Transcutaneous Electrical Nerve Stimulation (TENS))*	E: Triamcinolone acetonide + TENS + Therapeutic exercise program C: TENS + Therapeutic exercise program Duration: Single Injection of Triamcinolone Acetonide (1mL) + local anesthetic (9mL), 20min/d, 5d/wk for 3wks TENS, 5d/wk, for 3wks exercise	E vs C: Verbal Analogue Scale Felxion (+exp) Abduction (+exp) Internal rotation (+exp) External rotation (+exp) Visual Analogue Scale Rest (+exp) Activity (+exp) Night (+exp) Passive Range of Motion (+exp) MAS (-) Modified Barthel Index (-) Brunnstrom Recovery Stages (-)
Different approaches to steroids compared against one another		
Hou Y. et al. (2022) RCT (8) NStart=60 NEnd=60 TPS=Subacute A1 vs A2	E: Dual corticosteroid injection + conventional therapy C: single corticosteroid injection + conventional therapy Duration: 30min/d(conventional therapy), 5d/wk, 4wks	E vs C: Pain-VAS (+exp) PROM (-) FMA-UE (+exp) MBI (-)
Steroids combined with other interventions compared to control		
Zhang J. et al. (2023) RCT (7) NStart=42 NEnd=42 TPS=Subacute A vs B	E1: Ultrasonic-guided betamethasone local injection + Routine Rehabilitation E2: Extracorporeal shock wave therapy + Routine Rehabilitation Duration: E1: (Rehab = 30 mins/d, 5d/wk, 2wks; Injection = one dose); E2: (Rehab =	E1 vs E2: VAS-Pain (-) Cytokine serum levels IL-1 (+exp1) IL-6 (+exp1) IL-8 (+exp1)

Also in Table 26 (Extracorporeal Shockwave Therapy)	30 mins/d, 5d/wk, 2wks; ESWT = 20 mins/d, 1d/wk 4wks)	TNF-α (+exp1) Neer Score (-) mBI (-) FMA (-) 24-Item Hamilton Depression Rating Scale (-) SF-36 (-)
Cross-Referenced RCTs: Combined or Comparative Interventions Involving Steroids (results included in this table's levels of evidence)		
Kim & Chang (2021) RCT (7) NStart=20 NEnd=20 TPS=Chronic A vs B *Primary listing: Table 27 (Additional Afferent and Peripheral Stimulation Methods)*	E: Pulsed Radiofrequency + rehabilitation therapy C: Intra-articular corticosteroid injection + rehabilitation therapy Duration: rehab: 2.5hr/d, 5d/week, 8wks	E vs C: NRS (+con) ROM (+con)
Terlemez et al. (2020) RCT (8) NStart=34 NEnd=30 TPS=Chronic A + B vs A/B vs 0 *Primary listing: Table 35 (Nerve Block)*	E1: Lidocaine Injection (suprascapular nerve block) E2: 5ml Lidocaine AND betamethasone C: Placebo injection Duration: 1 injection	E1 vs C: Visual analog scale during passive range of motion (-) E2 vs C: Visual analog scale during passive range of motion (+exp) E1 vs E2: Visual analog scale during passive range of motion (-)
EunYoung et al. (2016) Pilot RCT (7) NStart=21 NEnd=21 TPS=Subacute A vs B *Primary listing: Table 43 (Other Pharmacological and Medical Interventions)*	E1: IV pamidronate 180mg E2: Oral prednisolone Duration: IV pamidronate 180mg via 3 infusions over 6d; E2: oral prednisolone (1mg/kg body weight) tapered over 2wks	E1 vs E2: Hand edema: Change in circumference: Wrist (+exp2) Middle finger (-) Pain VAS (-)
Jang et al. (2016c) RCT (6) NStart=39 NEnd=31 TPS=Subacute A vs B *Primary listing: Table 43 (Other Pharmacological and Medical Interventions)*	E: Hyaluronic acid (2mL) C: Triamcinolone acetonide (40mg) Duration: Hyaluronic acid (2mL) 3d/wk for 4wk	E vs C: Wong-Baker Scale for pain (-) Passive Range of Motion (-)
Lim et al. (2008) RCT (9) NStart=29 NEnd=25 TPS=Chronic A vs B *Primary listing: Table 33 (Botulinum Toxin)*	E: Intramuscular botulinum toxin A (100U) + standard physiotherapy C: Intra-articular triamcinolone acetonide injection (40mg) + standard physiotherapy Duration: 1 injection + minimum 2 sessions/week for 6 weeks physiotherapy	E vs C: Pain NRS (-) FMA (-) Modified Ashworth scale (-) Passive RoM (-) Physicians global rating scale for therapeutic goal (-)

Abbreviations and table notes: C=control group; D=days; E=experimental group; H=hours; Min=minutes; RCT=randomized controlled trial; TPS=time post stroke category (Acute: less than 30 days, Subacute: more than 1 month but less than 6 months, Chronic: over 6 months); Wk=weeks.

+exp indicates a statistically significant between groups difference at α=0.05 in favour of the experimental group
+exp1/+exp2/+exp3 indicates a statistically significant between groups difference at α=0.05 in favour of the first, second or third experimental group
+con indicates a statistically significant between groups difference at α=0.05 in favour of the control group
- indicates no statistically significant between groups differences at α=0.05

1. Body Functions and Structures

MOTOR FUNCTION			
LoE	**Conclusion Statement**	**RCTs**	**References**
1b	Steroids may not have a difference in efficacy when compared to sham for improving motor function.	1	Snels et al. (2000)
2	Steroids may produce greater improvements in motor function than conventional therapy.	1	Chen et al. (2023b)
1b	Dual corticosteroid injection with conventional therapy may produce greater improvements in motor function than single corticosteroid injection with conventional therapy.	1	Hou Y. et al. (2022)
1b	Ultrasonic-guided betamethasone local injection with Rehabilitation may not have a difference in efficacy when compared to Extracorporeal shock wave therapy with Rehabilitation for improving motor function.	1	Zhang J. et al. (2023)
1b	Intramuscular botulinum toxin A with physiotherapy may not have a difference in efficacy when compared to Intra-articular triamcinolone acetonide injection with physiotherapy for improving motor function.	1	Lim et al. (2008)

STROKE SEVERITY			
LoE	**Conclusion Statement**	**RCTs**	**References**
1b	Steroids may not have a difference in efficacy when compared to conventional therapy for improving stroke severity.	1	Baykal et al. (2013)
1b	Oral Prednisolone may not have a difference in efficacy when compared to Discontinued Prednisone for improving stroke severity.	1	Kalita et al. (2016)
1b	Triamcinolone acetonide with transcutaneous electrical nerve stimulation and Therapeutic exercise program may not have a difference in efficacy when compared to transcutaneous electrical nerve stimulation with Therapeutic exercise program for improving stroke severity.	1	Lakse et al. (2009)

SPASTICITY			
LoE	**Conclusion Statement**	**RCTs**	**References**
1b	Steroids may not have a difference in efficacy when compared to conventional therapy for improving spasticity.	1	Baykal et al. (2013)
1b	Triamcinolone acetonide with transcutaneous electrical nerve stimulation and Therapeutic exercise program may not have a difference in efficacy when compared to transcutaneous electrical nerve stimulation with Therapeutic exercise program for improving spasticity.	1	Lakse et al. (2009)
1b	Intramuscular botulinum toxin A with physiotherapy may not have a difference in efficacy when compared to Intra-articular triamcinolone acetonide injection with physiotherapy for improving spasticity.	1	Lim et al. (2008)

RANGE OF MOTION			
LoE	**Conclusion Statement**	**RCTs**	**References**
1b	Intra-Articular Steroid Injection (IASI) may not have a difference in efficacy when compared to Suprascapular Nerve Block (SSNB) for improving range of motion.	1	Yasar et al. (2011)
1b	Steroids may produce greater improvements in range of motion than conventional therapy.	2	Chen et al. (2023b); Baykal et al. (2013)
1b	Triamcinolone acetonide with transcutaneous electrical nerve stimulation and Therapeutic exercise program may produce greater improvements in range of motion than transcutaneous electrical nerve stimulation with Therapeutic exercise program.	1	Lakse et al. (2009)
1b	Dual corticosteroid injection with conventional therapy may not have a difference in efficacy when compared to single corticosteroid injection with conventional therapy for improving range of motion.	1	Hou Y. et al. (2022)
1b	Intramuscular botulinum toxin A with physiotherapy may not have a difference in efficacy when compared to Intra-articular triamcinolone acetonide injection with physiotherapy for improving range of motion.	1	Lim et al. (2008)
1b	There is conflicting evidence about the effect of Lidocaine Injection (suprascapular nerve block) when compared to Placebo injection for improving range of motion.	1	Terlemez et al. (2020)
1b	Lidocaine Injection (suprascapular nerve block) may not have a difference in efficacy when compared to 5ml Lidocaine AND betamethasone for improving range of motion.	1	Terlemez et al. (2020)
1b	Pulsed Radiofrequency with rehabilitation therapy may result in lesser improvements in range of motion when compared to Intra-articular corticosteroid injection with rehabilitation therapy.	1	Kim & Chang (2021)
1a	Steroids may produce greater improvements in range of motion than sham.	2	Rah et al. (2012); Snels et al. (2000)
1b	Hyaluronic acid (2mL) may not have a difference in efficacy when compared to Triamcinolone acetonide (40mg) for improving range of motion.	1	Jang et al. (2016c)

2. Activities

ACTIVITIES OF DAILY LIVING			
LoE	**Conclusion Statement**	**RCTs**	**References**
1a	There is conflicting evidence about the effect of Steroids when compared to sham for improving performance of activities of daily living.	2	Rah et al. (2012); Snels et al. (2000)
1b	There is conflicting evidence about the effect of Steroids when compared to conventional therapy for improving performance of activities of daily living.	2	Chen et al. (2023b); Baykal et al. (2013)
1b	Oral Prednisolone may not have a difference in efficacy when compared to Oral Piroxicam for improving performance of activities of daily living.	1	Kalita et al. (2006)
1b	Oral Prednisolone may not have a difference in efficacy when compared to Discontinued Prednisone for improving performance of activities of daily living.	1	Kalita et al. (2016)
1b	Triamcinolone acetonide with transcutaneous electrical nerve stimulation and Therapeutic exercise program may not have a difference in efficacy when compared to transcutaneous electrical	1	Lakse et al. (2009)

	nerve stimulation with Therapeutic exercise program for improving performance of activities of daily living.		
1b	Dual corticosteroid injection with conventional therapy may not have a difference in efficacy when compared to single corticosteroid injection with conventional therapy for improving performance of activities of daily living.	1	Hou Y. et al. (2022)
1b	Ultrasonic-guided betamethasone local injection with Rehabilitation may not have a difference in efficacy when compared to Extracorporeal shock wave therapy with Rehabilitation for improving performance of activities of daily living.	1	Zhang J. et al. (2023)

Key Points

- Steroids may be beneficial for improving range of motion, but not motor function, after stroke when compared to sham; the literature is mixed regarding performance of activities of daily living.
- Steroids may be beneficial for improving motor function and range of motion, but not stroke severity and spasticity, after stroke when compared to conventional therapy; the literature is mixed regarding performance of activities of daily living.
- Dual corticosteroid injection with conventional therapy may be beneficial for improving motor function, but not performance of activities of daily living and range of motion, after stroke when compared to single corticosteroid injection with conventional therapy.
- Ultrasonic-guided betamethasone local injection with Rehabilitation may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Extracorporeal shock wave therapy with Rehabilitation.
- Intramuscular botulinum toxin A with physiotherapy may not be beneficial for improving motor function, spasticity, and range of motion after stroke when compared to Intra-articular triamcinolone acetonide injection with physiotherapy.
- Oral Prednisolone may not be beneficial for improving performance of activities of daily living after stroke when compared to Oral Piroxicam.
- Oral Prednisolone may not be beneficial for improving performance of activities of daily living and stroke severity after stroke when compared to Discontinued Prednisone.
- Triamcinolone acetonide with transcutaneous electrical nerve stimulation and Therapeutic exercise program may be beneficial for improving range of motion, but not performance of activities of daily living, spasticity, and stroke severity, after stroke when compared to transcutaneous electrical nerve stimulation with Therapeutic exercise program.
- Intra-Articular Steroid Injection (IASI) may not be beneficial for improving range of motion after stroke when compared to Suprascapular Nerve Block (SSNB).
- The literature is mixed regarding the effect of Lidocaine Injection (suprascapular nerve block) on improvement of range of motion after stroke when compared to Placebo injection.
- Lidocaine Injection (suprascapular nerve block) may not be beneficial for improving range of motion after stroke when compared to 5ml Lidocaine AND betamethasone.
- Pulsed Radiofrequency with rehabilitation therapy may be less beneficial than Intra-articular corticosteroid injection with rehabilitation therapy for improving range of motion after stroke.
- Hyaluronic acid (2mL) may not be beneficial for improving range of motion after stroke when compared to Triamcinolone acetonide (40mg).

Summary of Key Points: Steroids

Intervention	Control(s)	Function domain(s)	Effect
Steroids	sham	Range of motion	+
Steroids	sham	Motor function	−

Steroids	sham	Performance of activities of daily living	=
Steroids	conventional therapy	Motor function, range of motion	+
Steroids	conventional therapy	Stroke severity, spasticity	–
Steroids	conventional therapy	Performance of activities of daily living	=
Dual corticosteroid injection with conventional therapy	single corticosteroid injection with conventional therapy	Motor function	+
Dual corticosteroid injection with conventional therapy	single corticosteroid injection with conventional therapy	Performance of activities of daily living, range of motion	–
Ultrasonic-guided betamethasone local injection with Rehabilitation	Extracorporeal shock wave therapy with Rehabilitation	Motor function, performance of activities of daily living	–
Intramuscular botulinum toxin A with physiotherapy	Intra-articular triamcinolone acetonide injection with physiotherapy	Motor function, spasticity, range of motion	–
Oral Prednisolone	Oral Piroxicam	Performance of activities of daily living	–
Oral Prednisolone	Discontinued Prednisone	Performance of activities of daily living, stroke severity	–
Triamcinolone acetonide with transcutaneous electrical nerve stimulation and Therapeutic exercise program	transcutaneous electrical nerve stimulation with Therapeutic exercise program	Range of motion	+
Triamcinolone acetonide with transcutaneous electrical nerve stimulation and Therapeutic exercise program	transcutaneous electrical nerve stimulation with Therapeutic exercise program	Performance of activities of daily living, spasticity, stroke severity	–
Intra-Articular Steroid Injection (IASI)	Suprascapular Nerve Block (SSNB)	Range of motion	–
Lidocaine Injection (suprascapular nerve block)	Placebo injection	Range of motion	=
Lidocaine Injection (suprascapular nerve block)	5ml Lidocaine AND betamethasone	Range of motion	–
Pulsed Radiofrequency with rehabilitation therapy	Intra-articular corticosteroid injection with rehabilitation therapy	Range of motion	–
Hyaluronic acid (2mL)	Triamcinolone acetonide (40mg)	Range of motion	–

Cerebrolysin



Adapted from: http://www.gerovitalshop.eu/it/home/18-cerebrolysin-5ml.html

Cerebrolysin contains low molecular weight neuropeptides and free amino acids which are believed to have neuroprotective properties, inhibit free radical formation, reduce neuroinflammation, and activate calpain apoptosis (Muresanu et al. 2016). Two RCTs were identified comparing cerebrolysin to a placebo (Chang et al. 2016; Muresanu et al. 2016).

A total of three RCTs were found that evaluated cerebrolysin for upper extremity motor rehabilitation. Three RCTs compared cerebrolysin with sham (Mitrovic et al. (2023); Chang et al. (2016); Muresanu et al. (2016)).

The methodological details and results of all three RCTs are presented in Table 37.

Table 37. RCTs Evaluating Cerebrolysin for Upper Extremity Motor Rehabilitation

Authors (Year) **Study Design (PEDro Score)** **Sample Size start** **Sample Size end** **Time post stroke category** **Study design**	**Interventions** **Duration: Session length, frequency per week for total number of weeks**	**Outcome Measures** **Result (direction of effect)**
Cerebrolysin compared to sham		
Mitrovic et al. (2023) RCT (9) NStart=60 NEnd=60 TPS=Acute A vs 0	E: Cerebrolysin(30ml) + conventional rehab C: Placebo + conventional rehab Duration: 45min/d(30ml cerebrolysin, 45min conventional rehab), 7d/wk, 3wks	E vs C: NIHSS (+exp) ARAT (+exp) FMA-UE (+exp) BI (+exp)
Chang et al. (2016) RCT (6) NStart=70 NEnd=66 TPS=Acute	E: Cerebrolysin (30mL diluted with70mL saline) C: Placebo Duration: 1x/d for 6wk	E vs C: Fugl-Meyer Assessment (-)

A vs 0		
Muresanu et al. (2016) RCT (8) NStart=208 NEnd=196 TPS=Acute A vs 0	E: Cerebrolysin (30mL/d) C: Placebo injection Duration: 1x/d for 21d	E vs C: Action Research Arm Test (+exp) 9-Hole Peg Test (-) Gait velocity (-) Modified Rankin Scale (+exp) Barthel Index (+exp) SF-36 Health survey PCS (+exp) MCS (-) Geriatric Depression Scale (+exp) Goodglass and Kaplan Communication Scale (-) NIHSS (+exp) Line cancellation (-) Gap detection (-)

Abbreviations and table notes: C=control group; D=days; E=experimental group; H=hours; Min=minutes; RCT=randomized controlled trial; TPS=time post stroke category (Acute: less than 30 days, Subacute: more than 1 month but less than 6 months, Chronic: over 6 months); Wk=weeks.

+exp indicates a statistically significant between groups difference at α=0.05 in favour of the experimental group

+exp1/+exp2/+exp3 indicates a statistically significant between groups difference at α=0.05 in favour of the first, second or third experimental group

+con indicates a statistically significant between groups difference at α=0.05 in favour of the control group

- indicates no statistically significant between groups differences at α=0.05

1. Body Functions and Structures

MOTOR FUNCTION			
LoE	**Conclusion Statement**	**RCTs**	**References**
1a	Cerebrolysin may produce greater improvements in motor function than sham.	3	Mitrovic et al. (2023); Chang et al. (2016); Muresanu et al. (2016)

STROKE SEVERITY			
LoE	**Conclusion Statement**	**RCTs**	**References**
1a	Cerebrolysin may produce greater improvements in stroke severity than sham.	2	Mitrovic et al. (2023); Muresanu et al. (2016)

2. Activities

ACTIVITIES OF DAILY LIVING			
LoE	**Conclusion Statement**	**RCTs**	**References**
1a	Cerebrolysin may produce greater improvements in performance of activities of daily living than sham.	2	Mitrovic et al. (2023); Muresanu et al. (2016)

DEXTERITY			
LoE	**Conclusion Statement**	**RCTs**	**References**
1b	Cerebrolysin may not have a difference in efficacy when compared to sham for improving dexterity.	1	Muresanu et al. (2016)

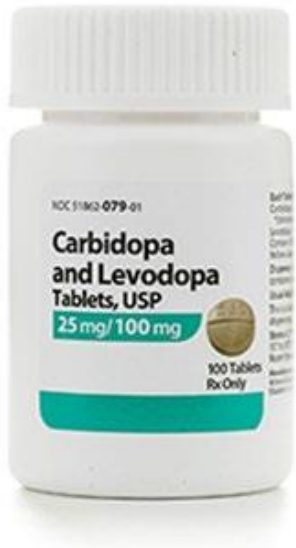
Key Points

- Cerebrolysin may be beneficial for improving motor function, performance of activities of daily living, and stroke severity, but not dexterity, after stroke when compared to sham.

Summary of Key Points: Cerebrolysin

Intervention	Control(s)	Function domain(s)	Effect
Cerebrolysin	sham	Motor function, performance of activities of daily living, stroke severity	+
Cerebrolysin	sham	Dexterity	–

Levodopa



Adapted from: https://www.maynepharma.com/products/us-products/generic-products/generic-products-catalog/carbidopalevodopa-tablets/

Levodopa has been the hallmark pharmaceutical for the treatment of Parkinson's disease. However, its ability to affect motor movements in Parkison's disease is limited by its narrow therapeutic window, short half-life, and poor bioavailability (Tambassco et al. 2018). Two RCTs were indentified comparing levodopa to a placebo (Rosser et al. 2008; Restemeyer et al. 2007).

A total of six RCTs were found that evaluated levodopa for upper extremity motor rehabilitation. One RCT compared dopamine agonists combined with other interventions with sham (Sonde & Lokk (2007)). One RCT compared dopamine agonists combined with other interventions with sham or motor relearning programmes (Floel et al. (2005)). Three RCTs compared dopamine agonists with sham (Acler et al. (2009); Rosser et al. (2008); Restemeyer et al. (2007)). One RCT compared dopamine agonists combined with other interventions with dopamine agonists (levodopa, carbidopa) (Samuel et al. (2017)).

The methodological details and results of all six RCTs are presented in Table 38.

Table 38. RCTs Evaluating Levodopa for Upper Extremity Motor Rehabilitation

Authors (Year) Study Design (PEDro Score) Sample Size start Sample Size end Time post stroke category Study design	Interventions Duration: Session length, frequency per week for total number of weeks	Outcome Measures Result (direction of effect)

Dopamine agonists combined with other interventions compared to sham		
Sonde & Lokk (2007) RCT (7) NStart=30 NEnd=25 TPS=Acute A + B vs A vs B vs 0 *Also in Table 41 (Central Nervous System Stimulants)*	E1: Amphetamine (10mg) + Levodopa (50mg) + conventional physiotherapy E2: Amphetamine (20mg) + Levodopa-Placebo + conventional physiotherapy E3: Amphetamine-Placebo + Levodopa (100mg) + conventional physiotherapy C: Amphetamine-Placebo + Levodopa-Placebo +conventional physiotherapy Duration: 30min/d, 5d/wk, 2wks physiotherapy; 1x oral capsule 60min before training	E1/E2/E3 vs C: Fugl-Meyer Assessment (-) Barthel Index (-) Mini-Mental State Exam (-)
Dopamine agonists combined with other interventions compared to sham or motor relearning programmes		
Floel et al. (2005) RCT Crossover (5) NStart=9 NEnd=9 TPS=Chronic A + B vs A/B *Also in Table 1 (Neurodevelopmental Techniques)*	E: Levodopa (100mg levodeopa and 25mg of carbidopa) + Training (to make motor memory, it is like a motor learning training) C: Placebo + Training Duration: 2hrs before intake of single oral dose/session, 2 sessions; 24hr apart	E vs C: Blood pressure (no stat) heart rate (no stat) Motion kinematics (no stat) TMS evoked movement (+exp) MEP amplitude (no stat)
Dopamine agonists compared to sham		
Acler et al. (2009) RCT Crossover (5) NStart=12 NEnd=10 TPS=Chronic A vs 0	E: Levodopa (L-DOPA) + Carbidopa C: Placebo Duration: 100mg/d levodopa and 25mg/d carbidopa, 7d/wk, 5wk with 2 month washout	E vs C: Rivermead Motor Assessment (-) Nine Hole Peg Test - Affected Hand (+exp1) Nine Hole Peg Test - Non-affected Hand (-) 10 meter walking test (+exp) beck depression inventory (-) MEP amplitude (-) Resting motor threshold (-) Cortical silent period (+exp)
Rosser et al. (2008) RCT Crossover (5) NStart=18 NEnd=18 TPS=Chronic A vs 0	E: Levodopa (100mg) + Cabidopa (25mg) C: Placebo (125mg) Duration: 1hr physio (3x) + Levodopa (3x)	E vs C: Finger Tapping Task (-) PANAS (-) reaction time blood pressure heart rate
Restemeyer et al. (2007) Pilot RCT (9) NStart=10 NEnd=10 TPS=Chronic A vs 0	E: Levodopa 100mg + physiotherapy C: Placebo 100mg + physiotherapy Duration: 2 doses levodopa/placebo & 60min/session physiotherapy	E vs C: 9HPT (-) Grip strength (-) ARAT (-) Motor excitability (-)
Dopamine agonists combined with other interventions compared to dopamine agonists (levodopa, carbidopa)		
Samuel et al. (2017) Pilot RCT (3) NStart=8 NEnd=6 TPS=Acute A + B vs A/B *Also in Table 17 (Virtual Reality)*	E: virtual reality training + levodopa C: Levodopa Duration: 30min, 5d/wk, 2wk	E vs C: Fugl-Meyer Upper Extremity (no stat) Action Research Arm Test (no stat) kinematics: and-path ratio score no. of flexion-extension movements no. of velocity peaks per movement time taken for each flexion-extension

Abbreviations and table notes: C=control group; D=days; E=experimental group; H=hours; Min=minutes; RCT=randomized controlled trial; TPS=time post stroke category (Acute: less than 30 days, Subacute: more than 1 month but less than 6 months, Chronic: over 6 months); Wk=weeks.

+exp indicates a statistically significant between groups difference at α=0.05 in favour of the experimental group

+exp1/+exp2/+exp3 indicates a statistically significant between groups difference at α=0.05 in favour of the first, second or third experimental group

+con indicates a statistically significant between groups difference at α=0.05 in favour of the control group

- indicates no statistically significant between groups differences at α=0.05

1. Body Functions and Structures

MOTOR FUNCTION			
LoE	**Conclusion Statement**	**RCTs**	**References**
1b	Amphetamine with Levodopa and conventional physiotherapy may not have a difference in efficacy when compared to Amphetamine-Placebo with Levodopa-Placebo and conventional physiotherapy for improving motor function.	1	Sonde & Lokk (2007)
1b	Levodopa (L-DOPA) with Carbidopa may not have a difference in efficacy when compared to Placebo for improving motor function.	3	Acler et al. (2009); Rosser et al. (2008); Restemeyer et al. (2007)

MUSCLE STRENGTH			
LoE	**Conclusion Statement**	**RCTs**	**References**
1b	Levodopa (L-DOPA) with Carbidopa may not have a difference in efficacy when compared to Placebo for improving muscle strength.	1	Restemeyer et al. (2007)

2. Activities

ACTIVITIES OF DAILY LIVING			
LoE	**Conclusion Statement**	**RCTs**	**References**
1b	Amphetamine with Levodopa and conventional physiotherapy may not have a difference in efficacy when compared to Amphetamine-Placebo with Levodopa-Placebo and conventional physiotherapy for improving performance of activities of daily living.	1	Sonde & Lokk (2007)

DEXTERITY			
LoE	**Conclusion Statement**	**RCTs**	**References**
1b	Levodopa (L-DOPA) with Carbidopa may not have a difference in efficacy when compared to Placebo for improving dexterity.	2	Acler et al. (2009); Restemeyer et al. (2007)

Key Points

- Amphetamine with Levodopa and conventional physiotherapy may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Amphetamine-Placebo with Levodopa-Placebo and conventional physiotherapy.
- Levodopa (L-DOPA) with Carbidopa may not be beneficial for improving motor function, muscle strength, and dexterity after stroke when compared to Placebo.

Summary of Key Points: Levodopa

Intervention	Control(s)	Function domain(s)	Effect
Amphetamine with Levodopa and conventional physiotherapy	Amphetamine-Placebo with Levodopa-Placebo and conventional physiotherapy	Motor function, performance of activities of daily living	–

Levodopa (L-DOPA) with Carbidopa	Placebo	Motor function, muscle strength, dexterity	–

Statins and Antihypertensives



Adapted from: https://www.aarp.org/health/drugs-supplements/info-2016/new-guidelines-on-who-should-take-statins-cs.html

HMG-CoA reductase inhibitors (statins) are widely used worldwide due to their anti- atherosclerotic, anti-inflammatory, and immunomodulatory properties (Lin et al. 2015). This suggests that statins may have a beneficial role in infection, in fact, statins are found to have beneficial effects on the prevention and treatment of infections in diseases including cerebrovascular accidents (Lin et al. 2015). Statins are also believed to have a neuroprotective effect and are conducive to promoting autophagy in neurological disorders (Lin et al. 2015). Some antihypertenives have also been examined for stroke recovery. Three RCTs were identified that examined statins and antihypertensives.

A total of five RCTs were found that evaluated statins and antihypertensives for upper extremity motor rehabilitation. One RCT compared secondary prevention medications with conventional therapy (Wang et al. (2017a)). One RCT compared antihypertensive combined with other interventions with mannitol (Jose et al. (2017)). One RCT evaluated antihypertensive (Matsumoto et al. (2009)). One RCT compared antihypertensive combined with other interventions with sham (McPherson et al. (2018)). One RCT compared antihypertensive with sham (DiCesare et al. (2016)).

The methodological details and results of all five RCTs are presented in Table 39.

Table 39. RCTs Evaluating Statins and Antihypertensives for Upper Extremity Motor Rehabilitation

Authors (Year) **Study Design (PEDro Score)** **Sample Size start** **Sample Size end** **Time post stroke category** **Study design**	**Interventions** **Duration: Session length, frequency per week for total number of weeks**	**Outcome Measures** **Result (direction of effect)**
Secondary prevention medications compared to conventional therapy		
Wang et al. (2017a) RCT (6) NStart=96 NEnd=96 TPS=Acute	E: secondary prevention (Atorvastatin (20 mg) + Clopidogrel (75 mg))+ physical rehabilitation C: physical rehabilitation Duration: 1x/d, 3mo	E vs C: FMA (+exp) Barthel Index (+exp) functional comprehensive assessment (+exp)

A vs 0		
Antihypertensive combined with other interventions compared to mannitol		
Jose et al. (2017) RCT (5) NStart=110 NEnd=98 TPS=Not Reported A vs B *Also in Table 43 (Other Pharmacological and Medical Interventions)*	E1: Telmisartan E2: Amlodipine C: Mannitol Duration: Not Reported	E1 vs C: NIHSS (+exp1) limb power score right UL (+exp1) right LL (+exp1) left LL (+exp1) SBP (no stat) DBP (no stat) E1 v E2: NIHSS (+exp1) limb power score right UL (+exp1); right LL (no stat); left LL (no stat) SBP (+exp1) DBP (+exp1) E2 vs C: NIHSS (no stat) limb power score (no stat) SBP (no stat) DBP (no stat)
Antihypertensive compared to control		
Matsumoto et al. (2009) RCT (7) NStart=35 NEnd=35 TPS=Subacute A1 vs A2	E1: Olmesartan (10 mg) E2: Amlodipine (2.5 mg) Duration: 1x/d, 4wks; both doses increased for another 4 weeks for 8 weeks total; CT was 5x/wk, 8wks	E1 vs E2: Barthel Index (-) Brunnstrom Recovery Stages (+exp1) MMSE Cerebrovascular reserve capacity cerebral blood flow blood pressure (SBP and DBP)
Antihypertensive combined with other interventions compared to sham		
McPherson et al. (2018) RCT Crossover (7) NStart=20 NEnd=16 TPS=Chronic A vs B vs 0 *Also in Table 34 (Antispastic Medications)*	E1: Isradipine (2.5mg up to 10m/d) E2: Tizanidine (4mg up to 24mg/d) C: Placebo Duration: 5wks titration phase + 4wk active stabilization phase, 4wk washout period	E1/E2 vs C: Work Area (+exp2) Muscle Strength (-) E1 vs E2: Work Area (-) Muscle Strength (-)
Antihypertensive compared to sham		
DiCesare et al. (2016) RCT (6) NStart=139 NEnd=137 TPS=Acute A vs 0	E: Phosphodiesterase inhibitor 6mg C: Sham Duration: 6mg capsule/d for 90d	E vs C: MRS (-) NIHSS (-) BI (-) BBT (-) Grip strength (-) 10-Meter Walk Test, Repeatable Battery Assessment of Neuropsychological Status Naming and Coding Subtests, Line Cancellation Test, and Recognition Memory Test

Abbreviations and table notes: C=control group; D=days; E=experimental group; H=hours; Min=minutes; RCT=randomized controlled trial; TPS=time post stroke category (Acute: less than 30 days, Subacute: more than 1 month but less than 6 months, Chronic: over 6 months); Wk=weeks.

+exp indicates a statistically significant between groups difference at α=0.05 in favour of the experimental group

+exp1/+exp2/+exp3 indicates a statistically significant between groups difference at α=0.05 in favour of the first, second or third experimental group

+con indicates a statistically significant between groups difference at α=0.05 in favour of the control group

- indicates no statistically significant between groups differences at α=0.05

1. Body Functions and Structures

MOTOR FUNCTION			
LoE	**Conclusion Statement**	**RCTs**	**References**
1b	Secondary prevention (atorvastatin and clopidogrel) with physical rehabilitation may produce greater improvements in motor function than physical rehabilitation.	1	Wang et al. (2017a)

STROKE SEVERITY			
LoE	**Conclusion Statement**	**RCTs**	**References**
2	Telmisartan may produce greater improvements in stroke severity than Mannitol.	1	Jose et al. (2017)
1b	Olmesartan may produce greater improvements in stroke severity than Amlodipine.	1	Matsumoto et al. (2009)
1b	Phosphodiesterase inhibitor 6mg may not have a difference in efficacy when compared to Sham for improving stroke severity.	1	DiCesare et al. (2016)

MUSCLE STRENGTH			
LoE	**Conclusion Statement**	**RCTs**	**References**
1b	There is conflicting evidence about the effect of Isradipine when compared to Placebo for improving muscle strength.	1	McPherson et al. (2018)
1b	Isradipine may not have a difference in efficacy when compared to Tizanidine for improving muscle strength.	1	McPherson et al. (2018)
1b	Phosphodiesterase inhibitor 6mg may not have a difference in efficacy when compared to Sham for improving muscle strength.	1	DiCesare et al. (2016)

2. Activities

ACTIVITIES OF DAILY LIVING			
LoE	**Conclusion Statement**	**RCTs**	**References**
1b	Secondary prevention (atorvastatin and clopidogrel) with physical rehabilitation may produce greater improvements in performance of activities of daily living than physical rehabilitation.	1	Wang et al. (2017a)
1b	Olmesartan may not have a difference in efficacy when compared to Amlodipine for improving performance of activities of daily living.	1	Matsumoto et al. (2009)
1b	Phosphodiesterase inhibitor 6mg may not have a difference in efficacy when compared to Sham for improving performance of activities of daily living.	1	DiCesare et al. (2016)

DEXTERITY			
LoE	**Conclusion Statement**	**RCTs**	**References**
1b	Phosphodiesterase inhibitor 6mg may not have a difference in efficacy when compared to Sham for improving dexterity.	1	DiCesare et al. (2016)

Key Points

- Secondary prevention (atorvastatin and clopidogrel) with physical rehabilitation may be beneficial for improving motor function and performance of activities of daily living after stroke when compared to physical rehabilitation.
- Phosphodiesterase inhibitor 6mg may not be beneficial for improving dexterity, performance of activities of daily living, stroke severity, and muscle strength after stroke when compared to Sham.
- Olmesartan may be beneficial for improving stroke severity, but not performance of activities of daily living, after stroke when compared to Amlodipine.
- Telmisartan may be beneficial for improving stroke severity after stroke when compared to Mannitol.
- The literature is mixed regarding the effect of Isradipine on improvement of muscle strength after stroke when compared to Placebo.
- Isradipine may not be beneficial for improving muscle strength after stroke when compared to Tizanidine.

Summary of Key Points: Statins and Antihypertensives

Intervention	Control(s)	Function domain(s)	Effect
Secondary prevention (atorvastatin and clopidogrel) with physical rehabilitation	physical rehabilitation	Motor function, performance of activities of daily living	+
Phosphodiesterase inhibitor 6mg	Sham	Dexterity, performance of activities of daily living, stroke severity, muscle strength	−
Olmesartan	Amlodipine	Stroke severity	+
Olmesartan	Amlodipine	Performance of activities of daily living	−
Telmisartan	Mannitol	Stroke severity	+
Isradipine	Placebo	Muscle strength	=
Isradipine	Tizanidine	Muscle strength	−

Antidepressants



Adapted from: https://www.newportacademy.com/resources/treatment/teens-antidepressants-side-effects-risks-holistic-treatment/

A total of seven RCTs were found that evaluated antidepressants for upper extremity motor rehabilitation. Seven RCTs compared antidepressants with sham (Krishnan et al. (2021); Bembenek et al. (2020); Chollet et al. (2011); Berends et al. (2009); Zittel et al. (2008); Zittel et al. (2007); Pariente et al. (2001)).

In addition, one RCT in which antidepressants formed part of a combined or comparative intervention are cross-referenced at the end of Table 40; their primary listings appear in other tables.

The methodological details and results of all seven RCTs are presented in Table 40.

Table 40. RCTs Evaluating Antidepressants for Upper Extremity Motor Rehabilitation

Authors (Year) **Study Design (PEDro Score)** **Sample Size start** **Sample Size end** **Time post stroke category** **Study design**	**Interventions** **Duration: Session length, frequency per week for total number of weeks**	**Outcome Measures** **Result (direction of effect)**
Antidepressants compared to sham		
Krishnan et al. (2021) RCT (8) NStart=168 NEnd=168 TPS=Acute A vs 0	E: Flouxetine 20mg C: Placebo Duration: 1/d, 90d	E vs C: BI (+exp) NHPG (+exp) Finger oscillation (+exp)
Bembenek et al. (2020) RCT (8) NStart=61 NEnd=54 TPS=Acute A vs 0	E: Fluoxetine (20mg/d) C: Placebo Duration: 20mg/d, 7d/wk, 6mo	E vs C: Modified Rankin Scale (-) NIHSS, total score (-) Medical Research Council - Affected Hand (-) Brunnstrom Scale - Affected Hand (-) Barthel Index (-) Stroke Impact Scale - All subsets (-) MHI-5 (-) Visual Analog Scale (-) EQ5d-5L (-)
Chollet et al. (2011) RCT (7) NStart=118 NEnd=113	E: Fluoxetine (20mg) C: Placebo Duration: 1x/d, 3mo	E vs C: Fugl-Meyer Assessment (+exp) National Institute of Health Stroke Scale (-) Modified Rankin Scale (+exp)

TPS=Acute A vs 0		Montgomery Asberg Depression Rating Scale (-)
Berends et al. (2009) RCT Crossover (4) NStart=10 NEnd=10 TPS=Chronic A vs 0	E: Fluoxetine 20mg C: Placebo Duration: 2x/d, 2wks	E vs C: Grip strength (+exp) Motricity Index (-) EMG muscle activity
Zittel et al. (2008) RCT Crossover (5) NStart=8 NEnd=8 TPS=Chronic A vs 0	E: Oral Citalopram (40mg)+ Standard physiotherapy C: Placebo capsule+ Standard physiotherapy Duration: 1 Dose+1hr PT right after dose, 2 wk washout	E vs C: Nine Hole Peg Test affected hand (+exp) unaffected hand (-) Hand grip strength (-)
Zittel et al. (2007) Pilot RCT (6) NStart=10 NEnd=10 TPS=Chronic A vs 0	E: Reboxetine + Physiotherapy C: Placebo + Physiotherapy Duration: 1 Dose + 1hr physio	E vs C: Tapping speed (+exp) Hand Grip strength (+exp) 9HPT (-) TMS-MEP amplitude (-) TMS-motor thresholds (no stats)
Pariente et al. (2001) RCT Crossover (7) NStart=8 NEnd=8 TPS=Acute A vs 0	E: fMRI with fluoxetine C: fMRI with Placebo Duration: Single-dose fluoxetine or placebo 5 hr before fMRI, 7 day washout	E vs C: Nine Hole Peg Test (-) Finger Tapping Test (+exp1) Dynamometer Test (+exp1)
Cross-Referenced RCTs: Combined or Comparative Interventions Involving Antidepressants (results included in this table's levels of evidence)		
BoninPinto et al. (2019) RCT (9) NStart=27 NEnd=23 TPS=Chronic A + B vs A/B vs 0 *Primary listing: Table 29 (Repetitive Transcranial Magnetic Stimulation (rTMS))*	E1: Active rTMS + fluoxetine E2: Sham rTMS + fluoxetine C: Sham rTMS + placebo fluoxetine Duration: 20min/d rTMS, 5d/wk, 2wks followed by 1d/wk, 8wks	E1 vs E2: FMA scale (-) Jebsen Taylor hand function (+exp1) MEP amplitude (-) Intracortical facilitation (+exp1) intracortical inhibition (+exp1) E1 vs C: FMA scale (-) Jebsen Taylor hand function (+exp1) MEP amplitude (+exp1) Intracortical facilitation (-) intracortical inhibition (+exp2) E2 vs C: FMA scale (+con) Jebsen Taylor hand function (+con) MEP amplitude (-) Intracortical inhibition (+exp2) intracortical facilitation (+exp2)

Abbreviations and table notes: C=control group; D=days; E=experimental group; H=hours; Min=minutes; RCT=randomized controlled trial; TPS=time post stroke category (Acute: less than 30 days, Subacute: more than 1 month but less than 6 months, Chronic: over 6 months); Wk=weeks.

+exp indicates a statistically significant between groups difference at α=0.05 in favour of the experimental group

+exp1/+exp2/+exp3 indicates a statistically significant between groups difference at α=0.05 in favour of the first, second or third experimental group

+con indicates a statistically significant between groups difference at α=0.05 in favour of the control group

- indicates no statistically significant between groups differences at α=0.05

1. Body Functions and Structures

MOTOR FUNCTION			
LoE	**Conclusion Statement**	**RCTs**	**References**
1a	Antidepressants may produce greater improvements in motor function than sham.	3	Krishnan et al. (2021); Chollet et al. (2011); Pariente et al. (2001)
1b	Active repetitive transcranial magnetic stimulation with fluoxetine may result in lesser improvements in motor function when compared to Sham repetitive transcranial magnetic stimulation with placebo fluoxetine.	1	BoninPinto et al. (2019)
1b	There is conflicting evidence about the effect of Active repetitive transcranial magnetic stimulation with fluoxetine when compared to Sham repetitive transcranial magnetic stimulation with fluoxetine for improving motor function.	1	BoninPinto et al. (2019)

STROKE SEVERITY			
LoE	**Conclusion Statement**	**RCTs**	**References**
1a	There is conflicting evidence about the effect of Antidepressants when compared to sham for improving stroke severity.	2	Bembenek et al. (2020); Chollet et al. (2011)

MUSCLE STRENGTH			
LoE	**Conclusion Statement**	**RCTs**	**References**
1a	There is conflicting evidence about the effect of Antidepressants when compared to sham for improving muscle strength.	5	Bembenek et al. (2020); Berends et al. (2009); Zittel et al. (2008); Zittel et al. (2007); Pariente et al. (2001)

2. Activities

ACTIVITIES OF DAILY LIVING			
LoE	**Conclusion Statement**	**RCTs**	**References**
1a	There is conflicting evidence about the effect of Antidepressants when compared to sham for improving performance of activities of daily living.	2	Krishnan et al. (2021); Bembenek et al. (2020)

DEXTERITY			
LoE	**Conclusion Statement**	**RCTs**	**References**
1a	There is conflicting evidence about the effect of Antidepressants when compared to sham for improving dexterity.	4	Krishnan et al. (2021); Zittel et al. (2008); Zittel et al. (2007); Pariente et al. (2001)

Key Points

- Antidepressants may be beneficial for improving motor function after stroke when compared to sham; the literature is mixed regarding stroke severity, muscle strength, performance of activities of daily living, and dexterity.
- Active repetitive transcranial magnetic stimulation with fluoxetine may be less beneficial than Sham repetitive transcranial magnetic stimulation with placebo fluoxetine for improving motor function after stroke.

- The literature is mixed regarding the effect of Active repetitive transcranial magnetic stimulation with fluoxetine on improvement of motor function after stroke when compared to Sham repetitive transcranial magnetic stimulation with fluoxetine.

Summary of Key Points: Antidepressants

Intervention	Control(s)	Function domain(s)	Effect
Antidepressants	sham	Motor function	+
Antidepressants	sham	Stroke severity, muscle strength, performance of activities of daily living, dexterity	=
Active repetitive transcranial magnetic stimulation with fluoxetine	Sham repetitive transcranial magnetic stimulation with placebo fluoxetine	Motor function	–
Active repetitive transcranial magnetic stimulation with fluoxetine	Sham repetitive transcranial magnetic stimulation with fluoxetine	Motor function	=

Central Nervous System Stimulants



Adapted from: https://www.narconon.org/drug-information/amphetamine-health-risks.html

A total of six RCTs were found that evaluated central nervous system stimulants for upper extremity motor rehabilitation. Four RCTs compared central nervous system stimulants with sham (Schambra et al. (2016); Schuster et al. (2011); Tardy et al. (2006); Treig et al. (2003)). One RCT compared central nervous system stimulants combined with other interventions with sham or exercise and custom physiotherapy protocols (Gladstone et al. (2006)). One RCT compared central nervous system stimulants combined with other interventions with sham or CIMT (Nadeau et al. (2014)).

In addition, two RCTs in which central nervous system stimulants formed part of a combined or comparative intervention are cross-referenced at the end of Table 41; their primary listings appear in other tables.

The methodological details and results of all six RCTs are presented in Table 41.

Table 41. RCTs Evaluating Central Nervous System Stimulants for Upper Extremity Motor Rehabilitation

Authors (Year) Study Design (PEDro Score)	Interventions	Outcome Measures Result (direction of effect)

Sample Size start Sample Size end Time post stroke category Study design	Duration: Session length, frequency per week for total number of weeks	
Central nervous system stimulants compared to sham		
Schambra et al. (2016) RCT Crossover (7) NStart=20 NEnd=18 TPS=Chronic A vs 0	E: Extended-release theophylline (300 mg) C: Placebo capsule Duration: 300mg single dose; 1wk washout period	E vs C: Pinch Strength (-) 9HPT Speed (-) Accuracy (-) Average alertness (-) Average excitement (-) Total amount of exercise (-) Total amount of sleep (-) blood pressure heart rate resting motor threshold short interval intracortical inhibition interhemispheric inhibition
Schuster et al. (2011) Pilot RCT (8) NStart=16 NEnd=16 TPS=Subacute A vs 0	E: dexamphetamine + physiotherapy C: placebo + physiotherapy Duration: 10 mg, 2x/wk for 5wk & 1hr/d physiotherapy	E vs C: Chedoke-McMaster Stroke Assessment; - ADL (+exp) - Impairment (-) - arm (+exp) - hand (-) - leg (-) - foot (-) postural control (-)
Tardy et al. (2006) RCT Crossover (9) NStart=8 NEnd=8 TPS=Acute A vs 0	E: Methylphenidate (20mg) +passive wrist and fingers training C: Placebo + passive wrist and fingers training Duration: 20mg, single dose, 7d washout. 10min, 2 times passive training	E vs C: Finger tapping scores (+exp) Hand grip strength (-) fMRI Hand S1M1 ispi (+exp) Face S1M1 ipsi (+exp) PMC ipsi (-) PMC contra (+exp) SMA ant (-) SMA post (-) BA 40 ipsi (-) BA 9 ipsi (-) Insula ipsi (-) Cerebellum ipsi (-) Cerebellum contra (-) Cerebellum vermis (+exp) Anterior cinghum ipsi (+exp)
Treig et al. (2003) RCT (9) NStart=24 NEnd=24 TPS=Acute A vs 0	E: 10mg D-amphetamine + physio C: Placebo + physio Duration: 10mg every 4d, total 100mg/36d	E vs C: Barthel Index (-) Rivermead Motor Score (-)

Central nervous system stimulants combined with other interventions compared to sham or exercise and custom physiotherapy protocols		
Gladstone et al. (2006) RCT (7) NStart=71 NEnd=67 TPS=Acute A + B vs A/B *Also in Table 3 (Exercise and Strength Training)*	E: Dextroamphetamine + physiotherapy C: Placebo + Physiotherapy Duration: single dose 10 mg, 1x/d + 60min/d physiotherapy, 2d/wk, 5wks	E vs C: FMA total (-) UE (-) LE (-) Chedoke Arm and Hand Activity Inventory score (-) Independent Ambulation with environmental barriers (-) FIM (-) Chedoke McMaster Disability Inventory (-) Clinical Outcome Variable Scale (-) ambulatory (-) independent ambulation (-)
Central nervous system stimulants combined with other interventions compared to sham or CIMT		
Nadeau et al. (2014) Pilot RCT (7) NStart=24 NEnd=22 TPS=Chronic A + B1 vs A + B2 vs A *Also in Table 6 (Constraint-Induced Movement Therapy (CIMT))*	E1: CIMT-6hr + cycloserine E2: CIMT-2hr + cycloserine C1: CIMT-6hr + placebo C2: CIMT-2hr + placebo Duration: 2/6h, 3-5d/wk for 10wk	E vs C: Fugl-Meyer Assessment (-) Wolf Motor Function Test (-) Motor Activity Log (-) Grip strength SIS scale geriatric depression scale
Cross-Referenced RCTs: Combined or Comparative Interventions Involving Central Nervous System Stimulants (results included in this table's levels of evidence)		
Wang et al. (2014c) Pilot RCT (5) NStart=9 NEnd=9 TPS=Acute A + B vs A/B *Primary listing: Table 31 (Transcranial Direct Current Stimulation (tDCS))*	E1: dual tDCS + methylphenidate E2: tDCS + placebo E3: Sham tDCS + methylphenidate Duration: 20min/d, 3d/wk, 4wk	E1 vs E2/E3: Purdue Pegboard Test (+exp1) MEP (-)
Sonde & Lokk (2007) RCT (7) NStart=30 NEnd=25 TPS=Acute A + B vs A vs B vs 0 *Primary listing: Table 38 (Levodopa)*	E1: Amphetamine (10mg) + Levodopa (50mg) + conventional physiotherapy E2: Amphetamine (20mg) + Levodopa-Placebo + conventional physiotherapy E3: Amphetamine-Placebo + Levodopa (100mg) + conventional physiotherapy C: Amphetamine-Placebo + Levodopa-Placebo +conventional physiotherapy Duration: 30min/d, 5d/wk, 2wks physiotherapy; 1x oral capsule 60min before training	E1/E2/E3 vs C: Fugl-Meyer Assessment (-) Barthel Index (-) Mini-Mental State Exam (-)

Abbreviations and table notes: C=control group; D=days; E=experimental group; H=hours; Min=minutes; RCT=randomized controlled trial; TPS=time post stroke category (Acute: less than 30 days, Subacute: more than 1 month but less than 6 months, Chronic: over 6 months); Wk=weeks.

+exp indicates a statistically significant between groups difference at α=0.05 in favour of the experimental group

+exp1/+exp2/+exp3 indicates a statistically significant between groups difference at α=0.05 in favour of the first, second or third experimental group

+con indicates a statistically significant between groups difference at α=0.05 in favour of the control group

- indicates no statistically significant between groups differences at α=0.05

1. Body Functions and Structures

MOTOR FUNCTION			
LoE	**Conclusion Statement**	**RCTs**	**References**
1b	Dextroamphetamine with physiotherapy may not have a difference in efficacy when compared to Placebo with Physiotherapy for improving motor function.	1	Gladstone et al. (2006)
1b	Amphetamine with Levodopa and conventional physiotherapy may not have a difference in efficacy when compared to Amphetamine-Placebo with Levodopa-Placebo and conventional physiotherapy for improving motor function.	1	Sonde & Lokk (2007)
1a	There is conflicting evidence about the effect of Central nervous system stimulants when compared to sham for improving motor function.	2	Tardy et al. (2006); Treig et al. (2003)
1b	CIMT-6hr with cycloserine may not have a difference in efficacy when compared to CIMT-6hr with placebo for improving motor function.	1	Nadeau et al. (2014)

STROKE SEVERITY			
LoE	**Conclusion Statement**	**RCTs**	**References**
1b	Central nervous system stimulants may not have a difference in efficacy when compared to sham for improving stroke severity.	1	Schuster et al. (2011)

MUSCLE STRENGTH			
LoE	**Conclusion Statement**	**RCTs**	**References**
1a	Central nervous system stimulants may not have a difference in efficacy when compared to sham for improving muscle strength.	2	Schambra et al. (2016); Tardy et al. (2006)

2. Activities

ACTIVITIES OF DAILY LIVING			
LoE	**Conclusion Statement**	**RCTs**	**References**
1b	Central nervous system stimulants may not have a difference in efficacy when compared to sham for improving performance of activities of daily living.	1	Treig et al. (2003)
1b	Dextroamphetamine with physiotherapy may not have a difference in efficacy when compared to Placebo with Physiotherapy for improving performance of activities of daily living.	1	Gladstone et al. (2006)
1b	Amphetamine with Levodopa and conventional physiotherapy may not have a difference in efficacy when compared to Amphetamine-Placebo with Levodopa-Placebo and conventional physiotherapy for improving performance of activities of daily living.	1	Sonde & Lokk (2007)
1b	CIMT-6hr with cycloserine may not have a difference in efficacy when compared to CIMT-6hr with placebo for improving performance of activities of daily living.	1	Nadeau et al. (2014)

DEXTERITY			
LoE	**Conclusion Statement**	**RCTs**	**References**
1b	Central nervous system stimulants may not have a difference in efficacy when compared to sham for improving dexterity.	1	Schambra et al. (2016)

2	Dual tDCS with methylphenidate may produce greater improvements in dexterity than tDCS with placebo.	1	Wang et al. (2014c)
2	Dual tDCS with methylphenidate may produce greater improvements in dexterity than Sham tDCS with methylphenidate.	1	Wang et al. (2014c)

Key Points

- Dextroamphetamine with physiotherapy may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Placebo with Physiotherapy.
- Amphetamine with Levodopa and conventional physiotherapy may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Amphetamine-Placebo with Levodopa-Placebo and conventional physiotherapy.
- Central nervous system stimulants may not be beneficial for improving stroke severity, muscle strength, performance of activities of daily living, and dexterity after stroke when compared to sham; the literature is mixed regarding motor function.
- CIMT-6hr with cycloserine may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to CIMT-6hr with placebo.
- Dual tDCS with methylphenidate may be beneficial for improving dexterity after stroke when compared to tDCS with placebo.
- Dual tDCS with methylphenidate may be beneficial for improving dexterity after stroke when compared to Sham tDCS with methylphenidate.

Summary of Key Points: Central Nervous System Stimulants

Intervention	Control(s)	Function domain(s)	Effect
Dextroamphetamine with physiotherapy	Placebo with Physiotherapy	Motor function, performance of activities of daily living	–
Amphetamine with Levodopa and conventional physiotherapy	Amphetamine-Placebo with Levodopa-Placebo and conventional physiotherapy	Motor function, performance of activities of daily living	–
Central nervous system stimulants	sham	Stroke severity, muscle strength, performance of activities of daily living, dexterity	–
Central nervous system stimulants	sham	Motor function	=
CIMT-6hr with cycloserine	CIMT-6hr with placebo	Motor function, performance of activities of daily living	–
Dual tDCS with methylphenidate	tDCS with placebo	Dexterity	+
Dual tDCS with methylphenidate	Sham tDCS with methylphenidate	Dexterity	+

Neuroprotectants and Regenerative Therapies



Adapted from: https://mstrust.org.uk/a-z/neuroprotection

Neuroprotective and regenerative approaches — including growth factors, monoclonal antibodies, erythropoietin, stem cell therapies, hyperbaric oxygen and remote ischemic conditioning — aim to protect or restore neural tissue to promote motor recovery after stroke.

A total of nine RCTs were found that evaluated neuroprotectants and regenerative therapies for upper extremity motor rehabilitation. One RCT compared erythropoietin combined with other interventions with sham (Shin et al. (2016b)). One RCT compared stem cell therapy with sham (Uzdu et al. (2021)). Three RCTs compared stem cell therapy with conventional therapy (Jaillard et al. (2020); Prasad et al. (2014); Kondziolka et al. (2005)). Three RCTs compared neuroprotective biologics with sham (Cramer et al. (2017); Floel et al. (2011); Alter et al. (1994)). One RCT compared hyperbaric oxygen therapy with sham (Harrison et al. (2024)).

The methodological details and results of all nine RCTs are presented in Table 42.

Table 42. RCTs Evaluating Neuroprotectants and Regenerative Therapies for Upper Extremity Motor Rehabilitation

Authors (Year) **Study Design (PEDro Score)** **Sample Size start** **Sample Size end** **Time post stroke category** **Study design**	**Interventions** **Duration: Session length, frequency per week for total number of weeks**	**Outcome Measures** **Result (direction of effect)**
Erythropoietin combined with other interventions compared to sham		
Shin et al. (2016b) RCT (9) NStart=6 NEnd=6 TPS=Not Reported A + B vs 0	E: Erythropoiegtin (300 U/kg) + Granulocyte-Colony Stimulating Factor (10Ug/kg) C: Placebo Duration: 1x/d, for 5d/mo for 3mo	E vs C: Mini-Mental Sate Exam (-) Modified Barthel Index (-) Grip Strength (-) Pinch Power (-) Box and Block Test (-) Laboratory Measures
Stem cell therapy compared to sham		
Uzdu et al. (2021) RCT (8)	E: Platelet-Rich Plasma Injections C: Placebo Injections	E vs C: Shoulder Passive Range of Motion (-)

NStart=44 NEnd=40 TPS=Chronic A vs 0	Duration: 1x/wk, 3wk	Visual Analogue Scale Pain At Rest and During Movement (-) Functional Independence Measure (-) Self-Care (-) Motor (-) Modified Ashworth Scale Shoulder Adductor Spasticity (-) Elbow Flexor Spasticity (-) Wrist Flexor Spasticity (-)
Stem cell therapy compared to conventional therapy		
Jaillard et al. (2020) RCT (7) NStart=31 NEnd=31 TPS=Subacute A1 vs A2 vs 0	E1: Low Dose Mesenchymal Stem Cell Injection (100 million) E2: High Dose Mesenchymal Stem Cell Injection (300 million) C: Conventional therapy Duration: 1 injection & 5d/wk ,for 3-6mo Conventional therapy	E1/E2 vs C: Modified Rankin Score (-) Barthel Index (-) National Institute of Health Stroke Scale (-) Motor (-) Fugl-Meyer Assessment (-) Passive Wrist Movement fMRI Activity in Primary Motor Cortex-4a (+exp) Passive Wrist Movement fMRI Activity in Primary Motor Cortex-4p (+exp)
Prasad et al. (2014) RCT (8) NStart=120 NEnd=116 TPS=Acute A vs 0	E: Bone Marrow MoNonuclear Stem Cell (BMSC) Infusion C: Conventional care Duration: 1 session	E vs C: National Institute of Health Stroke Scale (-) Modified Rankin Scale (-) Barthel Index (-) Infarct volume (-)
Kondziolka et al. (2005) RCT (5) NStart=18 NEnd=18 TPS=Chronic A1 vs A2 vs 0	E1: Neuronal Cell Transplantation With Rehabilitation (5 million cells) E2: Neuronal Cell Transplantation With Rehabilitation (10 million cells) C: Rehabilitation Alone Duration: 6mos	E1/E2 vs C: European Stroke Scale (-) National Institutes of Health Stroke Scale (-) Stroke Impact Scale (-) Everyday Memory Score (+exp1,+exp2) Fugl-Meyer Assessment (-) Upper Extremity (-) Lower Extremity (-) Action Research Arm Test Grasp (-) Pinch (-) Grip (-) Gross (+exp1,exp2)
Neuroprotective biologics compared to sham		
Cramer et al. (2017) RCT (8) NStart=134 NEnd=133 TPS=Acute A vs 0	E: IntraveNous MoNoclonal Antibody GSK249320 Infusion C: Placebo Duration: 2 infusions, 15mg/kg	E vs C: Gait Velocity (No stats/data) Box and Block Test (No stats/data) Modified Rankin Scale (No stats/data) Falls (No stats/data) National Institutes of Health Stroke Scale (No stats/data)
Floel et al. (2011) RCT (7) NStart=41 NEnd=39	E: Granulocyte-colony-stimulating factor (G-CSF) C: Placebo Duration: 1 injection/d, 10 d total	E vs C: Jebsen Taylor Hand Test (-) Finger Tapping Speed (-) Verbal Learning (-)

TPS=Chronic A vs 0		
Alter et al. (1994) RCT (5) NStart=287 NEnd=275 TPS=Acute A vs 0	E: Ganglioside GM1 (100mg) C: Placebo Duration: 1 dose/d, 28d	E vs C: Toronto Stroke Scale (-) Barthel Index (-) Fugl-Meyer Assessment Upper Extremity (-) Lower Extremity (-) Boston Naming Test, Visual Form discrimination, Line Cancellation Test, TMT-A/B, Depression VAS Scale
Hyperbaric oxygen therapy compared to sham		
Harrison et al. (2024) RCT (9) NStart=34 NEnd=30 TPS=Chronic A vs 0	E: Hyperabaric oxygen therapy C: Sham Hyperbaric oxygen therapy Duration: 90 mins/d, 5ds/wk, 8wks	E vs C: SIS (+con) NIHSS (-) MoCA (-) Berg Balance Scale (-) Digit Symbol Substitution Test (-) 6-minWT (-) 5-MWT (-) CES-D (-) SF36 physical component score (-) mental component score (-) BBT (-) Grip strength (-)

Abbreviations and table notes: C=control group; D=days; E=experimental group; H=hours; Min=minutes; RCT=randomized controlled trial; TPS=time post stroke category (Acute: less than 30 days, Subacute: more than 1 month but less than 6 months, Chronic: over 6 months); Wk=weeks.

+exp indicates a statistically significant between groups difference at α=0.05 in favour of the experimental group

+exp1/+exp2/+exp3 indicates a statistically significant between groups difference at α=0.05 in favour of the first, second or third experimental group

+con indicates a statistically significant between groups difference at α=0.05 in favour of the control group

- indicates no statistically significant between groups differences at α=0.05

1. Body Functions and Structures

MOTOR FUNCTION			
LoE	**Conclusion Statement**	**RCTs**	**References**
1b	Stem cell therapy may not have a difference in efficacy when compared to conventional therapy for improving motor function.	2	Jaillard et al. (2020); Kondziolka et al. (2005)
1b	Neuroprotective biologics may not have a difference in efficacy when compared to sham for improving motor function.	2	Floel et al. (2011); Alter et al. (1994)

STROKE SEVERITY			
LoE	**Conclusion Statement**	**RCTs**	**References**
1a	Stem cell therapy may not have a difference in efficacy when compared to conventional therapy for improving stroke severity.	3	Jaillard et al. (2020); Prasad et al. (2014); Kondziolka et al. (2005)
2	Neuroprotective biologics may not have a difference in efficacy when compared to sham for improving stroke severity.	1	Alter et al. (1994)

1b	Hyperabaric oxygen therapy may not have a difference in efficacy when compared to Sham Hyperbaric oxygen therapy for improving stroke severity.	1	Harrison et al. (2024)

MUSCLE STRENGTH			
LoE	**Conclusion Statement**	**RCTs**	**References**
1b	Erythropoiegtin with Granulocyte-Colony Stimulating Factor may not have a difference in efficacy when compared to Placebo for improving muscle strength.	1	Shin et al. (2016b)
1b	Hyperabaric oxygen therapy may not have a difference in efficacy when compared to Sham Hyperbaric oxygen therapy for improving muscle strength.	1	Harrison et al. (2024)

SPASTICITY			
LoE	**Conclusion Statement**	**RCTs**	**References**
1b	Platelet-Rich Plasma Injections may not have a difference in efficacy when compared to Placebo Injections for improving spasticity.	1	Uzdu et al. (2021)

RANGE OF MOTION			
LoE	**Conclusion Statement**	**RCTs**	**References**
1b	Platelet-Rich Plasma Injections may not have a difference in efficacy when compared to Placebo Injections for improving range of motion.	1	Uzdu et al. (2021)

2. Activities

ACTIVITIES OF DAILY LIVING			
LoE	**Conclusion Statement**	**RCTs**	**References**
1b	Erythropoiegtin with Granulocyte-Colony Stimulating Factor may not have a difference in efficacy when compared to Placebo for improving performance of activities of daily living.	1	Shin et al. (2016b)
1b	Platelet-Rich Plasma Injections may not have a difference in efficacy when compared to Placebo Injections for improving performance of activities of daily living.	1	Uzdu et al. (2021)
1a	Stem cell therapy may not have a difference in efficacy when compared to conventional therapy for improving performance of activities of daily living.	2	Jaillard et al. (2020); Prasad et al. (2014)
2	Neuroprotective biologics may not have a difference in efficacy when compared to sham for improving performance of activities of daily living.	1	Alter et al. (1994)

DEXTERITY			
LoE	**Conclusion Statement**	**RCTs**	**References**
1b	Erythropoiegtin with Granulocyte-Colony Stimulating Factor may not have a difference in efficacy when compared to Placebo for improving dexterity.	1	Shin et al. (2016b)
1b	Hyperabaric oxygen therapy may not have a difference in efficacy when compared to Sham Hyperbaric oxygen therapy for improving dexterity.	1	Harrison et al. (2024)

Key Points

- Stem cell therapy may not be beneficial for improving motor function, performance of activities of daily living, and stroke severity after stroke when compared to conventional therapy.
- Neuroprotective biologics may not be beneficial for improving motor function, performance of activities of daily living, and stroke severity after stroke when compared to sham.
- Erythropoiegtin with Granulocyte-Colony Stimulating Factor may not be beneficial for improving dexterity, performance of activities of daily living, and muscle strength after stroke when compared to Placebo.
- Hyperabaric oxygen therapy may not be beneficial for improving dexterity, stroke severity, and muscle strength after stroke when compared to Sham Hyperbaric oxygen therapy.
- Platelet-Rich Plasma Injections may not be beneficial for improving performance of activities of daily living, spasticity, and range of motion after stroke when compared to Placebo Injections.

Summary of Key Points: Neuroprotectants and Regenerative Therapies

Intervention	Control(s)	Function domain(s)	Effect
Stem cell therapy	conventional therapy	Motor function, performance of activities of daily living, stroke severity	–
Neuroprotective biologics	sham	Motor function, performance of activities of daily living, stroke severity	–
Erythropoiegtin with Granulocyte-Colony Stimulating Factor	Placebo	Dexterity, performance of activities of daily living, muscle strength	–
Hyperabaric oxygen therapy	Sham Hyperbaric oxygen therapy	Dexterity, stroke severity, muscle strength	–
Platelet-Rich Plasma Injections	Placebo Injections	Performance of activities of daily living, spasticity, range of motion	–

Other Pharmacological and Medical Interventions



Adapted from: https://unsplash.com/photos/orange-and-white-medication-pill-ZHys6xN7sUE

A range of additional pharmacological and medical interventions has been investigated for upper limb motor recovery after stroke, including cholinesterase inhibitors, anti-inflammatory biologics, phosphodiesterase-5 inhibitors, cannabinoids, nootropics, dietary interventions and other agents.

A total of thirteen RCTs were found that evaluated other pharmacological and medical interventions for upper extremity motor rehabilitation. One RCT compared ozone with conventional therapy (Wu et al. (2016)). One RCT compared segmental neuromyopathy with conventional therapy (Ratmansky et al. (2012)). Two RCTs compared hyaluronic acid with sham (Huang et al. (2018); Huang et al. (2016a)). One RCT compared dietary Interventions with sham (Momosaki et al. (2019)). One RCT compared dietary Interventions with sham or exercise and custom physiotherapy protocols (Liao et al. (2019)). One RCT compared etanercept with sham (Ralph et al. (2020)). One RCT compared cannabinoid (nabiximols) with sham (Marinelli et al. (2022)). One RCT compared homeopathic

medicines with sham (Dutta et al. (2023)). One RCT compared pamidronate with steroids (EunYoung et al. (2016)). One RCT compared hyaluronic acid combined with other interventions with steroids (Jang et al. (2016c)). One RCT compared lithium with sham (Mohammadianinejad et al. (2014)). One RCT compared nootropics combined with other interventions with sham or task-specific training (Ward et al. (2017)).

In addition, 4 RCTs in which other pharmacological and medical interventions formed part of a combined or comparative intervention are cross-referenced at the end of Table 43; their primary listings appear in other tables.

The methodological details and results of all thirteen RCTs are presented in Table 43.

Table 43. RCTs Evaluating Other Pharmacological and Medical Interventions for Upper Extremity Motor Rehabilitation

Authors (Year) **Study Design (PEDro Score)** **Sample Size start** **Sample Size end** **Time post stroke category** **Study design**	**Interventions** **Duration: Session length, frequency per week for total number of weeks**	**Outcome Measures** **Result (direction of effect)**
Ozone compared to conventional therapy		
Wu et al. (2016) RCT (6) NStart=60 NEnd=60 TPS=Acute A vs 0	E: major ozonated autohemotherapy + stroke usual medical management C: stroke usual medical management Duration: 1x/d, 10 ± 2d ozonated autohemotherapy	E vs C: National Institutes of Health Stroke Scale score (+exp) modified Rankin scale score (+exp)
Segmental neuromyopathy compared to conventional therapy		
Ratmansky et al. (2012) RCT (6) NStart=24 NEnd=24 TPS=Subacute A vs 0	E: Segmental neuromyotherapy (SNMT) + Standard therapy C: Standard therapy Duration: 45min/d, 3d/wk for 4wks SNMT; 1-2h, 5d/wk for 4wks standard therapy	E vs C: Hand Behind Neck Test for Pain (-) Neer Test for Pain (+exp) Visual Analogue Scale pain (-) Fugl-Meyer Assessment (+exp) Modified Ashworth Scale (-) Algometry Test for Pain (-)
Hyaluronic acid compared to sham		
Huang et al. (2018) RCT (7) NStart=36 NEnd=27 TPS=Subacute A vs 0	E: 2.5mL Hyaluronic acid injection C: 2.5mL saline injection Duration: 1x/wk for 3wks	E vs C: mod Ashworth scale (-) Shoulder subluxation (-) Pain free ROM (-) FMA UE (-) pain Visual analog scale (VAS) (-) hyperemia grading (sonography measure)
Huang et al. (2016a) RCT (9) NStart=26 NEnd=26 TPS=Acute A vs 0	E: Hyaluronic acid injection + conventional therapy C: Placebo injection (sodium chloride) +Conventional therapy Duration: 1x/wk, 3wk HA injection & 120min/d, 5d/wk, 3wks conventional therapy	E vs C: MAS (-) FMA UE (-) VAS pain (+exp) Shoulder ROM (-) shoulder subluxation
Dietary Interventions compared to sham		
Momosaki et al. (2019) RCT (9) NStart=100	E: Vitamin D Supplementation (2000 IU/d) C: Placebo	E vs C: Barthel Index (-) Grip Strength (-)

NEnd=97 TPS=Subacute A vs 0	Duration: 5capsules/d, 8wks	Brunnstrom Stage (-) calf circumference measure whole body muscle mass (-)
Dietary Interventions compared to sham or exercise and custom physiotherapy protocols		
Liao et al. (2019) RCT (5) NStart=23 NEnd=22 TPS=Chronic A vs 0	E: Conv rehab + Soymilk Ingestion C: Conv rehab + Placebo Milk Ingestion Duration: 100min PT/OT, 20min FES, 3d/wk, 8wks	E vs C: Hand grip strength (+exp) 8-feet walking speed (+exp) walking performance per unit lean mass (+exp) 6-minute walk test (+exp) Short physical performance battery (-) Balance Score Task Score Gait Speed Score Sit-to-Stand (No stats) Walking Distance (No stats)
Etanercept compared to sham		
Ralph et al. (2020) RCT (8) NStart=26 NEnd=22 TPS=Chronic A vs 0	E: Etanercept (25mg) C: Placebo (saline) Duration: 2 injections, 2wks apart, 30d follow up	E vs C: Numeric Pain Rating Scale (+exp) Active Range of Motion - Shoulder (+exp) Passive range of motion (+exp) Fatigue Assessent Scale (-) Beck Depression Inventory (-) Sit to Stand Test (-) Cold temperature pain sensitivity (+exp) Moca/30 (-) Algometry of arm affected (+exp) good (-)
Cannabinoid (nabiximols) compared to sham		
Marinelli et al. (2022) RCT Crossover (6) NStart=41 NEnd=34 TPS=Chronic A vs 0	E: Nabiximol cannabinoid C: Placebo nabiximol Duration: max. 12sprays/d, 4wks - 2wk washout	E vs C: MAS (-) wrist flexors (+exp) meanEMG (-) Pain-NRS (-) Spasticity NRS (-) Spasm number (-) Sleep NRS (+exp) Bladder NRS (-)
Homeopathic medicines compared to sham		
Dutta et al. (2023) RCT (6) NStart=60 NEnd=48 TPS=Chronic A vs 0	E: Individualized homeopathic medicines + Standard physiotherapy C: Placebo + Standard physiotherapy Duration: 6mo	E vs C: Medical Research Council Scale (-) Stroke Impact Scale (-) physical problem (+exp) memory and thinking (-) mood and emotion (-) communication and understanding (-) usual activities (-) mobility (-) ability to use affected limb (-) ability to participate in social activities (-)

		modified Ashworth Scale (-) VAS-Stroke Recovery (-)
Pamidronate compared to steroids		
EunYoung et al. (2016) Pilot RCT (7) NStart=21 NEnd=21 TPS=Subacute A vs B *Also in Table 36 (Steroids)*	E1: IV pamidronate 180mg E2: Oral prednisolone Duration: IV pamidronate 180mg via 3 infusions over 6d; E2: oral prednisolone (1mg/kg body weight) tapered over 2wks	E1 vs E2: Hand edema: Change in circumference: Wrist (+exp2) Middle finger (-) Pain VAS (-)
Hyaluronic acid combined with other interventions compared to steroids		
Jang et al. (2016c) RCT (6) NStart=39 NEnd=31 TPS=Subacute A vs B *Also in Table 36 (Steroids)*	E: Hyaluronic acid (2mL) C: Triamcinolone acetonide (40mg) Duration: Hyaluronic acid (2mL) 3d/wk for 4wk	E vs C: Wong-Baker Scale for pain (-) Passive Range of Motion (-)
Lithium compared to sham		
Mohammadianinejad et al. (2014) Pilot RCT (6) NStart=80 NEnd=66 TPS=Acute A vs 0	E: Lithium 300mg + Conventional therapy C: Placebo tablet + Conventional therapy Duration: 2x/day, 30d,	E vs C: modified NIHSS (-) FMA-hand (-)
Nootropics combined with other interventions compared to sham or task-specific training		
Ward et al. (2017) Pilot RCT (8) NStart=12 NEnd=9 TPS=Chronic A + B vs A/B *Also in Table 4 (Task-Specific Training)*	E: Atomoxetine + Task Oriented Upper Extremity Training C: Placebo + Task Oriented Upper Extremity Training Duration: 40 mg, 1x/d followed by 2hr-training, 10d	E vs C: Fugl-Meyer Assessment (+exp) Action Research Arm Test (-) Wolf Motor Function Test less affected UL (-) more affected UL (-) heart rate blood pressure
Cross-Referenced RCTs: Combined or Comparative Interventions Involving Other Pharmacological and Medical Interventions (results included in this table's levels of evidence)		
Jose et al. (2017) RCT (5) NStart=110 NEnd=98 TPS=Not Reported A vs B *Primary listing: Table 39 (Statins and Antihypertensives)*	E1: Telmisartan E2: Amlodipine C: Mannitol Duration: Not Reported	E1 vs C: NIHSS (+exp1) limb power score right UL (+exp1) right LL (+exp1) left LL (+exp1) SBP (no stat) DBP (no stat) E1 v E2: NIHSS (+exp1) limb power score right UL (+exp1); right LL (no stat); left LL (no stat) SBP (+exp1) DBP (+exp1)

		E2 vs C: NIHSS (no stat) limb power score (no stat) SBP (no stat) DBP (no stat)
Ahmed et al. (2015) RCT (6) NStart=40 NEnd=40 TPS=Not Reported A vs B *Primary listing: Table 47 (Traditional Herbal Medicine)*	E: Traditional medicines and massage C: Piracetam (800mg) + usual post stroke meds (Lisinopril (2.5mg) + Aspirin (5mg)) Duration: 1x/d administration of exp drugs, 2x/d administration of con drugs	E vs C: Stroke Rehabilitation Assessment of Movement Upper Limb (+exp)
Hou et al. (2014) RCT (6) NStart=488 NEnd=488 TPS=Acute A vs B *Primary listing: Table 44 (Acupuncture)*	E: Acupuncture (aligned acupuncture at the muscle regions plus cutaneous needle therapy) C: Piracetam Injection Duration: 1x/d, 3wks \~40min	E vs C: Modified Ashworth Scale: (+exp) Limb joint function Shoulder Abduction: (+exp) Pronation of Forearm: (+exp) Elbow Flexion: (+exp) Wrist Flexion: (+exp) Finger Flexion: (+exp) Neurological Deficit Grades (1-5): (+exp) FMA (+exp)
Nadeau et al. (2004) RCT (5) NStart=24 NEnd=20 TPS=Chronic A + B vs A/B *Primary listing: Table 6 (Constraint-Induced Movement Therapy (CIMT))*	E: Donepezil + CIMT C: Placebo + CIMT Duration: 5mg/d, 2wk + 10mg/d 4wk	E vs C: Wolf Motor Function Test (-) Motor Activity Log (-) Fugl-Meyers Upper Extremity (-) Stoke Impact Scale Item 8 (Participation) Item 9 (-) Geriatric Depression Scale (-) Actual Amount of Use Test (-) Caregiver Strain Index: (-) Finger-Tapping (-) WMFT (+exp) BBT (-)

Abbreviations and table notes: C=control group; D=days; E=experimental group; H=hours; Min=minutes; RCT=randomized controlled trial; TPS=time post stroke category (Acute: less than 30 days, Subacute: more than 1 month but less than 6 months, Chronic: over 6 months); Wk=weeks.

+exp indicates a statistically significant between groups difference at α=0.05 in favour of the experimental group

+exp1/+exp2/+exp3 indicates a statistically significant between groups difference at α=0.05 in favour of the first, second or third experimental group

+con indicates a statistically significant between groups difference at α=0.05 in favour of the control group

- indicates no statistically significant between groups differences at α=0.05

1. Body Functions and Structures

MOTOR FUNCTION			
LoE	**Conclusion Statement**	**RCTs**	**References**
1b	Segmental neuromyotherapy (SNMT) with therapy may produce greater improvements in motor function than therapy.	1	Ratmansky et al. (2012)
1a	Hyaluronic acid may not have a difference in efficacy when compared to sham for improving motor function.	2	Huang et al. (2018); Huang et al. (2016a)

1b	Traditional medicines and massage may produce greater improvements in motor function than piracetam with usual post-stroke medications.	1	Ahmed et al. (2015)
1b	Acupuncture (aligned acupuncture at the muscle regions plus cutaneous needle therapy) may produce greater improvements in motor function than Piracetam Injection.	1	Hou et al. (2014)
2	Donepezil with constraint-induced movement therapy may not have a difference in efficacy when compared to Placebo with constraint-induced movement therapy for improving motor function.	1	Nadeau et al. (2004)
1b	Lithium 300mg with Conventional therapy may not have a difference in efficacy when compared to Placebo tablet with Conventional therapy for improving motor function.	1	Mohammadianinejad et al. (2014)
1b	Atomoxetine with Task Oriented Upper Extremity Training may not have a difference in efficacy when compared to Placebo with Task Oriented Upper Extremity Training for improving motor function.	1	Ward et al. (2017)

STROKE SEVERITY			
LoE	**Conclusion Statement**	**RCTs**	**References**
1b	Major ozonated autohemotherapy with stroke usual medical management may produce greater improvements in stroke severity than stroke usual medical management.	1	Wu et al. (2016)
1b	Vitamin D Supplementation may not have a difference in efficacy when compared to Placebo for improving stroke severity.	1	Momosaki et al. (2019)
1b	Individualized homeopathic medicines with physiotherapy may not have a difference in efficacy when compared to Placebo with physiotherapy for improving stroke severity.	1	Dutta et al. (2023)
2	Telmisartan may produce greater improvements in stroke severity than Mannitol.	1	Jose et al. (2017)
1b	Acupuncture (aligned acupuncture at the muscle regions plus cutaneous needle therapy) may produce greater improvements in stroke severity than Piracetam Injection.	1	Hou et al. (2014)
1b	Lithium 300mg with Conventional therapy may not have a difference in efficacy when compared to Placebo tablet with Conventional therapy for improving stroke severity.	1	Mohammadianinejad et al. (2014)

MUSCLE STRENGTH			
LoE	**Conclusion Statement**	**RCTs**	**References**
1b	Vitamin D Supplementation may not have a difference in efficacy when compared to Placebo for improving muscle strength.	1	Momosaki et al. (2019)
2	Conv rehab with Soymilk Ingestion may produce greater improvements in muscle strength than Conv rehab with Placebo Milk Ingestion.	1	Liao et al. (2019)
1b	Individualized homeopathic medicines with physiotherapy may not have a difference in efficacy when compared to Placebo with physiotherapy for improving muscle strength.	1	Dutta et al. (2023)

SPASTICITY			
LoE	**Conclusion Statement**	**RCTs**	**References**
1b	Segmental neuromyotherapy (SNMT) with therapy may not have a difference in efficacy when compared to therapy for improving spasticity.	1	Ratmansky et al. (2012)

1a	Hyaluronic acid may not have a difference in efficacy when compared to sham for improving spasticity.	2	Huang et al. (2018); Huang et al. (2016a)
1b	Nabiximol cannabinoid may not have a difference in efficacy when compared to Placebo nabiximol for improving spasticity.	1	Marinelli et al. (2022)
1b	Individualized homeopathic medicines with physiotherapy may not have a difference in efficacy when compared to Placebo with physiotherapy for improving spasticity.	1	Dutta et al. (2023)
1b	Acupuncture (aligned acupuncture at the muscle regions plus cutaneous needle therapy) may produce greater improvements in spasticity than Piracetam Injection.	1	Hou et al. (2014)

RANGE OF MOTION			
LoE	**Conclusion Statement**	**RCTs**	**References**
1a	Hyaluronic acid may not have a difference in efficacy when compared to sham for improving range of motion.	2	Huang et al. (2018); Huang et al. (2016a)
1b	Etanercept may produce greater improvements in range of motion than Placebo (saline).	1	Ralph et al. (2020)
1b	Acupuncture (aligned acupuncture at the muscle regions plus cutaneous needle therapy) may produce greater improvements in range of motion than Piracetam Injection.	1	Hou et al. (2014)
1b	Hyaluronic acid (2mL) may not have a difference in efficacy when compared to Triamcinolone acetonide (40mg) for improving range of motion.	1	Jang et al. (2016c)

2. Activities

ACTIVITIES OF DAILY LIVING			
LoE	**Conclusion Statement**	**RCTs**	**References**
1b	Vitamin D Supplementation may not have a difference in efficacy when compared to Placebo for improving performance of activities of daily living.	1	Momosaki et al. (2019)
2	Donepezil with constraint-induced movement therapy may not have a difference in efficacy when compared to Placebo with constraint-induced movement therapy for improving performance of activities of daily living.	1	Nadeau et al. (2004)

DEXTERITY			
LoE	**Conclusion Statement**	**RCTs**	**References**
2	Donepezil with constraint-induced movement therapy may not have a difference in efficacy when compared to Placebo with constraint-induced movement therapy for improving dexterity.	1	Nadeau et al. (2004)

Key Points

- Segmental neuromyotherapy (SNMT) with therapy may be beneficial for improving motor function, but not spasticity, after stroke when compared to therapy.
- Hyaluronic acid may not be beneficial for improving motor function, spasticity, and range of motion after stroke when compared to sham.
- Traditional medicines and massage may be beneficial for improving motor function after stroke when compared to piracetam with usual post-stroke medications.

- Acupuncture (aligned acupuncture at the muscle regions plus cutaneous needle therapy) may be beneficial for improving motor function, spasticity, range of motion, and stroke severity after stroke when compared to Piracetam Injection.
- Donepezil with constraint-induced movement therapy may not be beneficial for improving motor function, dexterity, and performance of activities of daily living after stroke when compared to Placebo with constraint-induced movement therapy.
- Vitamin D Supplementation may not be beneficial for improving performance of activities of daily living, stroke severity, and muscle strength after stroke when compared to Placebo.
- Nabiximol cannabinoid may not be beneficial for improving spasticity after stroke when compared to Placebo nabiximol.
- Individualized homeopathic medicines with physiotherapy may not be beneficial for improving spasticity, stroke severity, and muscle strength after stroke when compared to Placebo with physiotherapy.
- Etanercept may be beneficial for improving range of motion after stroke when compared to Placebo (saline).
- Major ozonated autohemotherapy with stroke usual medical management may be beneficial for improving stroke severity after stroke when compared to stroke usual medical management.
- Telmisartan may be beneficial for improving stroke severity after stroke when compared to Mannitol.
- Conv rehab with Soymilk Ingestion may be beneficial for improving muscle strength after stroke when compared to Conv rehab with Placebo Milk Ingestion.
- Hyaluronic acid (2mL) may not be beneficial for improving range of motion after stroke when compared to Triamcinolone acetonide (40mg).
- Lithium 300mg with Conventional therapy may not be beneficial for improving motor function and stroke severity after stroke when compared to Placebo tablet with Conventional therapy.
- Atomoxetine with Task Oriented Upper Extremity Training may not be beneficial for improving motor function after stroke when compared to Placebo with Task Oriented Upper Extremity Training.

Summary of Key Points: Other Pharmacological and Medical Interventions

Intervention	Control(s)	Function domain(s)	Effect
Segmental neuromyotherapy (SNMT) with therapy	therapy	Motor function	+
Segmental neuromyotherapy (SNMT) with therapy	therapy	Spasticity	−
Hyaluronic acid	sham	Motor function, spasticity, range of motion	−
Traditional medicines and massage	piracetam with usual post-stroke medications	Motor function	+
Acupuncture (aligned acupuncture at the muscle regions plus cutaneous needle therapy)	Piracetam Injection	Motor function, spasticity, range of motion, stroke severity	+
Donepezil with constraint-induced movement therapy	Placebo with constraint-induced movement therapy	Motor function, dexterity, performance of activities of daily living	−
Vitamin D Supplementation	Placebo	Performance of activities of daily living, stroke severity, muscle strength	−
Nabiximol cannabinoid	Placebo nabiximol	Spasticity	−
Individualized homeopathic medicines with physiotherapy	Placebo with physiotherapy	Spasticity, stroke severity, muscle strength	−
Etanercept	Placebo (saline)	Range of motion	+
Major ozonated autohemotherapy with stroke usual medical management	stroke usual medical management	Stroke severity	+

Telmisartan	Mannitol	Stroke severity	+
Conv rehab with Soymilk Ingestion	Conv rehab with Placebo Milk Ingestion	Muscle strength	+
Hyaluronic acid (2mL)	Triamcinolone acetonide (40mg)	Range of motion	–
Lithium 300mg with Conventional therapy	Placebo tablet with Conventional therapy	Motor function, stroke severity	–
Atomoxetine with Task Oriented Upper Extremity Training	Placebo with Task Oriented Upper Extremity Training	Motor function	–

Complementary and Alternative Medicine

Acupuncture



Adapted from: https://www.mccaffreyhealth.com/acupuncture-for-chronic-pain/

The use of acupuncture has recently gained attention as an adjunct to stroke rehabilitation in Western countries even though acupuncture has been a primary treatment method in China for about 2000 years (Baldry, 2005). In China, acupuncture is an acceptable, time-efficient, simple, safe and economical form of treatment used to ameliorate motor, sensation, verbal communication and further neurological functions in post-stroke patients," (Wu et al., 2002). According to Rabinstein and Shulman (2003), "Acupuncture is a therapy that involves stimulation of defined anatomic locations on the skin by a variety of techniques, the most common being stimulation with metallic needles that are manipulated either manually or that serve as electrodes conducting electrical currents". There is a range of possible acupuncture mechanisms that may contribute to the health benefits experienced by stroke patients (Park et al. 2006). For example, acupuncture may stimulate the release of neurotransmitters (Han & Terenius, 1982) and have an effect on the deep structure of the brain (Wu et al. 2002). Lo et al. (2005) established acupuncture, when applied for at least 10 minutes, led to long-lasting changes in cortical excitability and plasticity even after the needle stimulus was removed. With respect to stroke rehabilitation, the benefit of acupuncture has been evaluated most frequently for pain relief and recovery from hemiparesis. 24 RCTs for acupuncture were identified.

A total of 43 RCTs were found that evaluated acupuncture for upper extremity motor rehabilitation. Eleven RCTs compared acupuncture with conventional therapy (Zhan et al. (2023); Li et al. (2022a); Wang et al. (2020a); Chen et al. (2016); Liu et al. (2016b); Mendigutia-Gómez et al. (2016); Zhao et al. (2015b); Gao et al. (2013); Alexander et al. (2004); DiLorenzo et al. (2004); Sze et al. (2002)). Eight RCTs compared acupuncture with sham (Chen et al. (2024); Wang et al. (2023e); Zhang et al. (2023b); Lee et al. (2016b); Chen et al. (2014); Huang et al. (2011);

Wayne et al. (2005); Naeser et al. (1992)). Five RCTs compared different approaches to acupuncture (Xie et al. (2022); Wang et al. (2020c); Zhang et al. (2013); Zhao et al. (2009); He et al. (2006)). One RCT evaluated acupuncture combined with other interventions (Zhuang et al. (2012)). One RCT compared acupuncture combined with other interventions with nootropics (Hou et al. (2014)). Three RCTs compared acupuncture combined with other interventions with acupuncture (Wei et al. (2019a); Dall'AgNol et al. (2018); Huang et al. (2017b)). Two RCTs compared dry Needling with conventional therapy (Zhang et al. (2021); Mendigutia-Gomez et al. (2020)). Two RCTs compared different approaches to dry needling (Ansari et al. (2024); Hernandez-Ortiz et al. (2020)). Three RCTs compared dry Needling with sham (Mody D. et al. (2024); Calvo et al. (2022); Tavakol et al. (2021)). Four RCTs compared acupuncture combined with other interventions with conventional therapy (Li et al. (2024b); Ni et al. (2017); Bai et al. (2013); Sallstrom et al. (1996)). One RCT compared dry Needling with sham (Panahi et al. (2024)). One RCT compared dry Needling combined with other interventions with exercise and custom physiotherapy protocols (Babazadeh-Zavieh et al. (2024)). One RCT compared acupuncture combined with other interventions with acupuncture or exercise and custom physiotherapy protocols (Ni et al. (2013)).

In addition, 7 RCTs in which acupuncture formed part of a combined or comparative intervention are cross-referenced at the end of Table 44; their primary listings appear in other tables.

The methodological details and results of all 43 RCTs are presented in Table 44.

Table 44. RCTs Evaluating Acupuncture for Upper Extremity Motor Rehabilitation

Authors (Year) **Study Design (PEDro Score)** **Sample Size start** **Sample Size end** **Time post stroke category** **Study design**	**Interventions** **Duration: Session length, frequency per week for total number of weeks**	**Outcome Measures** **Result (direction of effect)**
Acupuncture compared to conventional therapy		
Zhan et al. (2023) RCT (8) NStart=108 NEnd=102 TPS=Subacute A vs 0	E: Scalp acupuncture + Conventional rehabilitation C: Conventional rehabilitation Duration: E: 30min/d, 5d/wk for 4wks acupuncture + 5d/wk conventional rehabilitation C: 5d/wk conventional rehabilitation	E vs C: FMA-UE (+exp) FMA-LE (+exp) mBI (+exp) mRS (+exp)
Li et al. (2022a) RCT (7) NStart=497 NEnd=487 TPS=Subacute A1 vs A2 vs 0	E1: Traditional chinese literature Acupuncture + conventional rehab E2: Modern Acupuncture + conventional rehab C: Conventional Physiotherapy Duration: 30min/d, 5d/wk, 2wk	E1/E2 vs C: NIHSS (+exp1) BI (+exp2) MAS (-)
Wang et al. (2020a) RCT (8) NStart=134 NEnd=124 TPS=Subacute A vs 0	E: Acupuncture treatment + conventional treatment C: Conventional treatment Duration: 6d/wk, 4wk	E vs C: Fugl-Meyer Assessment (+exp) upper limb (-) lower limb (+exp) Barthel Index (-) for those who were able to walk gait velocity (+exp) step length (+exp) cadence (+exp) step width (+exp) Hip ROM (+exp) Knee ROM (+exp) Ankle ROM (-) peak circumduction (+exp) peak hip hiking (+exp)

Chen et al. (2016) RCT (8) NStart=250 NEnd=241 TPS=Acute A vs 0	E: Acupuncture + standard therapy C: Standard therapy Duration: 18sessions/3wk	E vs C: NIHSS (-) FMA (-) MMSE (-) MOCA (-) videofluroscopic swallowing study (VFSS) (-)
Mendigutia-Gómez et al. (2016) RCT Crossover (8) NStart=20 NEnd=20 TPS=Not Reported A vs 0	E: Acupuncture C: Standard care Duration: 30min/d, 3d/wk for 4wk	E vs C: Pressure Pain Threshold on affected side Deltoid (+exp) Infraspinatus (+exp) C5-C6 zygapophyseal joint (+exp) C5-C6 Zygapophyseal (+exp) Modified Ashworth Scale Upper Trapezius (-) Pectoralis Major (-) Subscapularis (-) Infraspinatus (+exp) Shoulder Range of Motion flexion (-) abduction (+exp) External Rotation (+exp)
Liu et al. (2016b) RCT (6) NStart=38 NEnd=31 TPS=Acute A vs 0	E: Manual acupuncture + standard care C: Standard care Duration: NR	E vs C: NIHSS (-) FMA (-) FIM (-) BI (-) mRS (-)
Zhao et al. (2015b) RCT (8) NStart=124 NEnd=119 TPS=Subacute A vs 0	E: Acupuncture (warm needling therapy and acupuncture at meridian-sinew sites) C: Standard care Duration: 30min/d, 5d/wk for 2wk	E vs C: Visual Analog Scale - Pain (+exp) Active and Passive Range of Motion (+exp) Barthel Index (-)
Gao et al. (2013) RCT (6) NStart=106 NEnd=106 TPS=Acute A1 vs A2 vs 0	E1: contralateral acupuncture E2: conventional acupuncture C: Conventional treatment Duration: Not Reported	E1 vs E2: Neurological deficit score (+exp1) mod BI (-) FMA (-) E1 vs C: Neurological deficit score (+exp1) mod BI (+exp1) FMA (+exp1) E2 vs C: Neurological deficit score (+exp2) mod BI (+exp2) FMA (+exp2)
DiLorenzo et al. (2004) RCT (4) NStart=101 NEnd=101 TPS=Acute A vs 0	E: Dry Needling C: Conventional Therapy Duration: 4 sessions, 5-7 days in between	E vs C: Visual Analog Scale - Shoulder Pain (+exp) Rivermead Motricity Index

Alexander et al. (2004) Pilot RCT (6) NStart=32 NEnd=29 TPS=Acute A vs 0	E: Acupuncture C: Standard rehabilitation Duration: 30min/d, 2d/wk for 10 wk	E vs C: Fugl-Meyer Assessment (-) Motor Function LE (+exp) Functional Independence Measure (-) Tub/shower Transfer Mobility (+exp) Toilet Transfer Mobility (+exp)
Sze et al. (2002) RCT (8) NStart=106 NEnd=92 TPS=Acute A vs 0	E: Acupuncture + Standard Therapy C: Standard Therapy Duration: E: 30min/d 2-5d/wk for 10wks acupuncture + 105min/d 2-5d/wk for 10wks standard rehab C: 105min/d 2-5d/wk for 10wks standard rehab	E vs C: Fugl-Meyer Assessment (-) Motor subsection (-) Barthel Index (-) Functional Independence Measure (-) cognition (-) motor (-)
Acupuncture compared to sham		
Chen et al. (2024) RCT (8) NStart=54 NEnd=46 TPS=Acute A vs 0	E: Acupuncture C: Non-acupoint acupuncture Duration: 32min/d for 10d	E vs C: FMA (+exp) UE (+exp) LE (+exp) fMRI (no stat)
Wang et al. (2023e) RCT (6) NStart=53 NEnd=40 TPS=Acute A vs 0	E: Acupoint treatment + Routine rehabilitation C: Sham acupoint treatment + Routine rehabilitation Duration: 30min/d, 5d/wk for 2wks	E vs C: NIHSS (-) FMA-UE (-) FMA-LE (-) fMRI (no stat)
Zhang et al. (2023b) RCT (5) NStart=44 NEnd=40 TPS=Subacute A vs 0	E: Auricular Acupuncture + regular rehab C: Sham acupuncture + regular rehab Duration: 20 min/d acupuncture + 60 min/d conventionaltherapy, 5d/wk for 2wks	E vs C: FMA (+exp) MEP amplitude (+exp) fNIRS HbO2 (+exp)
Lee et al. (2016b) RCT (9) NStart=53 NEnd=48 TPS=Subacute A vs 0	E: Acupuncture C: Sham Acupuncture Duration: 15min/session, 3d/w, 3wks	E vs C: Pain VAS (-) Pain Numeric Rating Scale (+exp) Passive Range of Motion Flexion (-) Extension (-) Abduction (-) Manual Muscle Test (-) Modified Ashworth Scale (-) Korean beck Depression Inventory (-) Korean Modified Barthel Index (-)
Chen et al. (2014) RCT (2) NStart=24 NEnd=18 TPS=Subacute A vs 0	E: Acupuncture C: Sham acupuncture Duration: Needle inserted and twisted at 60 revolutions/min for varied lengths	E vs C: fMRI
Huang et al. (2011) RCT (3)	E: SJ 5 Acupoint Stimulation C: Sham Acupoint Stimulation	E vs C: fMRI data (No stats)

NStart=12 NEnd=12 TPS=Chronic A vs 0	Duration: Needle twirled +/- 180 degrees for 60x/min; 30s twirling + 30s resting; repeated for 60x	
Wayne et al. (2005) RCT (8) NStart=33 NEnd=24 TPS=Chronic A vs 0	E: Active acupuncture of body and scalp (combination of traditional and modern approaches) C: Sham acupuncture Duration: 45-60min, 2d/wk, 10wk	E vs C: Fugl-Meyer Assessment (-) Modified Ashworth scores elbow (-) wrist (-) ROM shoulder sagittal plane (-) shoulder frontal plane (-) shoulder transverse plane (-) elbow sagittal plane (-) forearm transverse plane (-) wrist sagittal plane (-) wrist frontal plane (-) thumb (-) digits (-) Barthel Index (-) Nottingham health profile (-) CES-D Epidemiological Surveys Depression (-) grip strength (-)
Naeser et al. (1992) RCT (5) NStart=16 NEnd=16 TPS=Subacute A vs 0	E: Acupuncture C: Sham acupuncture Duration: 1hr/d, 5d/wk for 4wk	E vs C: Boston Motor Inventory ROM(+exp)
Different approaches to acupuncture compared against one another		
Xie et al. (2022) RCT (6) NStart=97 NEnd=90 TPS=Subacute A1 vs A2	E: Acupuncture (body acupuncture) + Zhu's acupuncture (head acupuncture) + Conventional Rehab C: Acupuncture (body acupuncture) + Conventional Rehab Duration: 30 min/d (30 min acupuncture + 8 hour needle retention E1 only), 5d/wk, 4 wks	E vs C: MMST UL (+exp) LL (+exp) FMA UL (+exp) LL (+exp) Hand (-) mBI (+exp)
Wang et al. (2020c) Pilot RCT (8) NStart=40 NEnd=40 TPS=Acute A1 vs A2	E: Motor Entry Point Acupuncture C: Standard Acupuncture Duration: 40min, 6x/wk, for 4wk	E vs C: Range of Motion (+exp) Manual Muscle Test (+exp)
Zhang et al. (2013) RCT (5) NStart=36 NEnd=36 TPS=Subacute A1 vs A2	E: Acupuncture (acupoints group of brain-refreshing and orifice-opening needling method) + standard rehav C: Traditional acupuncture (routine acupuncture was applied in the control group on the same acupoints) Duration: 6d/wk for 6wks	E vs C: Modified Ashworth Scale: (+exp) Clinical Spasticity Index: (+exp)

Zhao et al. (2009) Pilot RCT (6) NStart=131 NEnd=120 TPS=Chronic A1 vs A2	E: Experimental acupuncture C: Traditional acupuncture Duration: 20min/d 5d/wk, 4wk	E vs C: Modified Ashworth Scale (+exp) Fugl Meyer Assessment Upper Extremity (+exp) Barthel Index (+exp) EMG
He et al. (2006) RCT (3) NStart=251 NEnd=245 TPS=Acute A1 vs A2	E1: 20 Minute Needling E2: 40 Minute Needling E3: 60 Minute Needling Duration: 1/d, 7d/wk, 10 sessions total	E1 vs E2: Myodynamia (-) Hand (-) Upper Limb (-) E2 vs E3: Myodynamia (-) Hand (-) Upper Limb (+exp3) E1 vs E3: Myodynamia (+exp3) Hand (-) Upper Limb (+exp3)
Acupuncture combined with other interventions compared to control		
Zhuang et al. (2012) RCT (7) NStart=295 NEnd=274 TPS=Subacute A + B vs A vs B *Also in Table 1 (Neurodevelopmental Techniques)*	E1: Acupuncture E2: Physiotherapy Bobath E3: Acupuncture + Physiotherapy Bobath Duration: 30min acupuncture, 1hr/d physio, 6d/wk, 4wk	E1 vs E2: Fugl-Meyer Assessment (-) Barthel Index (-) Neurologic Defect Scale (-) E1 vs E3: Fugl-Meyer Assessment (-) Barthel Index (-) Neurologic Defect Scale (-) E2 vs E3: Fugl-Meyer Assessment (-) Barthel Index (-) Neurologic Defect Scale (-)
Acupuncture combined with other interventions compared to nootropics		
Hou et al. (2014) RCT (6) NStart=488 NEnd=488 TPS=Acute A vs B *Also in Table 43 (Other Pharmacological and Medical Interventions)*	E: Acupuncture (aligned acupuncture at the muscle regions plus cutaneous needle therapy) C: Piracetam Injection Duration: 1x/d, 3wks \~40min	E vs C: Modified Ashworth Scale: (+exp) Limb joint function Shoulder Abduction: (+exp) Pronation of Forearm: (+exp) Elbow Flexion: (+exp) Wrist Flexion: (+exp) Finger Flexion: (+exp) Neurological Deficit Grades (1-5): (+exp) FMA (+exp)
Acupuncture combined with other interventions compared to acupuncture		
Wei et al. (2019a) RCT (4) NStart=40 NEnd=40 TPS=Subacute A + B vs A/B *Also in Table 8 (Stretching Programs)*	E: Acupuncture + neuromuscular joint facilitation C: Acupuncture Duration: 30min, 1x/d, 6x/wk	E vs C: Passive Range of Motion: (+exp) Fugl Meyer Upper Extremity: (+exp) Barthel Index: (-) Visual analogue scale (+exp)
Dall'AgNol et al. (2018)	E: Kinesio tape + acupuncture	E vs C:

RCT (6) NStart=16 NEnd=16 TPS=Chronic A + B vs A/B *Also in Table 9 (Orthotics and Taping)*	C: Acupuncture Duration: 30min, 3x/wk for 12wks	Wolf Motor Function Test (-) Modified Ashworth Scale (-) Active Range of Motion (-)
Huang et al. (2017b) Pilot RCT (6) NStart=79 NEnd=79 TPS=Subacute A + B vs A/B *Also in Table 24 (Thermal Stimulation)*	E: Heat/Cool Therapy + Accupuncture+ routine rehabilitation C: Accupuncture+ routine rehabilitation Duration: E: 30min/d acupuncture + 30min/d thermal stimulation, 6d/wk for 4wks C: 30min/d, 6d/wk for 4wks	E vs C: Visual Analogue Scale: Pain (+exp) FMA-UE (+exp) MBI (-) symptoms and motor function according to SHS criteria (+exp)
Dry Needling compared to conventional therapy		
Zhang et al. (2021) RCT (7) NStart=210 NEnd=210 TPS=Chronic A vs 0	E1: Dry needling + conventional rehab E2: Sham needling + conventional rehab C: Conventional therapy Duration: 30min/d, 5d/wk, 4wks	E1 vs E2/C: MAS (+exp1) E2 vs C: MAS (-)
Mendigutia-Gomez et al. (2020) RCT (4) NStart=16 NEnd=16 TPS=Chronic A vs 0	E: Trigger point dry needling C: Conventional therapy Duration: 1 needling session or conventional therapy (duration of session Not reported)	E vs C: Numerical Pain Rating Scale - Shoulder (+exp)
Different approaches to dry needling compared against one another		
Ansari et al. (2024) RCT (8) NStart=24 NEnd=24 TPS=Chronic A1 vs A2	E1: Dry needling (1 session) E2: Dry needling (3 sessions) Duration: E1: 1 session/day, 1 day; E2: 1 session/day, 3 days	E1 vs E2: Modified Modified Ashworth Scale (-) Passive resistance torque (+exp2) Wrist active extension ROM (+exp2) Wrist passive extension ROM (+exp2) BRS (-)
Hernandez-Ortiz et al. (2020) RCT Crossover (9) NStart=21 NEnd=21 TPS=Chronic A1 vs A2	E: Acupuncture Dry Needling On Trigger Points C: Acupuncture Dry Needling On Non-Trigger Points Duration: 15min, 1 session, follow up 6wks, 1wk washout period	E vs C: Modified Ashworth Scale (-) Numeric Pain Rating Scale (+exp) Motor Evaluation Scale For Upper Extremity In Stroke (-) Reaching Performance Scale (-)
Dry Needling compared to sham		
Mody D. et al. (2024) RCT (4) NStart=30 NEnd=30 TPS=Not Reported A vs 0	E: Dry Needling + conventional physiotherapy C: Sham acupuncture + conventional physiotherapy Duration: 2d/wk, 5wks	E vs C: Modified Ashworth Scale left side (+exp) right side (-)
Panahi et al. (2024) RCT (8) NStart=24 NEnd=24 TPS=Chronic	E: Dry Needling + FES + conventional exercise C: Sham-Needling + FES + Conventional exercise	E vs C: Muscle Thickness (+exp) Modified Ashworth Scale (-) FMA-UE (+exp) BBT (+exp)

A vs 0 *Also in Table 22 (Neuromuscular Electrical Stimulation (NMES))*	Duration: Dry Needling (1d/wk, 4wks); FES (10 min/d but goes up to 30 min/d by increases of 5 minutes each week, 3d/wk, 4wks); Exercise training (30min, but is gradually increased with patient progress, 3d/wk, 4wks)	Reflex torque (+exp)
Calvo et al. (2022) RCT (9) NStart=23 NEnd=23 TPS=Chronic A vs 0	E: Dry Needling C: Sham Duration: 60min/1 session	E vs C: FMA-UE motor (+exp) sensorimotor (+exp) wrist-hand (+exp) sensory (-) upper arm (-), mMAS elbow flex (-) elbow ext (+exp) wrist-dorsal flex (-) wrist-palmar flex (-) thumb adductor (-) EuroQol-5D (+exp) EQ-VAS (-)
Tavakol et al. (2021) RCT (9) NStart=24 NEnd=24 TPS=Chronic A vs 0	E: Dry Needling C: Sham Needling Duration: 1min/muscle, variable	E vs C: Modified Modified Ashworth Scale (+exp) Box and Block Test (-) Passive Range of Motion (+exp) Active Range of Motion (-)
Acupuncture combined with other interventions compared to conventional therapy		
Li et al. (2024b) RCT (5) NStart=105 NEnd=105 TPS=Subacute A + B vs A/B vs 0 *Also in Table 47 (Traditional Herbal Medicine)*	E1: Acupuncture + traditional Chinese herb hot compress + Conventional rehabilitation E2: Acupuncture + Conventional rehabilitation C: Conventional rehabilitation Duration: 30min/d, 5d/wk for 4wks conventional rehabilitation + 30min/d, 5d/wk for 4wks acupuncture + 20min/d, 5d/wk for 4wks hot compress	E1/E2 vs C: VAS-pain (no between-group stat) FMA-UE (no between-group stat) ADL Scale (no between-group stat) Shoulder-hand syndrome assessment scale (SHSS) (no between-group stat) shoulder joint movement angle (no between-group stat)
Ni et al. (2017) RCT (6) NStart=180 NEnd=176 TPS=Chronic A + B vs 0 *Also in Table 3 (Exercise and Strength Training)*	E: Superficial needling acupuncture plus club swing exercise + conventional therapy C: Conventional therapy Duration: 1-2x/d for 60d	E vs C: Visual Analogue Scale - Pain (+exp) Functional Comprehensive Assessment (+exp) Active Range of Motion: Shoulder flexion, extension, abduction, and internal rotation (+exp) Active Range of Motion: External shoulder rotation (-)
Bai et al. (2013) RCT (5) NStart=120 NEnd=120 TPS=Subacute A + B vs A vs B *Also in Table 3 (Exercise and Strength Training)*	E1: Physiotherapy E2: Acupuncture E3: Physiotherapy+Acupuncture Duration: Acupuncture: 30min/d, 6d/wk for 4wk; Physiotherapy: 45min/d, 6d/wk for 4wk	E1 vs E2: Simplified Fugl-Meyer Assessment (-) Modified Barthel Index (-) E1 vs E3: Simplified Fugl-Meyer Assessment (-) Modified Barthel Index (-) E2 vs E3: Simplified Fugl-Meyer Assessment (-) Modified Barthel Index (-)

Sallstrom et al. (1996) RCT (6) NStart=45 NEnd=45 TPS=Subacute A + B vs A/B	E: Acupuncture + individualized rehab training C: individualized rehab training Duration: 30min, 3-4x/wk, 6wk	E vs C: Motor Assessment Scale (+exp) Sunnaas Index of ADL (+exp) Nottingham Health Profile (+exp)
Dry Needling combined with other interventions compared to exercise and custom physiotherapy protocols		
Babazadeh-Zavieh et al. (2024) RCT (7) NStart=24 NEnd=24 TPS=Chronic A + B vs A/B *Also in Table 3 (Exercise and Strength Training)*	E: Dry Needling + exercise therapy C: Exercise therapy Duration: Needling: 1min/muscle, 1d/wk, 4wks; Exercise: 30min/d, 5dwk, 4wks	E vs C: Modified Modified Ashworth Scale (-) Hmax/Mmax (-) H-reflex latency (-) ARAT (-) FMA (-) AROM (+exp) PROM (-)
Acupuncture combined with other interventions compared to acupuncture or exercise and custom physiotherapy protocols		
Ni et al. (2013) RCT (7) NStart=165 NEnd=165 TPS=Chronic A + B1 vs A + B2 *Also in Table 3 (Exercise and Strength Training)*	E: Standard Acupuncture with Shixuan & Xiaohai acupoints + Functional training C: Standard Acupuncture only + Functional training Duration: 3 sessions	E vs C: Finger grip strength (+exp) Fugl-Meyer Assessment (+exp)
Cross-Referenced RCTs: Combined or Comparative Interventions Involving Acupuncture (results included in this table's levels of evidence)		
Zhu et al. (2023) RCT (6) NStart=347 NEnd=321 TPS=Not Reported A + B vs C *Primary listing: Table 47 (Traditional Herbal Medicine)*	E: Traditional Chinese medicine + Tuina treatment + Acupuncture + standard therapy C: Kinesiotherapy exercises + standard therapy Duration: E: 6hr/d, 5d/wk for 4wks; C: 30min/d 5d/wk for 4wks	E vs C: Modified Ashworth Scale elbow extension (+exp) knee flexion (+exp) Modified Barthel Index (+exp) Stroke Specific Quality of Life Scale (+exp)
Kosem M. et al. (2022) RCT (5) NStart=30 NEnd=30 TPS=Chronic A + B vs A/B *Primary listing: Table 33 (Botulinum Toxin)*	E: Botox + dry needling + conventional rehab C: Botox + conventionalrehab Duration: Dry needling conducted in 3d intervals for 4 times total starting immediately after injection	E vs C: MAS (+exp) MTS (+exp) FMA-UE (+exp)
Kim et al. (2020c) Pilot RCT (6) NStart=60 NEnd=42 TPS=Acute A + B vs A vs B vs 0 *Primary listing: Table 29 (Repetitive Transcranial Magnetic Stimulation (rTMS))*	E1: Scalp acupuncture (SA) E2: Repetitive transcranial magnetic stimulation (rTMS) E3: SAEM-CS- SA and electromagnetic convergence stimulation (SA and LF-rTMS simultaneously) C: Conventional therapy Duration: CSRT 30min, 2x/d, 5d/wk, 30 sessions/3wks & SA or rTMS or SAEM-CS 20min, 1x/d, 15 sessions/3wks	E1 vs C: Fugl-Meyer Upper Extremity (-), FMA Lower Extremity Fugl-Meyer Total (-) Modified Barthel Index (-) Functional Independence Measure (-) EQ-5D (-) E2 vs C: Fugl-Meyer Upper Extremity (+exp2) Fugl-Meyer Total (+exp2)

		Modified Barthel Index (+exp2) Functional Independence Measure (+exp2) EQ-5D (-) E3 vs C: Fugl-Meyer Upper Extremity (-) Fugl-Meyer Total (-) Modified Barthel Index (-) Functional Independence Measure (-) EQ-5D (-) E1 vs E3: Fugl-Meyer Upper Extremity (-) Fugl-Meyer Total (-) Modified Barthel Index (-) Functional Independence Measure (-) EQ-5D (-) E2 vs E3: Fugl-Meyer Upper Extremity (+exp2) Fugl-Meyer Total (+exp2) Modified Barthel Index (+exp2) Functional Independence Measure (+exp2) EQ-5D (-) E1 vs E2: Fugl-Meyer Upper Extremity (-) Fugl-Meyer Total (-) Modified Barthel Index (+exp2) Functional Independence Measure (+exp2) EQ-5D (-) NIHSS Modified rankin scale MMSE MEP Grip Strength ASHA-Noms
Zhao et al. (2018) RCT (5) NStart=28 NEnd=17 TPS=Subacute A + B vs A/B *Primary listing: Table 29 (Repetitive Transcranial Magnetic Stimulation (rTMS))*	E: Low frequency rTMS + scalp acupuncture C: Scalp Acupuncture Duration: 1x/d, 2wk	E vs C: Fugl Meyer Upper Extremity: (+exp) Modified Barthel Index: (+exp) diffusor tensor imaging
Song et al. (2016) RCT (4) NStart=30 NEnd=30 TPS=Acute A + B vs A/B *Primary listing: Table 6 (Constraint-Induced Movement Therapy (CIMT))*	E: Scalp cluster acupuncture + constraint-induced movement therapy C: Body acupuncture + traditional rehabilitation Duration: 6hr/d, (needles twisted 2- 3x), 6d/wk for 2wk	E vs C: Fugl-Meyer Assessment (+exp) blood oxygenation level-dependent functional magnetic resonance imaging (BOLD-fMRI) (+exp)
Wang et al. (2014d)	E: Electroacupuncture + Standard rehab	E vs C:

Pilot RCT (4) NStart=20 NEnd=15 TPS=Chronic A vs B *Primary listing: Table 45 (Electroacupuncture and Transcutaneous Electrical Acupoint Stimulation)*	C: Minimal acupuncture + Standard rehab Duration: 20min/d, 2d/wk for 6wk	Dynamic component of spasticity (proportion of angle of muscle reaction/ passive range of motion) elbow (-) Wrist (-)
Moon et al. (2003) RCT (3) NStart=35 NEnd=35 TPS=Subacute A + B vs A + C vs A *Primary listing: Table 45 (Electroacupuncture and Transcutaneous Electrical Acupoint Stimulation)*	E1: Electroacupunture + Routine acupuncture therapy E2: Moxibustion + Routine acupuncture therapy C: Routine acupuncture therapy Duration: C: 30min/session, 1x/d routine acupuncture therapy, 15days; E1: 50Hz, 30min/d, 15days; E2: 3x/d, 15days	E1/E2 vs C: E1 vs E2/C: Modified Ashworth Scale (+exp1)

Abbreviations and table notes: C=control group; D=days; E=experimental group; H=hours; Min=minutes; RCT=randomized controlled trial; TPS=time post stroke category (Acute: less than 30 days, Subacute: more than 1 month but less than 6 months, Chronic: over 6 months); Wk=weeks.

+exp indicates a statistically significant between groups difference at α=0.05 in favour of the experimental group

+exp1/+exp2/+exp3 indicates a statistically significant between groups difference at α=0.05 in favour of the first, second or third experimental group

+con indicates a statistically significant between groups difference at α=0.05 in favour of the control group

- indicates no statistically significant between groups differences at α=0.05

1. Body Functions and Structures

MOTOR FUNCTION			
LoE	**Conclusion Statement**	**RCTs**	**References**
1a	There is conflicting evidence about the effect of Acupuncture when compared to conventional therapy for improving motor function.	7	Zhan et al. (2023); Wang et al. (2020a); Chen et al. (2016); Liu et al. (2016b); Gao et al. (2013); Alexander et al. (2004); Sze et al. (2002)
1b	Contralateral acupuncture may not have a difference in efficacy when compared to conventional acupuncture for improving motor function.	1	Gao et al. (2013)
1a	There is conflicting evidence about the effect of Acupuncture when compared to sham for improving motor function.	4	Chen et al. (2024); Wang et al. (2023e); Zhang et al. (2023b); Wayne et al. (2005)
1a	Acupuncture: some approaches may produce greater improvements in motor function than others.	2	Xie et al. (2022); Zhao et al. (2009)
1b	Acupuncture may not have a difference in efficacy when compared to Physiotherapy Bobath for improving motor function.	1	Zhuang et al. (2012)
1b	Acupuncture may not have a difference in efficacy when compared to Acupuncture with Physiotherapy Bobath for improving motor function.	1	Zhuang et al. (2012)
1b	Physiotherapy Bobath may not have a difference in efficacy when compared to Acupuncture with Physiotherapy Bobath for improving motor function.	1	Zhuang et al. (2012)

1b	Acupuncture (aligned acupuncture at the muscle regions plus cutaneous needle therapy) may produce greater improvements in motor function than Piracetam Injection.	1	Hou et al. (2014)
1a	Acupuncture combined with other interventions may produce greater improvements in motor function than acupuncture.	3	Wei et al. (2019a); Dall'AgNol et al. (2018); Huang et al. (2017b)
1b	Different approaches to dry Needling may not have a difference in efficacy when compared with one another for improving motor function.	1	Hernandez-Ortiz et al. (2020)
1b	Dry Needling may not have a difference in efficacy when compared to sham for improving motor function.	1	Calvo et al. (2022)
2	Physiotherapy may not have a difference in efficacy when compared to Acupuncture for improving motor function.	1	Bai et al. (2013)
2	Physiotherapy may not have a difference in efficacy when compared to Physiotherapy with Acupuncture for improving motor function.	1	Bai et al. (2013)
2	Acupuncture may not have a difference in efficacy when compared to Physiotherapy with Acupuncture for improving motor function.	1	Bai et al. (2013)
1b	Dry Needling with Neurorehabilitation protocol (electrotherapy (functional electrical stimulation and hot pack) and stroke conventional exercise) may produce greater improvements in motor function than Sham-Needling with functional electrical stimulation with hot pack and Conventional exercise training.	1	Panahi et al. (2024)
1b	Dry Needling with exercise therapy may not have a difference in efficacy when compared to Exercise therapy for improving motor function.	1	Babazadeh-Zavieh et al. (2024)
2	Low frequency repetitive transcranial magnetic stimulation with scalp acupuncture may produce greater improvements in motor function than Scalp Acupuncture.	1	Zhao et al. (2018)
2	Scalp cluster acupuncture with constraint-induced movement therapy may produce greater improvements in motor function than Body acupuncture with traditional rehabilitation.	1	Song et al. (2016)
2	Botox with dry needling and conventional rehab may produce greater improvements in motor function than Botox with conventionalrehab.	1	Kosem M. et al. (2022)
1b	Standard Acupuncture with Shixuan & Xiaohai acupoints with Functional training may produce greater improvements in motor function than Standard Acupuncture only with Functional training.	1	Ni et al. (2013)
1b	Scalp acupuncture (SA) may not have a difference in efficacy when compared to Conventional therapy for improving motor function.	1	Kim et al. (2020c)
1b	Repetitive transcranial magnetic stimulation (rTMS) may produce greater improvements in motor function than Conventional therapy.	1	Kim et al. (2020c)
1b	SAEM-CS- SA and electromagnetic convergence stimulation (SA and LF-rTMS simultaneously) may not have a difference in efficacy when compared to Conventional therapy for improving motor function.	1	Kim et al. (2020c)
1b	Scalp acupuncture (SA) may not have a difference in efficacy when compared to SAEM-CS- SA and electromagnetic convergence stimulation (SA and LF-rTMS simultaneously) for improving motor function.	1	Kim et al. (2020c)
1b	Repetitive transcranial magnetic stimulation (rTMS) may produce greater improvements in motor function than SAEM-CS- SA and electromagnetic convergence stimulation (SA and LF-rTMS simultaneously).	1	Kim et al. (2020c)

1b	Scalp acupuncture (SA) may not have a difference in efficacy when compared to Repetitive transcranial magnetic stimulation (rTMS) for improving motor function.	1	Kim et al. (2020c)

STROKE SEVERITY			
LoE	**Conclusion Statement**	**RCTs**	**References**
1a	Acupuncture may produce greater improvements in stroke severity than conventional therapy.	5	Zhan et al. (2023); Li et al. (2022a); Chen et al. (2016); Liu et al. (2016b); Gao et al. (2013)
1b	Contralateral acupuncture may produce greater improvements in stroke severity than conventional acupuncture.	1	Gao et al. (2013)
1b	Acupuncture may not have a difference in efficacy when compared to sham for improving stroke severity.	1	Wang et al. (2023e)
1b	Acupuncture may not have a difference in efficacy when compared to Physiotherapy Bobath for improving stroke severity.	1	Zhuang et al. (2012)
1b	Acupuncture may not have a difference in efficacy when compared to Acupuncture with Physiotherapy Bobath for improving stroke severity.	1	Zhuang et al. (2012)
1b	Physiotherapy Bobath may not have a difference in efficacy when compared to Acupuncture with Physiotherapy Bobath for improving stroke severity.	1	Zhuang et al. (2012)
1b	Different approaches to dry needling may not have a difference in efficacy when compared with one another for improving stroke severity.	1	Ansari et al. (2024)
1b	Acupuncture (aligned acupuncture at the muscle regions plus cutaneous needle therapy) may produce greater improvements in stroke severity than Piracetam Injection.	1	Hou et al. (2014)

MUSCLE STRENGTH			
LoE	**Conclusion Statement**	**RCTs**	**References**
1a	Acupuncture may not have a difference in efficacy when compared to sham for improving muscle strength.	2	Lee et al. (2016b); Wayne et al. (2005)
1a	Acupuncture: some approaches may produce greater improvements in muscle strength than others.	2	Xie et al. (2022); Wang et al. (2020c)
1b	Dry Needling with Neurorehabilitation protocol (electrotherapy (functional electrical stimulation and hot pack) and stroke conventional exercise) may produce greater improvements in muscle strength than Sham-Needling with functional electrical stimulation with hot pack and Conventional exercise training.	1	Panahi et al. (2024)
1b	Standard Acupuncture with Shixuan & Xiaohai acupoints with Functional training may produce greater improvements in muscle strength than Standard Acupuncture only with Functional training.	1	Ni et al. (2013)

SPASTICITY			
LoE	**Conclusion Statement**	**RCTs**	**References**
1a	Acupuncture may not have a difference in efficacy when compared to conventional therapy for improving spasticity.	2	Li et al. (2022a); Mendigutia-Gómez et al. (2016)
1a	Acupuncture may not have a difference in efficacy when compared to sham for improving spasticity.	2	Lee et al. (2016b); Wayne et al. (2005)

1b	Acupuncture (aligned acupuncture at the muscle regions plus cutaneous needle therapy) may produce greater improvements in spasticity than Piracetam Injection.	1	Hou et al. (2014)
1b	Acupuncture combined with other interventions may not have a difference in efficacy when compared to acupuncture for improving spasticity.	1	Dall'AgNol et al. (2018)
1b	There is conflicting evidence about the effect of Dry Needling when compared to conventional therapy for improving spasticity.	1	Zhang et al. (2021)
1b	Different approaches to dry Needling may not have a difference in efficacy when compared with one another for improving spasticity.	1	Hernandez-Ortiz et al. (2020)
1b	Dry needling may not have a difference in efficacy when compared to Dry needling for improving spasticity.	1	Ansari et al. (2024)
1a	There is conflicting evidence about the effect of Dry Needling when compared to sham for improving spasticity.	3	Mody D. et al. (2024); Calvo et al. (2022); Tavakol et al. (2021)
1b	Dry Needling with Neurorehabilitation protocol (electrotherapy (functional electrical stimulation and hot pack) and stroke conventional exercise) may not have a difference in efficacy when compared to Sham-Needling with functional electrical stimulation with hot pack and Conventional exercise training for improving spasticity.	1	Panahi et al. (2024)
1b	Dry Needling with exercise therapy may not have a difference in efficacy when compared to Exercise therapy for improving spasticity.	1	Babazadeh-Zavieh et al. (2024)
2	Electroacupunture with acupuncture therapy may produce greater improvements in spasticity than acupuncture therapy.	1	Moon et al. (2003)
2	Botox with dry needling and conventional rehab may produce greater improvements in spasticity than Botox with conventionalrehab.	1	Kosem M. et al. (2022)
1b	Traditional Chinese medicine with Tuina treatment (massage techniques), Acupuncture kinesiotherapy and Basic stroke treatment may produce greater improvements in spasticity than Basic stroke treatment with modern rehabilitation techniques.	1	Zhu et al. (2023)
1b	Acupuncture: some approaches may produce greater improvements in spasticity than others.	2	Zhang et al. (2013); Zhao et al. (2009)

RANGE OF MOTION			
LoE	**Conclusion Statement**	**RCTs**	**References**
1a	Acupuncture may produce greater improvements in range of motion than conventional therapy.	3	Wang et al. (2020a); Mendigutia-Gómez et al. (2016); Zhao et al. (2015b)
1a	Acupuncture may not have a difference in efficacy when compared to sham for improving range of motion.	3	Lee et al. (2016b); Wayne et al. (2005); Naeser et al. (1992)
1b	Acupuncture (aligned acupuncture at the muscle regions plus cutaneous needle therapy) may produce greater improvements in range of motion than Piracetam Injection.	1	Hou et al. (2014)
1b	There is conflicting evidence about the effect of Acupuncture combined with other interventions when compared to acupuncture for improving range of motion.	2	Wei et al. (2019a); Dall'AgNol et al. (2018)
1b	Dry needling may result in lesser improvements in range of motion when compared to Dry needling.	1	Ansari et al. (2024)
1b	There is conflicting evidence about the effect of Dry Needling when compared to sham for improving range of motion.	1	Tavakol et al. (2021)

1b	There is conflicting evidence about the effect of Dry Needling with exercise therapy when compared to Exercise therapy for improving range of motion.	1	Babazadeh-Zavieh et al. (2024)
1b	Acupuncture: some approaches may produce greater improvements in range of motion than others.	1	Wang et al. (2020c)
1b	There is conflicting evidence about the effect of Acupuncture combined with other interventions when compared to conventional therapy for improving range of motion.	1	Ni et al. (2017)
2	Electroacupuncture with Standard rehab may not have a difference in efficacy when compared to Minimal acupuncture with Standard rehab for improving range of motion.	1	Wang et al. (2014d)

2. Activities

ACTIVITIES OF DAILY LIVING			
LoE	**Conclusion Statement**	**RCTs**	**References**
1a	There is conflicting evidence about the effect of Acupuncture when compared to conventional therapy for improving performance of activities of daily living.	8	Zhan et al. (2023); Li et al. (2022a); Wang et al. (2020a); Liu et al. (2016b); Zhao et al. (2015b); Gao et al. (2013); Alexander et al. (2004); Sze et al. (2002)
1b	Contralateral acupuncture may not have a difference in efficacy when compared to conventional acupuncture for improving performance of activities of daily living.	1	Gao et al. (2013)
1a	Acupuncture may not have a difference in efficacy when compared to sham for improving performance of activities of daily living.	2	Lee et al. (2016b); Wayne et al. (2005)
1a	Acupuncture: some approaches may produce greater improvements in performance of activities of daily living than others.	2	Xie et al. (2022); Zhao et al. (2009)
1b	Acupuncture may not have a difference in efficacy when compared to Physiotherapy Bobath for improving performance of activities of daily living.	1	Zhuang et al. (2012)
1b	Acupuncture may not have a difference in efficacy when compared to Acupuncture with Physiotherapy Bobath for improving performance of activities of daily living.	1	Zhuang et al. (2012)
1b	Physiotherapy Bobath may not have a difference in efficacy when compared to Acupuncture with Physiotherapy Bobath for improving performance of activities of daily living.	1	Zhuang et al. (2012)
1b	Acupuncture combined with other interventions may not have a difference in efficacy when compared to acupuncture for improving performance of activities of daily living.	2	Wei et al. (2019a); Huang et al. (2017b)
2	Physiotherapy may not have a difference in efficacy when compared to Acupuncture for improving performance of activities of daily living.	1	Bai et al. (2013)
2	Physiotherapy may not have a difference in efficacy when compared to Physiotherapy with Acupuncture for improving performance of activities of daily living.	1	Bai et al. (2013)
2	Acupuncture may not have a difference in efficacy when compared to Physiotherapy with Acupuncture for improving performance of activities of daily living.	1	Bai et al. (2013)
2	Low frequency repetitive transcranial magnetic stimulation with scalp acupuncture may produce greater improvements in performance of activities of daily living than Scalp Acupuncture.	1	Zhao et al. (2018)

1b	Traditional Chinese medicine with Tuina treatment (massage techniques), Acupuncture kinesiotherapy and Basic stroke treatment may produce greater improvements in performance of activities of daily living than Basic stroke treatment with modern rehabilitation techniques.	1	Zhu et al. (2023)
1b	Acupuncture with individualized rehabilitation training may produce greater improvements in performance of activities of daily living than individualized rehabilitation training alone.	1	Sallstrom et al. (1996)
1b	Dry needling may not have a difference in efficacy when compared to sham for improving performance of activities of daily living.	1	Calvo et al. (2022)
1b	Acupuncture combined with other interventions may produce greater improvements in performance of activities of daily living than conventional therapy.	1	Ni et al. (2017)
1b	Scalp acupuncture (SA) may not have a difference in efficacy when compared to Conventional therapy for improving performance of activities of daily living.	1	Kim et al. (2020c)
1b	Repetitive transcranial magnetic stimulation (rTMS) may produce greater improvements in performance of activities of daily living than Conventional therapy.	1	Kim et al. (2020c)
1b	SAEM-CS- SA and electromagnetic convergence stimulation (SA and LF-rTMS simultaneously) may not have a difference in efficacy when compared to Conventional therapy for improving performance of activities of daily living.	1	Kim et al. (2020c)
1b	Scalp acupuncture (SA) may not have a difference in efficacy when compared to SAEM-CS- SA and electromagnetic convergence stimulation (SA and LF-rTMS simultaneously) for improving performance of activities of daily living.	1	Kim et al. (2020c)
1b	Repetitive transcranial magnetic stimulation (rTMS) may produce greater improvements in performance of activities of daily living than SAEM-CS- SA and electromagnetic convergence stimulation (SA and LF-rTMS simultaneously).	1	Kim et al. (2020c)
1b	Scalp acupuncture (SA) may result in lesser improvements in performance of activities of daily living when compared to Repetitive transcranial magnetic stimulation (rTMS).	1	Kim et al. (2020c)

DEXTERITY			
LoE	**Conclusion Statement**	**RCTs**	**References**
1b	Dry Needling may not have a difference in efficacy when compared to sham for improving dexterity.	1	Tavakol et al. (2021)
1b	Dry Needling with Neurorehabilitation protocol (electrotherapy (functional electrical stimulation and hot pack) and stroke conventional exercise) may produce greater improvements in dexterity than Sham-Needling with functional electrical stimulation with hot pack and Conventional exercise training.	1	Panahi et al. (2024)

Key Points

- Acupuncture: some approaches may be more beneficial than others for improving motor function, muscle strength, spasticity, range of motion, and performance of activities of daily living.
- Contralateral acupuncture may be beneficial for improving stroke severity, but not motor function and performance of activities of daily living, after stroke when compared to conventional acupuncture.
- Acupuncture may not be beneficial for improving stroke severity, muscle strength, spasticity, range of motion, and performance of activities of daily living after stroke when compared to sham; the literature is mixed regarding motor function.

- Acupuncture may not be beneficial for improving motor function, performance of activities of daily living, and stroke severity after stroke when compared to Physiotherapy Bobath.
- Acupuncture may not be beneficial for improving motor function, performance of activities of daily living, and stroke severity after stroke when compared to Acupuncture with Physiotherapy Bobath.
- Physiotherapy Bobath may not be beneficial for improving motor function, performance of activities of daily living, and stroke severity after stroke when compared to Acupuncture with Physiotherapy Bobath.
- Acupuncture (aligned acupuncture at the muscle regions plus cutaneous needle therapy) may be beneficial for improving motor function, spasticity, range of motion, and stroke severity after stroke when compared to Piracetam Injection.
- Acupuncture combined with other interventions may be beneficial for improving motor function, but not spasticity and performance of activities of daily living, after stroke when compared to acupuncture; the literature is mixed regarding range of motion.
- Dry Needling may not be beneficial for improving motor function, performance of activities of daily living, and dexterity after stroke when compared to sham; the literature is mixed regarding spasticity and range of motion.
- Physiotherapy may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Acupuncture.
- Physiotherapy may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Physiotherapy with Acupuncture.
- Acupuncture may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Physiotherapy with Acupuncture.
- Dry Needling with Neurorehabilitation protocol (electrotherapy (functional electrical stimulation and hot pack) and stroke conventional exercise) may be beneficial for improving motor function, dexterity, and muscle strength, but not spasticity, after stroke when compared to Sham-Needling with functional electrical stimulation with hot pack and Conventional exercise training.
- Dry Needling with exercise therapy may not be beneficial for improving motor function and spasticity after stroke when compared to Exercise therapy; the literature is mixed regarding range of motion.
- Low frequency repetitive transcranial magnetic stimulation with scalp acupuncture may be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Scalp Acupuncture.
- Scalp cluster acupuncture with constraint-induced movement therapy may be beneficial for improving motor function after stroke when compared to Body acupuncture with traditional rehabilitation.
- Botox with dry needling and conventional rehab may be beneficial for improving motor function and spasticity after stroke when compared to Botox with conventionalrehab.
- Traditional Chinese medicine with Tuina treatment (massage techniques), Acupuncture kinesiotherapy and Basic stroke treatment may be beneficial for improving performance of activities of daily living and spasticity after stroke when compared to Basic stroke treatment with modern rehabilitation techniques.
- Acupuncture with individualized rehabilitation training may be beneficial for improving performance of activities of daily living after stroke when compared to individualized rehabilitation training alone.
- The literature is mixed regarding the effect of Dry Needling on improvement of spasticity after stroke when compared to conventional therapy.
- Dry needling may not be beneficial for improving spasticity after stroke when compared to Dry needling.
- Dry needling may be less beneficial than Dry needling for improving range of motion after stroke.
- Electroacupunture with acupuncture therapy may be beneficial for improving spasticity after stroke when compared to acupuncture therapy.
- Standard Acupuncture with Shixuan & Xiaohai acupoints with Functional training may be beneficial for improving motor function and muscle strength after stroke when compared to Standard Acupuncture only with Functional training.
- Acupuncture may be beneficial for improving stroke severity and range of motion, but not spasticity, after stroke when compared to conventional therapy; the literature is mixed regarding motor function and performance of activities of daily living.

- Scalp acupuncture (SA) may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Conventional therapy.
- Repetitive transcranial magnetic stimulation (rTMS) may be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Conventional therapy.
- SAEM-CS- SA and electromagnetic convergence stimulation (SA and LF-rTMS simultaneously) may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Conventional therapy.
- Scalp acupuncture (SA) may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to SAEM-CS- SA and electromagnetic convergence stimulation (SA and LF-rTMS simultaneously).
- Repetitive transcranial magnetic stimulation (rTMS) may be beneficial for improving motor function and performance of activities of daily living after stroke when compared to SAEM-CS- SA and electromagnetic convergence stimulation (SA and LF-rTMS simultaneously).
- Scalp acupuncture (SA) may not be beneficial for improving motor function after stroke when compared to Repetitive transcranial magnetic stimulation (rTMS).
- Electroacupuncture with Standard rehab may not be beneficial for improving range of motion after stroke when compared to Minimal acupuncture with Standard rehab.
- Different approaches to dry Needling may not have a difference in efficacy when compared with one another for improving motor function, stroke severity, and spasticity.
- Scalp acupuncture (SA) may be less beneficial than Repetitive transcranial magnetic stimulation (rTMS) for improving performance of activities of daily living after stroke.
- Acupuncture combined with other interventions may be beneficial for improving performance of activities of daily living after stroke when compared to conventional therapy; the literature is mixed regarding range of motion.

Summary of Key Points: Acupuncture

Intervention	Control(s)	Function domain(s)	Effect
Acupuncture	conventional therapy	Stroke severity, range of motion	+
Acupuncture	conventional therapy	Spasticity	–
Acupuncture	conventional therapy	Motor function, performance of activities of daily living	=
Contralateral acupuncture	conventional acupuncture	Stroke severity	+
Contralateral acupuncture	conventional acupuncture	Motor function, performance of activities of daily living	–
Acupuncture	sham	Stroke severity, muscle strength, spasticity, range of motion, performance of activities of daily living	–
Acupuncture	sham	Motor function	=
Acupuncture	One another (different approaches compared)	Motor function, muscle strength, spasticity, range of motion, performance of activities of daily living	+
Acupuncture	Physiotherapy Bobath	Motor function, performance of activities of daily living, stroke severity	–
Acupuncture	Acupuncture with Physiotherapy Bobath	Motor function, performance of activities of daily living, stroke severity	–
Physiotherapy Bobath	Acupuncture with Physiotherapy Bobath	Motor function, performance of activities of daily living, stroke severity	–

Acupuncture (aligned acupuncture at the muscle regions plus cutaneous needle therapy)	Piracetam Injection	Motor function, spasticity, range of motion, stroke severity	+
Acupuncture combined with other interventions	acupuncture	Performance of activities of daily living, spasticity	–
Acupuncture combined with other interventions	acupuncture	Range of motion	=
Dry Needling	One another (different approaches compared)	Motor function, stroke severity, spasticity	–
Dry Needling	sham	Motor function, performance of activities of daily living, dexterity	–
Dry Needling	sham	Spasticity, range of motion	=
Physiotherapy	Acupuncture	Motor function, performance of activities of daily living	–
Physiotherapy	Physiotherapy with Acupuncture	Motor function, performance of activities of daily living	–
Acupuncture	Physiotherapy with Acupuncture	Motor function, performance of activities of daily living	–
Dry Needling with Neurorehabilitation protocol (electrotherapy (functional electrical stimulation and hot pack) and stroke conventional exercise)	Sham-Needling with functional electrical stimulation with hot pack and Conventional exercise training	Motor function, dexterity, muscle strength	+
Dry Needling with Neurorehabilitation protocol (electrotherapy (functional electrical stimulation and hot pack) and stroke conventional exercise)	Sham-Needling with functional electrical stimulation with hot pack and Conventional exercise training	Spasticity	–
Dry Needling with exercise therapy	Exercise therapy	Motor function, spasticity	–
Dry Needling with exercise therapy	Exercise therapy	Range of motion	=
Low frequency repetitive transcranial magnetic stimulation with scalp acupuncture	Scalp Acupuncture	Motor function, performance of activities of daily living	+
Scalp cluster acupuncture with constraint-induced movement therapy	Body acupuncture with traditional rehabilitation	Motor function	+
Botox with dry needling and conventional rehab	Botox with conventionalrehab	Motor function, spasticity	+
Traditional Chinese medicine with Tuina treatment (massage techniques), Acupuncture kinesiotherapy and Basic stroke treatment	Basic stroke treatment with modern rehabilitation techniques	Performance of activities of daily living, spasticity	+
Acupuncture with individualized rehabilitation training	individualized rehabilitation training alone	Performance of activities of daily living	+
Dry Needling	conventional therapy	Spasticity	=
Dry needling	Dry needling	Spasticity, range of motion	–
Electroacupunture with acupuncture therapy	acupuncture therapy	Spasticity	+

Standard Acupuncture with Shixuan & Xiaohai acupoints with Functional training	Standard Acupuncture only with Functional training	Motor function, muscle strength	+
Acupuncture combined with other interventions	acupuncture	Motor function	+
Acupuncture combined with other interventions	conventional therapy	Performance of activities of daily living	+
Acupuncture combined with other interventions	conventional therapy	Range of motion	=
Scalp acupuncture (SA)	Conventional therapy	Motor function, performance of activities of daily living	–
Repetitive transcranial magnetic stimulation (rTMS)	Conventional therapy	Motor function, performance of activities of daily living	+
SAEM-CS- SA and electromagnetic convergence stimulation (SA and LF-rTMS simultaneously)	Conventional therapy	Motor function, performance of activities of daily living	–
Scalp acupuncture (SA)	SAEM-CS- SA and electromagnetic convergence stimulation (SA and LF-rTMS simultaneously)	Motor function, performance of activities of daily living	–
Repetitive transcranial magnetic stimulation (rTMS)	SAEM-CS- SA and electromagnetic convergence stimulation (SA and LF-rTMS simultaneously)	Motor function, performance of activities of daily living	+
Scalp acupuncture (SA)	Repetitive transcranial magnetic stimulation (rTMS)	Motor function, performance of activities of daily living	–
Electroacupuncture with Standard rehab	Minimal acupuncture with Standard rehab	Range of motion	–

Electroacupuncture and Transcutaneous Electrical Acupoint Stimulation



Adapted from: https://www.promotionhealthcare.com/electroacupuncture-treatment-pain-injuries/

A total of sixteen RCTs were found that evaluated electroacupuncture and transcutaneous electrical acupoint stimulation for upper extremity motor rehabilitation. Two RCTs compared electroacupuncture and transcutaneous electrical acupoint stimulation with sham (Wang et al. (2023a); Zhao et al. (2015a)). Four RCTs compared different approaches to electroacupuncture and transcutaneous electrical acupoint stimulation (Wu P. et al. (2024); Xia et al. (2023); Yao & Ouyang (2014); Chau et al. (2009)). Three RCTs compared electroacupuncture and transcutaneous electrical acupoint stimulation with conventional therapy (Au-Yeung et al. (2014b); Hsieh et al. (2007); Wong et al. (1999)). Two RCTs compared electroacupuncture and transcutaneous electrical acupoint stimulation combined with other interventions with strength training (Liu et al. (2008); Mukherjee et al. (2007)). Three RCTs compared

electroacupuncture and transcutaneous electrical acupoint stimulation combined with other interventions with acupuncture (Cui et al. (2014); Wang et al. (2014d); Moon et al. (2003)). One RCT compared electroacupuncture and transcutaneous electrical acupoint stimulation combined with other interventions with conventional therapy (Wen et al. (2014)). One RCT compared electroacupuncture and transcutaneous electrical acupoint stimulation combined with other interventions with electroacupuncture and transcutaneous electrical acupoint stimulation (Nguyen et al. (2023)).

In addition, 2 RCTs in which electroacupuncture and transcutaneous electrical acupoint stimulation formed part of a combined or comparative intervention are cross-referenced at the end of Table 45; their primary listings appear in other tables.

The methodological details and results of all sixteen RCTs are presented in Table 45.

Table 45. RCTs Evaluating Electroacupuncture and Transcutaneous Electrical Acupoint Stimulation for Upper Extremity Motor Rehabilitation

Authors (Year) **Study Design (PEDro Score)** **Sample Size start** **Sample Size end** **Time post stroke category** **Study design**	**Interventions** **Duration: Session length, frequency per week for total number of weeks**	**Outcome Measures** **Result (direction of effect)**
Electroacupuncture and transcutaneous electrical acupoint stimulation compared to sham		
Wang et al. (2023a) RCT (8) NStart=204 NEnd=196 TPS=Subacute A vs 0	E: Transcutaneous Electrical Acupoint Stimulation + Conventional therapy C: Sham Transcutaneous Electrical Acupoint Stimulation + Active conventional therapy Duration: 90 min/d (30 min transcutaneous electrical acupoint stimulation; 60 minutes conventional therapy); 5d/wk, 6wks	E vs C: FMA-UE (-) Manual Muscle Testing - Wrist extension (-) Wrist flexion (-) Modified Ashworth Scale (-) Lindmark Hand Function score (-) Barthel index (-)
Zhao et al. (2015a) RCT (8) NStart=60 NEnd=51 TPS=Subacute A1 vs A2 vs 0	E1: Transcutaneous electrical acupoint stimulation (TEAS) (100Hz) E2: Transcutaneous electrical acupoint stimulation (TEAS) (2Hz) C: Sham stimulation Duration: 0, 2, or 100Hz/d, 5d/wk for 4wk	E1 vs C: Modified Ashworth Scale (+exp) Disability Assessment Scale (-) Global Assessment Scale (-) Barthel Index (-) E2 vs C: Modified Ashworth Scale (+exp2) Disability Assessment Scale (-) Global Assessment Scale (-) Barthel Index (-) E1 vs E2: Modified Ashworth Scale (+exp) Disability Assessment Scale (-) Global Assessment Scale (-) Barthel Index (-)
Different approaches to electroacupuncture and transcutaneous electrical acupoint stimulation compared against one another		
Wu P. et al. (2024) RCT (7) NStart=39 NEnd=39 TPS=Acute A1 vs A2	E: ultrasound-guided electroacupuncture w/ conventional therapy C: electroacupuncture w/ conventional therapy Duration: 30min acupuncture + 1hr conventional/d, 7d/wk, 3wks	E vs C: Barthel Index (+exp) FMA (+exp) ARAT (+exp)

Xia et al. (2023) RCT (7) NStart=60 NEnd=57 TPS=Subacute A1 vs A2	E: Low-Frequency Acupoint Electrical Stimulation + Conventional Therapy C: Electroacupuncture Duration: 30min/d, 6d/wk, 3wks	E vs C: sEMG MAX/RMS (+exp) BRS (+exp) Modified ashworth scale (+exp) Lindmark Hand Function Score (+exp) Lovett muscle strength classification (+exp) Chinese Stroke Clinical Neurological Scale (+exp)
Yao & Ouyang (2014) RCT (5) NStart=68 NEnd=65 TPS=Subacute A1 vs A2	E: Electroacupuncture + Conventional rehab C: Electroacupuncture with ordinary needling technique + Conventional rehab Duration: 3d/wk, 2mo	E vs C: Fugl-Meyer Assessment (+exp) Neurological Function Defect Score (+exp)
Chau et al. (2009) RCT (4) NStart=23 NEnd=22 TPS=Acute A1 vs A2	E: Motor implicated acupuncture + Inpatient rehabilitation program C: Nonmotor-implicated acupunture + Inpatient rehabilitation program Duration: 30min/d, 3d/wk, for 8wks Acupunture	E vs C: Barthel's Index: (-) Fugl Meyer Upper Extremity: (-) Motricity Index: (-) Grip Power (-)
Electroacupuncture and transcutaneous electrical acupoint stimulation compared to conventional therapy		
Au-Yeung et al. (2014b) RCT (5) NStart=73 NEnd=60 TPS=Acute A vs 0	E1: Electroacupoint stimulation + conventional rehab E2: Sham stimulation + conventional rehab C: Conventional rehab Duration: 20Hz/d, 1h/d, 5d/wk for 4wk	E1 vs C: Hand Grip (+exp1) Index Pinch Grip Strength (+exp1) E2 vs C: Hand Grip (-) Index Pinch Grip Strength (-) Action Research Arm Test (-) E1 vs E2: Hand Grip (-) Index Pinch Grip Strength (-) Action Research Arm Test (-)
Hsieh et al. (2007) RCT (8) NStart=63 NEnd=63 TPS=Chronic A vs 0	E: Electroacupuncture + Conventional therapy C: Conventional therapy Duration: 20min/session, 2d/wk, 8sessions/mo	E vs C: FMA Total (+exp) Upper extremity (+exp) Wrist (+exp) Hand (+exp) Coordination and speed (+exp) FIM Total (-) Self-care (-) Social Cognition (+exp)
Wong et al. (1999) RCT (3) NStart=118 NEnd=118 TPS=Acute A vs 0	E: Electrical Acupuncture C: Conventional Rehabilitation Duration: 2h/d, 7d/wk, until discharge	E vs C: Brunnstrom Recovery Stages Admission (-) Discharge (+exp) Gain (+exp) Functional Independence Measure Admission (-) Discharge (+exp)

		Gain (+exp)
Electroacupuncture and transcutaneous electrical acupoint stimulation combined with other interventions compared to strength training		
Liu et al. (2008) Pilot RCT (4) NStart=10 NEnd=10 TPS=Chronic A + B vs A/B *Also in Table 3 (Exercise and Strength Training)*	E: Electroacupuncture + strength training C: Strength training Duration: 30min strength + 40min electroacupuncture, 2x/wk for 6wk	E vs C: Wrist extension AROM (no stats) Wrist strength (no stats) FMA (no stats) speed-dependent reflex torque
Mukherjee et al. (2007) RCT Crossover (3) NStart=7 NEnd=7 TPS=Chronic A + B vs A/B *Also in Table 3 (Exercise and Strength Training)*	E: Electroacupuncture + strength training C: Strength training Duration: 2Hz, 40min/d, 2d/wk for 6wk	E vs C: mAS (+exp) velocity ARST (no stats) segmented ARST (no stats) EMG of wrist flexors
Electroacupuncture and transcutaneous electrical acupoint stimulation combined with other interventions compared to acupuncture		
Cui et al. (2014) RCT (6) NStart=60 NEnd=60 TPS=Subacute A vs B	E: Electroacupuncture C: Accupuncture Duration: 1x/d, 6 sessions	E vs C: Elbow spasm (+exp) Clinical Spasticity Index (+exp) IEMG
Wang et al. (2014d) Pilot RCT (4) NStart=20 NEnd=15 TPS=Chronic A vs B *Also in Table 44 (Acupuncture)*	E: Electroacupuncture + Standard rehab C: Minimal acupuncture + Standard rehab Duration: 20min/d, 2d/wk for 6wk	E vs C: Dynamic component of spasticity (proportion of angle of muscle reaction/ passive range of motion) elbow (-) Wrist (-)
Moon et al. (2003) RCT (3) NStart=35 NEnd=35 TPS=Subacute A + B vs A + C vs A *Also in Table 47 (Traditional Herbal Medicine); Table 44 (Acupuncture)*	E1: Electroacupunture + Routine acupuncture therapy E2: Moxibustion + Routine acupuncture therapy C: Routine acupuncture therapy Duration: C: 30min/session, 1x/d routine acupuncture therapy, 15days; E1: 50Hz, 30min/d, 15days; E2: 3x/d, 15days	E1/E2 vs C: E1 vs E2/C: Modified Ashworth Scale (+exp1)
Electroacupuncture and transcutaneous electrical acupoint stimulation combined with other interventions compared to conventional therapy		
Wen et al. (2014) RCT (8) NStart=300 NEnd=300 TPS=Acute A + B vs 0 *Also in Table 47 (Traditional Herbal Medicine)*	E: Electroacupuncture + moxibustion C: Regular rehabilitation therapy Duration: 5-7d/wk for 4wk Electroacupuncture $ moxibustion	E vs C: Fugl-Meyer Assessment (-) modified rankin scale shoulder pain

Electroacupuncture and transcutaneous electrical acupoint stimulation combined with other interventions compared to electroacupuncture and transcutaneous electrical acupoint stimulation		
Nguyen et al. (2023) RCT (5) NStart=120 NEnd=120 TPS=Not Reported A + B vs A/B *Also in Table 3 (Exercise and Strength Training)*	E: Electroacupuncture + cycling C: Electroacupuncture Duration: E: 30min/d, 5d/wk cycling + 30min/d, 5d/wk for 6wks electroacupuncture C: 30min/d, 5d/wk for 6wks electroacupuncture	E vs C: Muscle strength grading quadriceps (+exp) tibialis anterior (+exp) deltoid (+exp) biceps (+exp) Modified Rankin Scale (+exp) Barthel Index (+exp) Orgogozo scale (+exp) EMG quadriceps (+exp) tibialis anterior (+exp) deltoid (+exp) biceps (+exp)
Cross-Referenced RCTs: Combined or Comparative Interventions Involving Electroacupuncture and Transcutaneous Electrical Acupoint Stimulation (results included in this table's levels of evidence)		
Hathaiareerug & Vearasilp (2019) RCT (7) NStart=18 NEnd=17 TPS=Subacute A vs B *Primary listing: Table 31 (Transcranial Direct Current Stimulation (tDCS))*	E1: Dual tDCS E2: Electroacupuncture Duration: 20min, 1x/wk, 3wks	E1 vs E2: Fugl-Meyer Assessment (-) Purdue Pegboard Test (-) Grip Strength (-)
Li et al. (2012) RCT (6) NStart=120 NEnd=120 TPS=Acute A + B vs 0 *Primary listing: Table 46 (Meridian Acupressure and Massage Therapy)*	E: Electroacupuncture + massage C: Conventional therapy Duration: E: 50min/d, 5d/wk for 6wks C: 40min/d, 5d/wk for 6wks	E vs C: Modified rankin scale (+exp) NRS-pain (+exp) stage of shoulder-hand syndrome (+exp) FMA UL (+exp) hand (-) mRS (+exp)

Abbreviations and table notes: C=control group; D=days; E=experimental group; H=hours; Min=minutes; RCT=randomized controlled trial; TPS=time post stroke category (Acute: less than 30 days, Subacute: more than 1 month but less than 6 months, Chronic: over 6 months); Wk=weeks.

+exp indicates a statistically significant between groups difference at α=0.05 in favour of the experimental group

+exp1/+exp2/+exp3 indicates a statistically significant between groups difference at α=0.05 in favour of the first, second or third experimental group

+con indicates a statistically significant between groups difference at α=0.05 in favour of the control group

- indicates no statistically significant between groups differences at α=0.05

1. Body Functions and Structures

MOTOR FUNCTION			
LoE	**Conclusion Statement**	**RCTs**	**References**
1b	Electroacupuncture and transcutaneous electrical acupoint stimulation may not have a difference in efficacy when compared to sham for improving motor function.	1	Wang et al. (2023a)
1a	Electroacupuncture and transcutaneous electrical acupoint stimulation: some approaches may produce greater improvements in motor function than others.	4	Wu P. et al. (2024); Xia et al. (2023); Yao & Ouyang (2014); Chau et al. (2009)

1b	Electroacupuncture and transcutaneous electrical acupoint stimulation may produce greater improvements in motor function than conventional therapy.	2	Au-Yeung et al. (2014b); Hsieh et al. (2007)
2	Electroacupoint stimulation with conventional rehab may not have a difference in efficacy when compared to Sham stimulation with conventional rehab for improving motor function.	1	Au-Yeung et al. (2014b)
1b	Electroacupuncture with moxibustion may not have a difference in efficacy when compared to Regular rehabilitation therapy for improving motor function.	1	Wen et al. (2014)
1b	Dual transcranial direct current stimulation may not have a difference in efficacy when compared to Electroacupuncture for improving motor function.	1	Hathaiareerug & Vearasilp (2019)
1b	There is conflicting evidence about the effect of Electroacupuncture with massage when compared to Conventional therapy for improving motor function.	1	Li et al. (2012)

STROKE SEVERITY			
LoE	**Conclusion Statement**	**RCTs**	**References**
1b	Electroacupuncture and transcutaneous electrical acupoint stimulation: some approaches may produce greater improvements in stroke severity than others.	2	Xia et al. (2023); Yao & Ouyang (2014)
2	Electroacupuncture and transcutaneous electrical acupoint stimulation may produce greater improvements in stroke severity than conventional therapy.	1	Wong et al. (1999)
2	Electroacupuncture with cycling may produce greater improvements in stroke severity than Electroacupuncture.	1	Nguyen et al. (2023)
1b	Electroacupuncture with massage may produce greater improvements in stroke severity than Conventional therapy.	1	Li et al. (2012)

MUSCLE STRENGTH			
LoE	**Conclusion Statement**	**RCTs**	**References**
1b	Electroacupuncture and transcutaneous electrical acupoint stimulation may not have a difference in efficacy when compared to sham for improving muscle strength.	1	Wang et al. (2023a)
1b	Different approaches to electroacupuncture and transcutaneous electrical acupoint stimulation may not have a difference in efficacy when compared with one another for improving muscle strength.	2	Xia et al. (2023); Chau et al. (2009)
2	There is conflicting evidence about the effect of Electroacupuncture and transcutaneous electrical acupoint stimulation when compared to conventional therapy for improving muscle strength.	1	Au-Yeung et al. (2014b)
2	Electroacupoint stimulation with conventional rehab may not have a difference in efficacy when compared to Sham stimulation with conventional rehab for improving muscle strength.	1	Au-Yeung et al. (2014b)
2	Electroacupuncture with cycling may produce greater improvements in muscle strength than Electroacupuncture.	1	Nguyen et al. (2023)
1b	Dual transcranial direct current stimulation may not have a difference in efficacy when compared to Electroacupuncture for improving muscle strength.	1	Hathaiareerug & Vearasilp (2019)

SPASTICITY			
LoE	**Conclusion Statement**	**RCTs**	**References**
1a	There is conflicting evidence about the effect of Electroacupuncture and transcutaneous electrical acupoint stimulation when compared to sham for improving spasticity.	2	Wang et al. (2023a); Zhao et al. (2015a)
1b	Transcutaneous electrical acupoint stimulation may produce greater improvements in spasticity than Transcutaneous electrical acupoint stimulation.	1	Zhao et al. (2015a)
1b	Electroacupuncture and transcutaneous electrical acupoint stimulation: some approaches may produce greater improvements in spasticity than others.	1	Xia et al. (2023)
2	Electroacupuncture with strength training may produce greater improvements in spasticity than Strength training.	1	Mukherjee et al. (2007)
1b	Electroacupunture with acupuncture therapy may produce greater improvements in spasticity than acupuncture therapy.	2	Cui et al. (2014); Moon et al. (2003)

RANGE OF MOTION			
LoE	**Conclusion Statement**	**RCTs**	**References**
2	Electroacupunture with acupuncture therapy may not have a difference in efficacy when compared to acupuncture therapy for improving range of motion.	1	Wang et al. (2014d)

2. Activities

ACTIVITIES OF DAILY LIVING			
LoE	**Conclusion Statement**	**RCTs**	**References**
1a	Electroacupuncture and transcutaneous electrical acupoint stimulation may not have a difference in efficacy when compared to sham for improving performance of activities of daily living.	2	Wang et al. (2023a); Zhao et al. (2015a)
1b	Transcutaneous electrical acupoint stimulation may not have a difference in efficacy when compared to Transcutaneous electrical acupoint stimulation for improving performance of activities of daily living.	1	Zhao et al. (2015a)
1b	Electroacupuncture and transcutaneous electrical acupoint stimulation: some approaches may produce greater improvements in performance of activities of daily living than others.	2	Wu P. et al. (2024); Chau et al. (2009)
1b	There is conflicting evidence about the effect of Electroacupuncture and transcutaneous electrical acupoint stimulation when compared to conventional therapy for improving performance of activities of daily living.	2	Hsieh et al. (2007); Wong et al. (1999)
2	Electroacupuncture with cycling may produce greater improvements in performance of activities of daily living than Electroacupuncture.	1	Nguyen et al. (2023)

DEXTERITY			
LoE	**Conclusion Statement**	**RCTs**	**References**
1b	Dual transcranial direct current stimulation may not have a difference in efficacy when compared to Electroacupuncture for improving dexterity.	1	Hathaiareerug & Vearasilp (2019)

Key Points

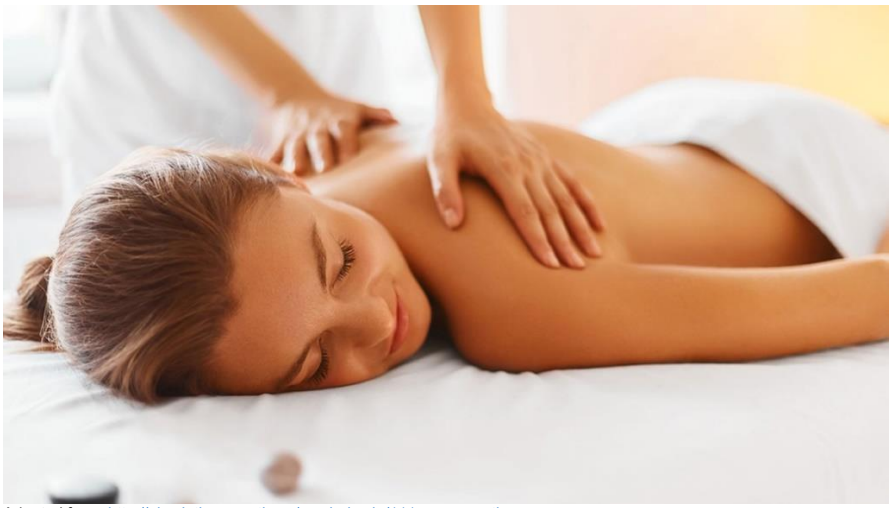
- Electroacupuncture and transcutaneous electrical acupoint stimulation may not be beneficial for improving motor function, muscle strength, and performance of activities of daily living after stroke when compared to sham; the literature is mixed regarding spasticity.
- Electroacupuncture and transcutaneous electrical acupoint stimulation may be beneficial for improving motor function and stroke severity after stroke when compared to conventional therapy; the literature is mixed regarding performance of activities of daily living and muscle strength.
- Electroacupoint stimulation with conventional rehab may not be beneficial for improving motor function and muscle strength after stroke when compared to Sham stimulation with conventional rehab.
- Electroacupuncture with moxibustion may not be beneficial for improving motor function after stroke when compared to Regular rehabilitation therapy.
- Dual transcranial direct current stimulation may not be beneficial for improving motor function, dexterity, and muscle strength after stroke when compared to Electroacupuncture.
- Electroacupuncture with massage may be beneficial for improving stroke severity after stroke when compared to Conventional therapy; the literature is mixed regarding motor function.
- Transcutaneous electrical acupoint stimulation may be beneficial for improving spasticity, but not performance of activities of daily living, after stroke when compared to Transcutaneous electrical acupoint stimulation.
- Electroacupuncture with cycling may be beneficial for improving performance of activities of daily living, stroke severity, and muscle strength after stroke when compared to Electroacupuncture.
- Electroacupuncture with strength training may be beneficial for improving spasticity after stroke when compared to Strength training.
- Electroacupunture with acupuncture therapy may be beneficial for improving spasticity, but not range of motion, after stroke when compared to acupuncture therapy.
- Electroacupuncture and transcutaneous electrical acupoint stimulation: some approaches may be more beneficial than others for improving motor function, stroke severity, spasticity, and performance of activities of daily living; different approaches to Electroacupuncture and transcutaneous electrical acupoint stimulation may not have a difference in efficacy when compared with one another for improving muscle strength.

Summary of Key Points: Electroacupuncture and Transcutaneous Electrical Acupoint Stimulation

Intervention	Control(s)	Function domain(s)	Effect
Electroacupuncture and transcutaneous electrical acupoint stimulation	sham	Motor function, muscle strength, performance of activities of daily living	–
Electroacupuncture and transcutaneous electrical acupoint stimulation	sham	Spasticity	=
Electroacupuncture and transcutaneous electrical acupoint stimulation	One another (different approaches compared)	Motor function, stroke severity, spasticity, performance of activities of daily living	+
Electroacupuncture and transcutaneous electrical acupoint stimulation	conventional therapy	Motor function, stroke severity	+
Electroacupuncture and transcutaneous electrical acupoint stimulation	conventional therapy	Performance of activities of daily living, muscle strength	=
Electroacupoint stimulation with conventional rehab	Sham stimulation with conventional rehab	Motor function, muscle strength	–
Electroacupuncture with moxibustion	Regular rehabilitation therapy	Motor function	–
Dual transcranial direct current stimulation	Electroacupuncture	Motor function, dexterity, muscle strength	–

Electroacupuncture with massage	Conventional therapy	Stroke severity	+
Electroacupuncture with massage	Conventional therapy	Motor function	=
Transcutaneous electrical acupoint stimulation	Transcutaneous electrical acupoint stimulation	Spasticity	+
Transcutaneous electrical acupoint stimulation	Transcutaneous electrical acupoint stimulation	Performance of activities of daily living	−
Electroacupuncture with cycling	Electroacupuncture	Performance of activities of daily living, stroke severity, muscle strength	+
Electroacupuncture with strength training	Strength training	Spasticity	+
Electroacupunture with acupuncture therapy	acupuncture therapy	Spasticity	+
Electroacupunture with acupuncture therapy	acupuncture therapy	Range of motion	−
Electroacupuncture and transcutaneous electrical acupoint stimulation	One another (different approaches compared)	Muscle strength	−

Meridian Acupressure and Massage Therapy



Adapted from: http://physiotherapeutic.ca/servi-physio/111-massage-therapy

A total of ten RCTs were found that evaluated meridian acupressure and massage therapy for upper extremity motor rehabilitation. One RCT compared meridian acupressure and massage therapy combined with other interventions with traditional herbal medicines (Zarnigar et al. (2012)). Five RCTs compared meridian acupressure and massage therapy with conventional therapy (Wang et al. (2019b); Di et al. (2017); Thanakiatpinyo et al. (2014); Kang et al. (2009); Mok et al. (2004)). Three RCTs compared meridian acupressure and massage therapy combined with other interventions with conventional therapy (Yang et al. (2017); Yue et al. (2013); Li et al. (2012)). One RCT compared different approaches to meridian acupressure and massage therapy (Shin et al. (2007)).

In addition, 3 RCTs in which meridian acupressure and massage therapy formed part of a combined or comparative intervention are cross-referenced at the end of Table 46; their primary listings appear in other tables.

The methodological details and results of all ten RCTs are presented in Table 46.

Table 46. RCTs Evaluating Meridian Acupressure and Massage Therapy for Upper Extremity Motor Rehabilitation

Authors (Year) Study Design (PEDro Score) Sample Size start Sample Size end Time post stroke category Study design	Interventions Duration: Session length, frequency per week for total number of weeks	Outcome Measures Result (direction of effect)
Meridian acupressure and massage therapy combined with other interventions compared to traditional herbal medicines		
Zarnigar et al. (2012) RCT (4) NStart=101 NEnd=60 TPS=Not Reported A vs B vs C *Also in Table 47 (Traditional Herbal Medicine); Table 3 (Exercise and Strength Training)*	E1: Massage E2: Tailored exercise (physical therapy regimen) C: Traditional medicine (Conventional unani drug therapy (Munzij, Mushil, Muaqwwi Aasab)) Duration: E: 45min/d, 1x/alternate day, 8wks; C: 2x/d, 15d munzij, alternate days for 1 wk mushil. 2x/d, 5wks muqawwi aasab	E1/E2 vs C: Fugl-Meyer Assessment (+exp1/2) Functional Independence Measure (+exp1/2) Independent walking ability (+exp2)
Meridian acupressure and massage therapy compared to conventional therapy		
Wang et al. (2019b) RCT (7) NStart=444 NEnd=397 TPS=Subacute A vs 0	E: Tui Na treatment + conventional rehabilitation C: Conventional rehabilitation Duration: 2.5 hr, 5d/wk, 4wk, CT & 40min, 5d/wk, 4wk, Tui Na	E vs C: Stats at 4wk time point for those treated 1-3mo after stroke Modified Ashworth Scale elbow flexors muscle (-) wrist flexors muscle (+exp) finger flexors muscle (+exp) Fugle-Meyer assessment (+exp) upper limb score (+exp) Modified Barthel Index (-) Stats at 4wk time point for those treated 4-6mo after stroke Modified Ashworth Scale elbow flexors muscle (+exp) wrist flexors muscle (-) finger flexors muscle (-) Fugle-Meyer assessment (-) upper limb score (-) Modified Barthel Index (-) Stats at 4wk time point for those treated 7-12mo after stroke: Modified Ashworth Scale elbow flexors muscle (-) wrist flexors muscle (-) finger flexors muscle (-) Fugle-Meyer assessment (-) upper limb score (-) Modified Barthel Index (-)
Di et al. (2017) RCT (5) NStart=150 NEnd=150 TPS=Subacute	E: Tuina Therapy C: Conventional therapy Duration: E: 30min/d, 3wk; C: 20min/d, 3wks	E vs C: Modified Ashworth Scale (+exp) Neurological Impairment Scale (+exp)

A vs 0		
Thanakiatpinyo et al. (2014) RCT (8) NStart=50 NEnd=45 TPS=Chronic A vs 0	E: Thai massage C: Conventional Physical therapy Duration: 30min/d, 2d/wk for 6wk	E vs C: Modified Ashworth Scale (-) Barthel Index (-) HADS Pictorial Thai QoL
Kang et al. (2009) RCT (5) NStart=56 NEnd=56 TPS=Acute A vs 0	E: Meridian accupressure C: Routine care Duration: 10min/d, 7d/wk for 2wk	E vs C: ADL scale by Kang (+exp) Depression 6 face rating scale (+exp) Grip power (+exp) Self reported pain score (+exp) Edema (+exp) Passive ROM- wrist flexion (+exp) wrist extension (+exp) elbow flexion (+exp) shoulder flexion (+exp) shoulder extension (+exp)
Mok et al. (2004) RCT (5) NStart=118 NEnd=102 TPS=Not Reported A vs 0	E: Slow stroke back massage + Routine nursing care C: Routine nursing care Duration: 10min/d, 7d	E vs C: Pain VAS-shoulder (+exp) heart rate (+exp) blood pressure (+exp) Strait-Tait anxiety inventory (+exp)
Meridian acupressure and massage therapy combined with other interventions compared to conventional therapy		
Yang et al. (2017) RCT (9) NStart=90 NEnd=79 TPS=Subacute A vs 0	E: Tui Na chinese massage therapy + conventional rehabilitation C: Placebo+ conventional rehabilitation Duration: 20-25min/d, 5d/wk for 4wk+ 80min/d conventional rehab	E vs C: FMA(-) Modified Barthel Index(-) mAS elbow flexor (+exp) forearm pronator (-) wrist flexor (+exp) finger flexor (-) hip flexor (-) hip adductor (-) knee flexor (+exp) knee extensor (+exp) ankle plantar flexor (-) ankle varusor (-)
Yue et al. (2013) RCT (6) NStart=78 NEnd=69 TPS=Acute A vs 0	E: Nurse-led acupressure + usual care C: Usual therapy Duration: 30min/d, 7d/wk, 4wk followed by 30min/d, 1d/wk, 8wks	E vs C: FMA(+exp) mBI(+exp)
Li et al. (2012) RCT (6) NStart=120 NEnd=120 TPS=Acute A + B vs 0	E: Electroacupuncture + massage C: Conventional therapy Duration: E: 50min/d, 5d/wk for 6wks C: 40min/d, 5d/wk for 6wks	E vs C: Modified rankin scale (+exp) NRS-pain (+exp) stage of shoulder-hand syndrome (+exp) FMA UL (+exp)

Also in Table 45 (Electroacupuncture and Transcutaneous Electrical Acupoint Stimulation)		hand (-) mRS (+exp)
Different approaches to meridian acupressure and massage therapy compared against one another		
Shin et al. (2007) Pilot RCT (6) NStart=30 NEnd=30 TPS=Acute A1 vs A2	E: aromatherapy acupressure C: acupressure Duration: 20min, 2x/d, 2wk	E vs C: Verbal Pain Rating System (+exp) Motor Power (-)
Cross-Referenced RCTs: Combined or Comparative Interventions Involving Meridian Acupressure and Massage Therapy (results included in this table's levels of evidence)		
Sun et al. (2024) RCT (8) NStart=100 NEnd=100 TPS=Not Reported A + B + C vs A/A + B *Primary listing: Table 24 (Thermal Stimulation)*	E: Vibrational heated pressure therapy + Meridian dredging exercise + conventional rehab C: meridian dredging exercise + conventional treatment Duration: 30min/d, 3d/wk, 4wks	E vs C: MAS (+exp) FMA UE (+exp) LE (+exp) BI (+exp) SSQOL (+exp)
Zhu et al. (2023) RCT (6) NStart=347 NEnd=321 TPS=Not Reported A + B vs C *Primary listing: Table 47 (Traditional Herbal Medicine)*	E: Traditional Chinese medicine + Tuina treatment + Acupuncture + standard therapy C: Kinesiotherapy exercises + standard therapy Duration: E: 6hr/d, 5d/wk for 4wks; C: 30min/d 5d/wk for 4wks	E vs C: Modified Ashworth Scale elbow extension (+exp) knee flexion (+exp) Modified Barthel Index (+exp) Stroke Specific Quality of Life Scale (+exp)
O'Brien et al. (2011) RCT (4) NStart=10 NEnd=10 TPS=Subacute A + B vs A + C *Primary listing: Table 11 (Mental Practice)*	E: Kinaesthetic Motor Imagery + Task specific training (Grasp) C: Relaxation + Task Specific Training (Grasp) Duration: 3 sessions	E vs C: Grasp Movement Time (-) Magnitude of extension of index finger (+exp) Angular displacement of proximal phalageal joints (+exp) Angular displacement of metacarpophalangeal joints (+exp)

Abbreviations and table notes: C=control group; D=days; E=experimental group; H=hours; Min=minutes; RCT=randomized controlled trial; TPS=time post stroke category (Acute: less than 30 days, Subacute: more than 1 month but less than 6 months, Chronic: over 6 months); Wk=weeks.

+exp indicates a statistically significant between groups difference at α=0.05 in favour of the experimental group

+exp1/+exp2/+exp3 indicates a statistically significant between groups difference at α=0.05 in favour of the first, second or third experimental group

+con indicates a statistically significant between groups difference at α=0.05 in favour of the control group

- indicates no statistically significant between groups differences at α=0.05

1. Body Functions and Structures

MOTOR FUNCTION			
LoE	**Conclusion Statement**	**RCTs**	**References**
2	Massage may produce greater improvements in motor function than Traditional medicine (Conventional unani drug therapy (Munzij, Mushil, Muaqwwi Aasab)).	1	Zarnigar et al. (2012)

1b	There is conflicting evidence about the effect of Electroacupuncture with massage when compared to Conventional therapy for improving motor function.	1	Li et al. (2012)
1b	Vibrational heated pressure therapy with Meridian dredging exercise and conventional rehab may produce greater improvements in motor function than meridian dredging exercise with conventional treatment.	1	Sun et al. (2024)
1b	Tui Na Chinese massage therapy with conventional rehabilitation may not have a difference in efficacy when compared to sham with conventional rehabilitation for improving motor function.	1	Yang et al. (2017)
1b	Nurse-led acupressure with usual care may produce greater improvements in motor function than usual care alone.	1	Yue et al. (2013)

STROKE SEVERITY			
LoE	**Conclusion Statement**	**RCTs**	**References**
1b	Electroacupuncture with massage may produce greater improvements in stroke severity than Conventional therapy.	1	Li et al. (2012)
2	Meridian acupressure and massage therapy may produce greater improvements in stroke severity than conventional therapy.	1	Di et al. (2017)

MUSCLE STRENGTH			
LoE	**Conclusion Statement**	**RCTs**	**References**
2	Meridian acupressure and massage therapy may produce greater improvements in muscle strength than conventional therapy.	1	Kang et al. (2009)

SPASTICITY			
LoE	**Conclusion Statement**	**RCTs**	**References**
1a	Meridian acupressure and massage therapy may not have a difference in efficacy when compared to conventional therapy for improving spasticity.	3	Wang et al. (2019b); Di et al. (2017); Thanakiatpinyo et al. (2014)
1b	Vibrational heated pressure therapy with Meridian dredging exercise and conventional rehab may produce greater improvements in spasticity than meridian dredging exercise with conventional treatment.	1	Sun et al. (2024)
1b	Tui Na Chinese massage therapy with conventional rehabilitation may not have a difference in efficacy when compared to sham with conventional rehabilitation for improving spasticity.	1	Yang et al. (2017)
1b	Traditional Chinese medicine with Tuina treatment, Acupuncture and standard therapy may produce greater improvements in spasticity than Kinesiotherapy exercises with standard therapy.	1	Zhu et al. (2023)

RANGE OF MOTION			
LoE	**Conclusion Statement**	**RCTs**	**References**
2	Meridian acupressure and massage therapy may produce greater improvements in range of motion than conventional therapy.	1	Kang et al. (2009)

2. Activities

ACTIVITIES OF DAILY LIVING			
LoE	**Conclusion Statement**	**RCTs**	**References**
2	Massage may produce greater improvements in performance of activities of daily living than Traditional medicine (Conventional unani drug therapy (Munzij, Mushil, Muaqwwi Aasab)).	1	Zarnigar et al. (2012)
1a	Meridian acupressure and massage therapy may not have a difference in efficacy when compared to conventional therapy for improving performance of activities of daily living.	3	Wang et al. (2019b); Thanakiatpinyo et al. (2014); Kang et al. (2009)
1b	Vibrational heated pressure therapy with Meridian dredging exercise and conventional rehab may produce greater improvements in performance of activities of daily living than meridian dredging exercise with conventional treatment.	1	Sun et al. (2024)
1b	Tui Na Chinese massage therapy with conventional rehabilitation may not have a difference in efficacy when compared to sham with conventional rehabilitation for improving performance of activities of daily living.	1	Yang et al. (2017)
1b	Nurse-led acupressure with usual care may produce greater improvements in performance of activities of daily living than usual care alone.	1	Yue et al. (2013)
1b	Traditional Chinese medicine with Tuina treatment, Acupuncture and standard therapy may produce greater improvements in performance of activities of daily living than Kinesiotherapy exercises with standard therapy.	1	Zhu et al. (2023)

Key Points

- Massage may be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Traditional medicine (Conventional unani drug therapy (Munzij, Mushil, Muaqwwi Aasab)).
- Electroacupuncture with massage may be beneficial for improving stroke severity after stroke when compared to Conventional therapy; the literature is mixed regarding motor function.
- Vibrational heated pressure therapy with Meridian dredging exercise and conventional rehab may be beneficial for improving motor function, performance of activities of daily living, and spasticity after stroke when compared to meridian dredging exercise with conventional treatment.
- Tui Na Chinese massage therapy with conventional rehabilitation may not be beneficial for improving motor function, spasticity, and performance of activities of daily living after stroke when compared to sham with conventional rehabilitation.
- Nurse-led acupressure with usual care may be beneficial for improving motor function and performance of activities of daily living after stroke when compared to usual care alone.
- Meridian acupressure and massage therapy may be beneficial for improving stroke severity, muscle strength, and range of motion, but not spasticity and performance of activities of daily living, after stroke when compared to conventional therapy.
- Traditional Chinese medicine with Tuina treatment, Acupuncture and standard therapy may be beneficial for improving spasticity and performance of activities of daily living after stroke when compared to Kinesiotherapy exercises with standard therapy.

Summary of Key Points: Meridian Acupressure and Massage Therapy

Intervention	Control(s)	Function domain(s)	Effect
Massage	Traditional medicine (Conventional unani drug therapy	Motor function, performance of activities of daily living	+

	(Munzij, Mushil, Muaqwwi Aasab))		
Electroacupuncture with massage	Conventional therapy	Stroke severity	+
Electroacupuncture with massage	Conventional therapy	Motor function	=
Vibrational heated pressure therapy with Meridian dredging exercise and conventional rehab	meridian dredging exercise with conventional treatment	Motor function, performance of activities of daily living, spasticity	+
Tui Na Chinese massage therapy with conventional rehabilitation	sham with conventional rehabilitation	Motor function, spasticity, performance of activities of daily living	−
Nurse-led acupressure with usual care	usual care alone	Motor function, performance of activities of daily living	+
Meridian acupressure and massage therapy	conventional therapy	Stroke severity, muscle strength, range of motion	+
Meridian acupressure and massage therapy	conventional therapy	Spasticity, performance of activities of daily living	−
Traditional Chinese medicine with Tuina treatment, Acupuncture and standard therapy	Kinesiotherapy exercises with standard therapy	Spasticity, performance of activities of daily living	+

Traditional Herbal Medicine



Adapted from: https://drmeelainling.com/herbs-diet/

Traditional herbal medicines, largely drawn from traditional Chinese and Unani medicine, have been investigated as adjuncts to conventional rehabilitation for upper limb motor recovery after stroke.

A total of nine RCTs were found that evaluated traditional herbal medicine for upper extremity motor rehabilitation. One RCT compared traditional herbal medicines combined with other interventions with nootropics (Ahmed et al. (2015)). Three RCTs compared traditional herbal medicines with conventional therapy (Wang et al. (2020b); Wei et al. (2016); Zhu et al. (2014)). Four RCTs compared traditional herbal medicines with sham (Yu et al. (2015); Seo et al. (2013); He et al. (2011); Kong et al. (2009)). One RCT compared traditional herbal medicines combined with other interventions with exercise and custom physiotherapy protocols (Zhu et al. (2023)).

In addition, 4 RCTs in which traditional herbal medicine formed part of a combined or comparative intervention are cross-referenced at the end of Table 47; their primary listings appear in other tables.

The methodological details and results of all nine RCTs are presented in Table 47.

Table 47. RCTs Evaluating Traditional Herbal Medicine for Upper Extremity Motor Rehabilitation

Authors (Year) **Study Design (PEDro Score)** **Sample Size start** **Sample Size end** **Time post stroke category** **Study design**	**Interventions** **Duration: Session length, frequency per week for total number of weeks**	**Outcome Measures** **Result (direction of effect)**
Traditional herbal medicines combined with other interventions compared to nootropics		
Ahmed et al. (2015) RCT (6) NStart=40 NEnd=40 TPS=Not Reported A vs B *Also in Table 43 (Other Pharmacological and Medical Interventions)*	E: Traditional medicines and massage C: Piracetam (800mg) + usual post stroke meds (Lisinopril (2.5mg) + Aspirin (5mg)) Duration: 1x/d administration of exp drugs, 2x/d administration of con drugs	E vs C: Stroke Rehabilitation Assessment of Movement Upper Limb (+exp)
Traditional herbal medicines compared to conventional therapy		
Wang et al. (2020b) RCT (7) NStart=444 NEnd=403 TPS=Subacute A vs 0	E: Tibetan medicated bathing therapy + conventional rehabilitation C: Conventional rehabilitation Duration: 1hr/d, 5d/wk, 4wk intervention& 2.5 hr/session CT	E vs C: Modified Ashworth Scale Elbow flexors muscle (+exp) Wrist flexors muscle (+exp) Finger flexors muscle (-) Fugl-Meyer Assessment (+exp) LE (-) upper limb (+exp) Modified Barthel Index (+exp)
Wei et al. (2016) RCT (5) NStart=84 NEnd=84 TPS=Subacute A vs 0	E: moxibustion (injected to acupoints)+ rehabilitation training C: rehabilitation training Duration: E: 25-30min/d moxibustion + 45min/d rehabilitation training, 5d/wk for 4wks C: 45min/d, 5d/wk for 4wks	E vs C: modified Ashworth scale (+exp) Clinical Spasticity Index (+exp) Fugl-Meyer Motor Scale (+exp) Patient Reported Outcomes (+exp) Barthel Index (+exp) Brunnstrom Recovery Stages UL (-) LL (-) hand function (+exp)
Zhu et al. (2014) RCT (6) NStart=60 NEnd=60 TPS=Acute A vs 0	E: Total Glucosides form Shaoyao Gancao decoction (Chinese Medicines) C: Conventional Therapy Duration: 30min/d, 6d/wk, 4wks con and exp, 10mL glucosides 3x/d postprandial and muscle rubbing using glucosides 4x/d for 4wks	E vs C: Ashworth Scale (+exp) Barthel Index Upper Limb (-) Lower Limb (+exp) Fugl Meyer Assessment -Upper Limb (-) Lower Limb (+exp) Integrated electro-myography Biceps (+exp) Tibialis Anterior (+exp) Gastrocnemius (+exp) Root Mean Square Biceps (+exp) Tibialis Anterior (+exp)

		Gastrocnemius (+exp)
Traditional herbal medicines compared to sham		
Yu et al. (2015) RCT (6) NStart=100 NEnd=87 TPS=Acute A vs 0	E: Traditional herbal medicine C: Placebo Duration: 12wk	E vs C: Fugl-Meyer Assessment (+exp) Barthel Index (+exp)
Seo et al. (2013) RCT (6) NStart=29 NEnd=24 TPS=Subacute A vs 0	E: Ouhyul herbal acupuncture point injection C: saline acupuncture point injection Duration: 3x/wk, 2wk	E vs C: Numerical rating scale-Pain (+exp) Passive range of motion-external shoulder rotation (-) Fugl-Meyer Assessment (+exp) McGill Pain questionnaire short form
He et al. (2011) RCT (9) NStart=140 NEnd=137 TPS=Acute A vs 0	E: Sanchi-tongshu (200mg Radix/Rhizoma Notoginseng extract) C: Placebo Duration: 1, 200mg capsule of placebo or Sanchi-tongshu, TID, 28d	E vs C: European Stroke Scale (+exp) Proximal muscle force of the upper limbs when maintaining straight in an angle of 45 from the bed (+exp) Proximal muscle force of the upper limbs when maintaining straight in an angle of 90 from the bed (+exp) Wrist Straightening (+exp) Finger Flexion (+exp) Barthel Index (+exp)
Kong et al. (2009) Pilot RCT (6) NStart=40 NEnd=32 TPS=Acute A vs 0	E: NeuroAid (MLC 601) (herbal supplement) C: Placebo capsule Duration: 4 capsules 3xd for 4wks	E vs C: FMA (-) NIHSS (-) FIM (-)
Traditional herbal medicines combined with other interventions compared to exercise and custom physiotherapy protocols		
Zhu et al. (2023) RCT (6) NStart=347 NEnd=321 TPS=Not Reported A + B vs C *Also in Table 44 (Acupuncture); Table 3 (Exercise and Strength Training); Table 46 (Meridian Acupressure and Massage Therapy)*	E: Traditional Chinese medicine + Tuina treatment + Acupuncture + standard therapy C: Kinesiotherapy exercises + standard therapy Duration: E: 6hr/d, 5d/wk for 4wks; C: 30min/d 5d/wk for 4wks	E vs C: Modified Ashworth Scale elbow extension (+exp) knee flexion (+exp) Modified Barthel Index (+exp) Stroke Specific Quality of Life Scale (+exp)
Cross-Referenced RCTs: Combined or Comparative Interventions Involving Traditional Herbal Medicine (results included in this table's levels of evidence)		
Li et al. (2024b) RCT (5) NStart=105 NEnd=105 TPS=Subacute A + B vs A/B vs 0 *Primary listing: Table 44 (Acupuncture)*	E1: Acupuncture + traditional Chinese herb hot compress + Conventional rehabilitation E2: Acupuncture + Conventional rehabilitation C: Conventional rehabilitation Duration: 30min/d, 5d/wk for 4wks conventional rehabilitation + 30min/d,	E1/E2 vs C: VAS-pain (no between-group stat) FMA-UE (no between-group stat) ADL Scale (no between-group stat) Shoulder-hand syndrome assessment scale (SHSS) (no between-group stat) shoulder joint movement angle (no between-group stat)

	5d/wk for 4wks acupuncture + 20min/d, 5d/wk for 4wks hot compress	
Wen et al. (2014) RCT (8) NStart=300 NEnd=300 TPS=Acute A + B vs 0 *Primary listing: Table 45 (Electroacupuncture and Transcutaneous Electrical Acupoint Stimulation)*	E: Electroacupuncture + moxibustion C: Regular rehabilitation therapy Duration: 5-7d/wk for 4wk Electroacupuncture $ moxibustion	E vs C: Fugl-Meyer Assessment (-) modified rankin scale shoulder pain
Zarnigar et al. (2012) RCT (4) NStart=101 NEnd=60 TPS=Not Reported A vs B vs C *Primary listing: Table 46 (Meridian Acupressure and Massage Therapy)*	E1: Massage E2: Tailored exercise (physical therapy regimen) C: Traditional medicine (Conventional unani drug therapy (Munzij, Mushil, Muaqwwi Aasab)) Duration: E: 45min/d, 1x/alternate day, 8wks; C: 2x/d, 15d munzij, alternate days for 1 wk mushil. 2x/d, 5wks muqawwi aasab	E1/E2 vs C: Fugl-Meyer Assessment (+exp1/2) Functional Independence Measure (+exp1/2) Independent walking ability (+exp2)
Moon et al. (2003) RCT (3) NStart=35 NEnd=35 TPS=Subacute A + B vs A + C vs A *Primary listing: Table 45 (Electroacupuncture and Transcutaneous Electrical Acupoint Stimulation)*	E1: Electroacupunture + Routine acupuncture therapy E2: Moxibustion + Routine acupuncture therapy C: Routine acupuncture therapy Duration: C: 30min/session, 1x/d routine acupuncture therapy, 15days; E1: 50Hz, 30min/d, 15days; E2: 3x/d, 15days	E1/E2 vs C: E1 vs E2/C: Modified Ashworth Scale (+exp1)

Abbreviations and table notes: C=control group; D=days; E=experimental group; H=hours; Min=minutes; RCT=randomized controlled trial; TPS=time post stroke category (Acute: less than 30 days, Subacute: more than 1 month but less than 6 months, Chronic: over 6 months); Wk=weeks.

+exp indicates a statistically significant between groups difference at α=0.05 in favour of the experimental group

+exp1/+exp2/+exp3 indicates a statistically significant between groups difference at α=0.05 in favour of the first, second or third experimental group

+con indicates a statistically significant between groups difference at α=0.05 in favour of the control group

- indicates no statistically significant between groups differences at α=0.05

1. Body Functions and Structures

MOTOR FUNCTION			
LoE	**Conclusion Statement**	**RCTs**	**References**
1b	Traditional medicines and massage may produce greater improvements in motor function than piracetam with usual post-stroke medications.	1	Ahmed et al. (2015)
1a	Traditional herbal medicines may produce greater improvements in motor function than conventional therapy.	3	Wang et al. (2020b); Wei et al. (2016); Zhu et al. (2014)
1a	Traditional herbal medicines may produce greater improvements in motor function than sham.	3	Yu et al. (2015); Seo et al. (2013); Kong et al. (2009)
2	Massage may produce greater improvements in motor function than Traditional medicine (Conventional unani drug therapy (Munzij, Mushil, Muaqwwi Aasab)).	1	Zarnigar et al. (2012)

1b	Electroacupuncture with moxibustion may not have a difference in efficacy when compared to Regular rehabilitation therapy for improving motor function.	1	Wen et al. (2014)

STROKE SEVERITY			
LoE	**Conclusion Statement**	**RCTs**	**References**
2	Traditional herbal medicines may not have a difference in efficacy when compared to conventional therapy for improving stroke severity.	1	Wei et al. (2016)
1a	There is conflicting evidence about the effect of Traditional herbal medicines when compared to sham for improving stroke severity.	2	He et al. (2011); Kong et al. (2009)

SPASTICITY			
LoE	**Conclusion Statement**	**RCTs**	**References**
1a	Traditional herbal medicines may produce greater improvements in spasticity than conventional therapy.	3	Wang et al. (2020b); Wei et al. (2016); Zhu et al. (2014)
1b	Traditional Chinese medicine with Tuina treatment (massage techniques), Acupuncture kinesiotherapy and Basic stroke treatment may produce greater improvements in spasticity than Basic stroke treatment with modern rehabilitation techniques.	1	Zhu et al. (2023)
2	Electroacupunture with acupuncture therapy may produce greater improvements in spasticity than acupuncture therapy.	1	Moon et al. (2003)

RANGE OF MOTION			
LoE	**Conclusion Statement**	**RCTs**	**References**
1b	Traditional herbal medicines may not have a difference in efficacy when compared to sham for improving range of motion.	1	Seo et al. (2013)

2. Activities

ACTIVITIES OF DAILY LIVING			
LoE	**Conclusion Statement**	**RCTs**	**References**
1a	Traditional herbal medicines may produce greater improvements in performance of activities of daily living than conventional therapy.	3	Wang et al. (2020b); Wei et al. (2016); Zhu et al. (2014)
1a	Traditional herbal medicines may produce greater improvements in performance of activities of daily living than sham.	3	Yu et al. (2015); He et al. (2011); Kong et al. (2009)
1b	Traditional Chinese medicine with Tuina treatment (massage techniques), Acupuncture kinesiotherapy and Basic stroke treatment may produce greater improvements in performance of activities of daily living than Basic stroke treatment with modern rehabilitation techniques.	1	Zhu et al. (2023)
2	Massage may produce greater improvements in performance of activities of daily living than Traditional medicine (Conventional unani drug therapy (Munzij, Mushil, Muaqwwi Aasab)).	1	Zarnigar et al. (2012)

Key Points

- Traditional medicines and massage may be beneficial for improving motor function after stroke when compared to piracetam with usual post-stroke medications.

- Traditional herbal medicines may be beneficial for improving motor function, performance of activities of daily living, and spasticity, but not stroke severity, after stroke when compared to conventional therapy.
- Traditional herbal medicines may be beneficial for improving motor function and performance of activities of daily living, but not range of motion, after stroke when compared to sham; the literature is mixed regarding stroke severity.
- Massage may be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Traditional medicine (Conventional unani drug therapy (Munzij, Mushil, Muaqwwi Aasab)).
- Electroacupuncture with moxibustion may not be beneficial for improving motor function after stroke when compared to Regular rehabilitation therapy.
- Traditional Chinese medicine with Tuina treatment (massage techniques), Acupuncture kinesiotherapy and Basic stroke treatment may be beneficial for improving performance of activities of daily living and spasticity after stroke when compared to Basic stroke treatment with modern rehabilitation techniques.
- Electroacupunture with acupuncture therapy may be beneficial for improving spasticity after stroke when compared to acupuncture therapy.

Summary of Key Points: Traditional Herbal Medicine

Intervention	Control(s)	Function domain(s)	Effect
Traditional medicines and massage	piracetam with usual post-stroke medications	Motor function	+
Traditional herbal medicines	conventional therapy	Motor function, performance of activities of daily living, spasticity	+
Traditional herbal medicines	conventional therapy	Stroke severity	−
Traditional herbal medicines	sham	Motor function, performance of activities of daily living	+
Traditional herbal medicines	sham	Range of motion	−
Traditional herbal medicines	sham	Stroke severity	=
Massage	Traditional medicine (Conventional unani drug therapy (Munzij, Mushil, Muaqwwi Aasab))	Motor function, performance of activities of daily living	+
Electroacupuncture with moxibustion	Regular rehabilitation therapy	Motor function	−
Traditional Chinese medicine with Tuina treatment (massage techniques), Acupuncture kinesiotherapy and Basic stroke treatment	Basic stroke treatment with modern rehabilitation techniques	Performance of activities of daily living, spasticity	+
Electroacupunture with acupuncture therapy	acupuncture therapy	Spasticity	+

Appendix A: Key Points

This appendix compiles the Key Points from all 47 intervention categories (Tables 1–47).

A.1 Neurodevelopmental Techniques (Table 1)

Key Points

- Brunnstrom hand manipulation treatment with Conventional occupational therapy may be beneficial for improving motor function, but not stroke severity, after stroke when compared to Motor relearning programme based hand protocol with Conventional occupational therapy.
- Early Sitting, Standing and Walking With Bobath Training (a bobath approach developed by the researchers) may be beneficial for improving motor function after stroke when compared to Bobath Training.
- Repetitive facilitative exercise (RFE) with botulinum toxin A injection, conventional self-training and conventional rehab may be beneficial for improving motor function, dexterity, and range of motion, but not spasticity, after stroke when compared to repetitive facilitative exercise (RFE) with conventional self-training and conventional rehab.
- Impairment oriented training Arm BASIS with usual treatment may not be beneficial for improving motor function and spasticity after stroke when compared to usual treatment.
- Impairment oriented training Arm BASIS with usual treatment may not be beneficial for improving spasticity after stroke when compared to Bobath therapy with usual treatment; the literature is mixed regarding motor function.
- Acupuncture may not be beneficial for improving motor function, performance of activities of daily living, and stroke severity after stroke when compared to Physiotherapy Bobath.
- Acupuncture may not be beneficial for improving motor function, performance of activities of daily living, and stroke severity after stroke when compared to Acupuncture with Physiotherapy Bobath.
- Physiotherapy Bobath may not be beneficial for improving motor function, performance of activities of daily living, and stroke severity after stroke when compared to Acupuncture with Physiotherapy Bobath.
- Electromyography-triggered neuromuscular electrical stimulation may not be beneficial for improving motor function and dexterity after stroke when compared to Tracking training (a structured motor learning program) or electromyography-triggered neuromuscular electrical stimulation with tracking training.
- Constraint-induced movement therapy may not be beneficial for improving motor function after stroke when compared to Bobath therapy; the literature is mixed regarding performance of activities of daily living.
- Tracking training of finger and wrist (temporospatial processing) may be beneficial for improving dexterity and range of motion, but not motor function, after stroke when compared to repetitive simple Movement training.
- Integrated behavioural and physical therapy with electromyography biofeedback may not be beneficial for improving motor function after stroke when compared to Exercise physical therapy (Bobath approach).
- Robotic training (InMotion ARM) with motor learning may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Motor learning.
- Shaping training with constraint-induced movement therapy transfer package (TP) may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Shaping training.
- Constraint-induced movement therapy may be beneficial for improving performance of activities of daily living, but not motor function and dexterity, after stroke when compared to motor relearning program.
- Proprioceptive neuromuscular facilitation with virtual reality (Nintendo Wii) may not be beneficial for improving motor function after stroke when compared to proprioceptive neuromuscular facilitation or Wii.
- Task Specific Training may be beneficial for improving motor function and spasticity after stroke when compared to Proprioceptive Neuromuscular Facilitation.
- Task-specific training may be beneficial for improving motor function and performance of activities of daily living after stroke when compared to training using the Bobath approach.

- Movement science based training may not be beneficial for improving motor function, dexterity, performance of activities of daily living, and spasticity after stroke when compared to Bobath concept.
- The literature is mixed regarding the effect of Visuo-Motor Grip Force Tracking Task Training of the paretic hand with Anodal Unilateral transcranial direct current stimulation on improvement of motor function after stroke when compared to Visuo-Motor Grip Force Tracking Task Training of the paretic hand with Placebo transcranial direct current stimulation.
- Visuo-Motor Grip Force Tracking Task Training of the paretic hand with Anodal Unilateral transcranial direct current stimulation may not be beneficial for improving motor function after stroke when compared to Visuo-Motor Grip Force Tracking Task Training of the paretic hand with Bilateral transcranial direct current stimulation.
- Neuromuscular electrical stimulation with conventional exercise may be beneficial for improving motor function after stroke when compared to conventional training.
- Functional electrical stimulation with Brunnstrom Hand rehab and conventional rehab may be beneficial for improving motor function, spasticity, and muscle strength after stroke when compared to Conventional Rehab.
- High-frequency repetitive transcranial magnetic stimulation with Motor Learning may be beneficial for improving muscle strength, but not motor function, dexterity, and performance of activities of daily living, after stroke when compared to Sham repetitive transcranial magnetic stimulation with Motor Learning.
- High-frequency repetitive transcranial magnetic stimulation with Motor training and Conventional therapy may not be beneficial for improving motor function and dexterity after stroke when compared to Sham repetitive transcranial magnetic stimulation with Motor training and Conventional Therapy.
- Neurodevelopmental techniques (Bobath approach) may be beneficial for improving motor function, but not dexterity, performance of activities of daily living, and muscle strength, after stroke when compared to conventional therapy.
- Brunnstrom movement therapy with conventional therapy may be beneficial for improving motor function and stroke severity after stroke when compared to mirror therapy with conventional therapy.
- Forced use therapy using splint may be beneficial for improving performance of activities of daily living after stroke when compared to Bimanual training based on neuro-developmental treatment; the literature is mixed regarding motor function.
- Impairment-oriented training may not be beneficial for improving motor function after stroke when compared to Conventional therapy.
- Finger movement tracking training may not be beneficial for improving dexterity after stroke when compared to Waitlist.
- Motor relearning with electrical stim may not be beneficial for improving dexterity and spasticity after stroke when compared to Bobath treatment with electrical stim.
- Motor relearning with electrical stim may be less beneficial than Bobath treatment with electrical stim for improving muscle strength after stroke.
- Interleaved combination method (ICM) repetitive transcranial magnetic stimulation with motor training may not be beneficial for improving dexterity after stroke when compared to Preconditioned combination method (PCM) repetitive transcranial magnetic stimulation with motor training.
- Dual transcranial direct current stimulation with motor learning training may be beneficial for improving dexterity, but not muscle strength, after stroke when compared to Sham dual transcranial direct current stimulation with motor learning training.
- Dual transcranial direct current stimulation with motor skill learning may be beneficial for improving dexterity after stroke when compared to Sham dual transcranial direct current stimulation with motor skill learning.
- Motor relearning programmes may not be beneficial for improving dexterity and performance of activities of daily living after stroke when compared to conventional therapy.
- Motor learning program may be beneficial for improving performance of activities of daily living after stroke when compared to Mirror therapy.
- Proprioceptive neuromuscular facilitation early may be beneficial for improving muscle strength, but not performance of activities of daily living, after stroke when compared to Cognitive therapeutic exercise (CTE) early or proprioceptive neuromuscular facilitation late or CTE late.

- Constraint-induced movement therapy may be beneficial for improving performance of activities of daily living and spasticity after stroke when compared to Motor learning programme.
- Low frequency Repetitive Transcranial Magnetic Stimulation to unaffected hemisphere with Brunnstrom movement therapy may be beneficial for improving proprioception, but not spasticity and stroke severity, after stroke when compared to Sham Repetitive Transcranial Magnetic Stimulation with Brunnstrom movement therapy.
- Motor relearning programmes may not be beneficial for improving muscle strength, spasticity, and performance of activities of daily living after stroke when compared to neurodevelopmental techniques (Bobath approach).
- Proprioceptive neuromuscular facilitation early may not be beneficial for improving stroke severity after stroke when compared to Cognitive therapeutic exercise (CTE) early or late.
- PNF with NMES may be beneficial for improving stroke severity, spasticity, range of motion, and performance of activities of daily living after stroke when compared to PNF.
- Task oriented circuit training may not be beneficial for improving motor function after stroke when compared to Neurodevelopmental techniques; the literature is mixed regarding performance of activities of daily living.
- Different approaches to Motor relearning programmes may not have a difference in efficacy when compared with one another for improving motor function; the literature is mixed regarding dexterity.

A.2 Bilateral Arm Training (Table 2)

Key Points

- Bilateral arm training may not be beneficial for improving stroke severity, muscle strength, performance of activities of daily living, and dexterity after stroke when compared to conventional therapy; the literature is mixed regarding motor function.
- Active-passive bilateral therapy (APBT) with Self-directed motor practice may not be beneficial for improving motor function, stroke severity, and muscle strength after stroke when compared to Self-directed motor practice on affected upper limb.
- Bilateral arm training combined with other interventions may be beneficial for improving motor function and stroke severity, but not muscle strength, spasticity, and dexterity, after stroke when compared to unilateral arm training; the literature is mixed regarding performance of activities of daily living.
- Bilateral arm training combined with other interventions may not be beneficial for improving performance of activities of daily living after stroke when compared to conventional therapy; the literature is mixed regarding motor function.
- Distributed constraint-induced therapy may be beneficial for improving motor function, but not performance of activities of daily living, after stroke when compared to bilateral arm training.
- Bilateral UE Training with Unilateral task-oriented training may not be beneficial for improving motor function, spasticity, and dexterity after stroke when compared to Unilateral task-oriented Training (using a hand orthosis).
- Bilateral arm training; visual fb mirror therapy may not be beneficial for improving motor function after stroke when compared to bilateral arm training without mirror therapy.
- Bilateral arm training with functional electrical stimulation and conventional occupational therapy may be beneficial for improving motor function and range of motion, but not performance of activities of daily living, spasticity, and muscle strength, after stroke when compared to Bilateral arm training with sham functional electrical stimulation and conventional occupational therapy.
- Constraint Induced Movement Therapy may not be beneficial for improving motor function and dexterity after stroke when compared to Bilateral Arm Training.
- Robotic arm therapy (NeReBot) with conventional therapy may not be beneficial for improving motor function, dexterity, performance of activities of daily living, spasticity, and muscle strength after stroke when compared to Conventional therapy with proximal paretic arm exercise.
- Shoulder sling exercise (Sling Suspension System on Shoulder Subluxation) may be beneficial for improving motor function and proprioception after stroke when compared to bilateral arm training.

- Modified constraint-induced movement therapy may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Bilateral training.
- Forced use therapy using splint may be beneficial for improving performance of activities of daily living after stroke when compared to Bimanual training based on neuro-developmental treatment; the literature is mixed regarding motor function.
- Constraint-induced movement therapy may be beneficial for improving motor function after stroke when compared to Conservative treatment (bimanual-upper-extremity training by conservative neurodevelopmental technique); the literature is mixed regarding muscle strength.
- Virtual reality bilateral arm training with conventional therapy may be beneficial for improving motor function, dexterity, and muscle strength after stroke when compared to Bilateral arm training with conventional therapy.
- Hospital-based task-oriented mirror therapy may not be beneficial for improving motor function, performance of activities of daily living, and proprioception after stroke when compared to Bilateral arm training.
- Constraint-induced movement therapy with bilateral arm training may not be beneficial for improving motor function, dexterity, and performance of activities of daily living after stroke when compared to Bimanual task-related training.
- Unilateral robot assisted therapy with modified constraint-induced movement therapy may not be beneficial for improving motor function after stroke when compared to Robot assist therapy; the literature is mixed regarding performance of activities of daily living.
- Unilateral robot assisted therapy with modified constraint-induced movement therapy may not be beneficial for improving motor function after stroke when compared to Bilateral robot assisted therapy with bilateral arm training.
- Unilateral robot assisted therapy with modified constraint-induced movement therapy may be less beneficial than Bilateral robot assisted therapy with bilateral arm training for improving performance of activities of daily living after stroke.
- Electromyography-triggered neuromuscular electrical stimulation with BAT may not be beneficial for improving motor function after stroke when compared to transcutaneous electrical nerve stimulation with BAT.
- Robot-Assisted Therapy with Bilateral Practice with Task-Specific Training may be beneficial for improving motor function after stroke when compared to Conventional Care with Task-Specific Training; the literature is mixed regarding performance of activities of daily living.
- Unilateral robot assisted therapy with constraint-induced movement therapy (unilateral arm) may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Robot assisted therapy alone (both modes).
- Unilateral robot assisted therapy with constraint-induced movement therapy (unilateral arm) may not be beneficial for improving performance of activities of daily living after stroke when compared to Bilateral robot assisted therapy with BAT (Bimanual tracking).
- Unilateral robot assisted therapy with constraint-induced movement therapy (unilateral arm) may be less beneficial than Bilateral robot assisted therapy with BAT (Bimanual tracking) for improving motor function after stroke.
- Associated Mirror Therapy (Mirror Therapy with Bimanual Training) may be beneficial for improving motor function and performance of activities of daily living, but not dexterity, after stroke when compared to Bimanual Training without mirroring with Conventional Care.
- Robotic Priming with mirror therapy (RMT) may not be beneficial for improving motor function, proprioception, and performance of activities of daily living after stroke when compared to Robotic Priming with Bilateral Upper Limb Training (RBULT).
- Virtual reality-based bilateral arm training with conventional rehab may not be beneficial for improving motor function after stroke when compared to bilateral arm training; the literature is mixed regarding proprioception.
- Occupation-Based Bilateral Upper Limb Training with Cognitive Behavioral Therapy may not be beneficial for improving motor function after stroke when compared to Occupation-Based Bilateral Upper Limb

Training with Conventional occupational therapy; the literature is mixed regarding performance of activities of daily living.

- Mirror therapy with Bilateral arm training and Conventional therapy may be beneficial for improving motor function after stroke when compared to Bilateral Arm training with Conventional therapy.
- Unilateral mirror therapy with Unimanual training may not be beneficial for improving motor function, performance of activities of daily living, and proprioception after stroke when compared to Mirror therapy.
- Unilateral mirror therapy with Unimanual training may not be beneficial for improving motor function, performance of activities of daily living, and proprioception after stroke when compared to Unilateral mirror therapy with Bimanual training.
- Unilateral mirror therapy with Bimanual training may not be beneficial for improving motor function and proprioception after stroke when compared to Bilateral mirror therapy with Bimanual training; the literature is mixed regarding performance of activities of daily living.
- Bilateral arm training with rhythmic auditory cueing may be less beneficial than task-oriented bilateral arm training for improving motor function, dexterity, and performance of activities of daily living after stroke.
- Bilateral motor priming with task-specific training may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to health care education with task-specific training.
- Unilateral robot-assisted arm training may be beneficial for improving motor function, but not performance of activities of daily living, after stroke when compared to Bilateral robot-assisted arm training.
- Modified constraint-induced movement therapy may not be beneficial for improving motor function, dexterity, performance of activities of daily living, proprioception, and muscle strength after stroke when compared to Dose-matched conventional treatment.
- Coupled bilateral training with load with electromyography-triggered neuromuscular electrical stimulation may not be beneficial for improving dexterity after stroke when compared to Coupled bilateral training with no load with electromyography-triggered neuromuscular electrical stimulation.
- Short-term bilateral arm training with electromyography triggered neuromuscular electrical stimulation may be less beneficial than long-term bilateral arm training with electromyography triggered neuromuscular electrical stimulation for improving muscle strength and dexterity after stroke.
- Electromyography-Triggered neuromuscular electrical stimulation with Bilateral Arm Training may be beneficial for improving dexterity after stroke when compared to Sham Stimulation with Bilateral Arm Training.
- Electromyography-Triggered neuromuscular electrical stimulation with Bilateral Arm Training may be beneficial for improving dexterity after stroke when compared to electromyography-Triggered neuromuscular electrical stimulation with Bilateral Arm Training.
- Bilateral arm training with rhythmic auditory cueing may not be beneficial for improving muscle strength after stroke when compared to Conventional therapy.
- Occupation-based bilateral upper extremity training may be beneficial for improving performance of activities of daily living after stroke when compared to Task-based bilateral upper extremity training.
- Bimanual, lever-driven wheelchair (LARA) for stationary arm exercise and overground ambulation with Videogame may not be beneficial for improving motor function, muscle strength, spasticity, and dexterity after stroke when compared to Conventional Arm Exercises.
- Mirror therapy-based Bilateral Training may not be beneficial for improving motor function after stroke when compared to Bilateral Training.
- Balance Training with Affected Hand at Low Back may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Balance Training.
- Balance Training with Elevated Affected Shoulder may be beneficial for improving motor function, but not performance of activities of daily living, after stroke when compared to Balance Training.
- Bilateral arm training combined with other interventions: some approaches may be more beneficial than others for improving motor function.
- Bilateral arm training: some approaches may be more beneficial than others for improving spasticity and performance of activities of daily living; different approaches to bilateral arm training may not have a difference in efficacy when compared with one another for improving motor function and muscle strength.

A.3 Exercise and Strength Training (Table 3)

Key Points

- Functional strength training may not be beneficial for improving motor function and muscle strength after stroke when compared to Movement performance therapy.
- Dynamic resistance training (POWER) may not be beneficial for improving motor function, performance of activities of daily living, spasticity, range of motion, and stroke severity after stroke when compared to Functional Task Practice (FTP).
- Strength training may be beneficial for improving motor function, muscle strength, and performance of activities of daily living, but not spasticity, after stroke when compared to conventional therapy; the literature is mixed regarding range of motion and dexterity.
- Functional strength training with conventional physical therapy may not be beneficial for improving motor function and dexterity after stroke when compared to Conventional physiotherapy X2.
- Exercise and custom physiotherapy protocols may be beneficial for improving motor function, muscle strength, and proprioception, but not stroke severity, spasticity, range of motion, and performance of activities of daily living, after stroke when compared to conventional therapy; the literature is mixed regarding dexterity.
- Arm treatment for 3hr/d may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Arm treatment for 2hr/d or Arm treatment for 1hr/d.
- Arm treatment for 3hr/d may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Arm treatment for 2hr/d.
- Functional strength training UL may be beneficial for improving motor function, but not dexterity, after stroke when compared to the other study arms.
- Graded Arm Supplementary Program may not be beneficial for improving performance of activities of daily living and muscle strength after stroke when compared to Conventional Therapy; the literature is mixed regarding motor function.
- Graded repetitive arm supplementary program protocol may be beneficial for improving motor function, performance of activities of daily living, and muscle strength after stroke when compared to Education book- self-administered homework exercise program.
- Strength training combined with other interventions may not be beneficial for improving motor function, dexterity, performance of activities of daily living, spasticity, and muscle strength after stroke when compared to stretching and positioning programs.
- Exercise and custom physiotherapy protocols may be beneficial for improving stroke severity, muscle strength, and performance of activities of daily living, but not motor function and dexterity, after stroke when compared to no treatment.
- Body-weight supported treadmill training may not be beneficial for improving motor function and muscle strength after stroke when compared to Education (reviewing home exercises).
- Strength training combined with other interventions may be beneficial for improving motor function, muscle strength, and performance of activities of daily living after stroke when compared to conventional therapy.
- Exercise and custom physiotherapy protocols combined with other interventions may be beneficial for improving motor function and performance of activities of daily living after stroke when compared to conventional therapy; the literature is mixed regarding spasticity.
- Arm Ergometer with conventional treatment may be beneficial for improving motor function, but not spasticity and range of motion, after stroke when compared to Cryotherapy with Proprioceptive Neuromusucal Facilitation and Neurodevelopmental Techniques.
- Exercise and custom physiotherapy protocols combined with other interventions may not be beneficial for improving motor function, performance of activities of daily living, and stroke severity after stroke when compared to exercise and custom physiotherapy protocols.
- Leg rehab training may be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Immobilization therapy with inflatable pressure splint (arm and leg with splints).

- Graded repetitive arm supplementary program may be beneficial for improving motor function and muscle strength after stroke when compared to Virtual reality.
- Boxing training may be beneficial for improving motor function after stroke when compared to No intervention or therapy.
- Boxing training may be beneficial for improving motor function after stroke when compared to Scapular stabilization training.
- Forced-rate exercise with Repetitive task practice may not be beneficial for improving motor function after stroke when compared to Repetitive task practice.
- Cycling exercise with feedback and Conventional therapy may be beneficial for improving spasticity, but not motor function and performance of activities of daily living, after stroke when compared to Conventional therapy; the literature is mixed regarding stroke severity.
- Task-related Training (Grasping or Retrieving Objects) may not be beneficial for improving motor function and spasticity after stroke when compared to Progressive Resistive Exercises.
- Smart Glove Upper Extremity Training (RAPAEL) with rehab may be beneficial for improving motor function, but not dexterity, performance of activities of daily living, and muscle strength, after stroke when compared to Upper Extremity Self-Training at home with rehab.
- Active-passive bilateral therapy (APBT) with Self-directed motor practice may not be beneficial for improving motor function, stroke severity, and muscle strength after stroke when compared to Self-directed motor practice on affected upper limb.
- Mental Practice with activities of daily living training session may be beneficial for improving motor function after stroke when compared to Sham Relaxation Exercise with activities of daily living training session.
- Whole-body vibration with Task Oriented Training and Conventional physical therapy may be beneficial for improving motor function and muscle strength after stroke when compared to Upper- and lower-Cycle group with Task Specific Training and Conventional physical therapy.
- Massage may be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Traditional medicine (Conventional unani drug therapy (Munzij, Mushil, Muaqwwi Aasab)).
- Group Circuit may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to high intensity physio or usual physiotherapy.
- Task-related Training with Trunk Restraint may not be beneficial for improving motor function and range of motion after stroke when compared to Resistive Exercises with Trunk Restraint.
- Dextroamphetamine with physiotherapy may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Placebo with Physiotherapy.
- Mirror therapy with usual care may not be beneficial for improving motor function, dexterity, spasticity, proprioception, and muscle strength after stroke when compared to Lower-limb exercise with usual care.
- Telemonitored hand robotic-assisted therapy (Hand mentor pro) with home exercise program may not be beneficial for improving motor function after stroke when compared to Home exercise program only.
- Modified constraint-induced movement therapy may be beneficial for improving motor function after stroke when compared to Conventional rehabilitation.
- Robot arm end effectors (ReoGO) with therapy may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to self-guided therapy with therapy.
- Telerehabilitation may not be beneficial for improving motor function after stroke when compared to In clinic Rehabilitation.
- Robot-Assisted Therapy may not be beneficial for improving motor function and spasticity after stroke when compared to Usual care.
- Robot-Assisted Therapy may not be beneficial for improving motor function and spasticity after stroke when compared to Dose-matched Intensive Comparison Therapy.
- Eccentric strength training may be beneficial for improving motor function, but not muscle strength, after stroke when compared to Task-oriented strength training.
- Intermittent theta burst stimulation with dexterity training may not be beneficial for improving motor function and dexterity after stroke when compared to Sham theta burst stimulation with dexterity training.

- Intermittent theta burst stimulation with dexterity training may not be beneficial for improving motor function and dexterity after stroke when compared to Continuous theta burst stimulation with dexterity training.
- Functional task practice (FTP) with Power training may be beneficial for improving performance of activities of daily living and muscle strength, but not spasticity, after stroke when compared to Functional task practice (FTP); the literature is mixed regarding motor function.
- Task specific training with strength training or resistance may be beneficial for improving motor function, range of motion, and muscle strength, but not spasticity, after stroke when compared to Task oriented training without resistance.
- Upper extremity thermal stimulation may be beneficial for improving motor function, but not performance of activities of daily living and spasticity, after stroke when compared to lower extremity thermal stimulation.
- Pointing movement practice with feedback may be beneficial for improving motor function, but not spasticity, after stroke when compared to Pointing movement practice without feedback.
- OnabotulinumtoxinA with upper limb rehabilitation may be beneficial for improving motor function, but not performance of activities of daily living and spasticity, after stroke when compared to OnabotulinumtoxinA.
- Progressive abduction loading therapy with horizontal-plance viscous resistance device may not be beneficial for improving motor function and muscle strength after stroke when compared to Progressive abduction loading therapy.
- Virtual Reality Boxing (Xbox Kinect) may not be beneficial for improving motor function and dexterity after stroke when compared to Boxing Practice with Therapist.
- Intermittent theta burst stimulation with Physical therapy may be beneficial for improving motor function, performance of activities of daily living, and stroke severity after stroke when compared to Physical Therapy.
- Intermittent theta burst stimulation with Physical therapy may not be beneficial for improving motor function, performance of activities of daily living, and stroke severity after stroke when compared to functional electrical stimulation with Physical therapy.
- Unilateral and bilateral task oriented exercises may not be beneficial for improving motor function, dexterity, performance of activities of daily living, and muscle strength after stroke when compared to Walking tasks.
- Physiotherapy may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Acupuncture.
- Physiotherapy may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Physiotherapy with Acupuncture.
- Acupuncture may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Physiotherapy with Acupuncture.
- Wii arm exercises may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Home-based arm exercises.
- Neuroanimation therapy using ARMEO exoskeleton may not be beneficial for improving motor function and muscle strength after stroke when compared to Modified Occupational therapy (stretching, task specific training).
- Robotic-assisted training with conventional therapy may be beneficial for improving motor function after stroke when compared to Conventional therapy with arm specific physiotherapy.
- Botulinum toxin injection with self-rehabilitation may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to BTI.
- Dual-Task Training with Conventional occupational therapy may be beneficial for improving motor function after stroke when compared to Single Task Training (combining sensory stimulation, UE muscle strength, cognitive and perceptual training, and fine hand movement) with Conventional occupational therapy.
- Virtual reality therapy with ARMEO with combination of different exercises may be beneficial for improving motor function, but not muscle strength, after stroke when compared to Conventional physiotherapy.

- High frequency repetitive transcranial magnetic stimulation with grip training and conventional rehab may not be beneficial for improving motor function, performance of activities of daily living, and muscle strength after stroke when compared to repetitive transcranial magnetic stimulation with conventional rehab or Grip training and conventional rehab.
- Three-Dimensional Upper Limb Robotic Exoskeleton Training may not be beneficial for improving spasticity after stroke when compared to Manual Rehabilitation; the literature is mixed regarding motor function.
- Robot-assisted training (RAT) with conventional rehab may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Enhanced upper extremity therapy (EUET) with conventional rehab.
- Cueing or remind to move with exercise or custom physiotherapy protocols may not be beneficial for improving motor function, dexterity, performance of activities of daily living, stroke severity, and muscle strength after stroke when compared to Sham with exercise or custom physiotherapy protocols.
- Anodal transcranial direct current stimulation with Upper extremity strength training may not be beneficial for improving motor function, dexterity, performance of activities of daily living, range of motion, and muscle strength after stroke when compared to Sham transcranial direct current stimulation with Upper extremity strength training.
- Jintronix Virtual reality may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to graded repetitive arm supplementary program rehab.
- Dual transcranial direct current stimulation with home exercise program may be beneficial for improving motor function, but not muscle strength, after stroke when compared to Sham transcranial direct current stimulation with home exercise program.
- Bihemispheric transcranial direct current stimulation with Custum physiotherapy protocol may be beneficial for improving motor function after stroke when compared to Sham transcranial direct current stimulation with Custom physiotherapy protocol; the literature is mixed regarding spasticity.
- Bihemispheric transcranial direct current stimulation with Custum physiotherapy protocol may not be beneficial for improving motor function and spasticity after stroke when compared to Unihemispheric transcranial direct current stimulation with Custum physiotherapy protocol.
- High-frequency repetitive transcranial magnetic stimulation with Conventional Therapy may be beneficial for improving motor function and dexterity after stroke when compared to Conventional therapy; the literature is mixed regarding muscle strength.
- High-frequency repetitive transcranial magnetic stimulation with Conventional Therapy may not be beneficial for improving dexterity and muscle strength after stroke when compared to Contralateral limb Cross education (strength training) with Conventional therapy.
- High-frequency repetitive transcranial magnetic stimulation with Conventional Therapy may be less beneficial than Contralateral limb Cross education (strength training) with Conventional therapy for improving motor function after stroke.
- Contralateral limb Cross education (strength training) with Conventional therapy may not be beneficial for improving motor function, dexterity, and muscle strength after stroke when compared to high-frequency repetitive transcranial magnetic stimulation with cross education and conventional therapy.
- High-frequency repetitive transcranial magnetic stimulation with Conventional Therapy may not be beneficial for improving motor function, dexterity, and muscle strength after stroke when compared to high-frequency repetitive transcranial magnetic stimulation with cross education and conventional therapy.
- Robotic training with Rebless may be beneficial for improving motor function, but not performance of activities of daily living, spasticity, range of motion, and muscle strength, after stroke when compared to UE training with Motomed ergometer.
- Modified Constraint-Induced Movement Therapy with Exercise or custom physiotherapy (Telerehabilitation) may be beneficial for improving motor function, dexterity, performance of activities of daily living, and muscle strength after stroke when compared to Home exercise program.
- Enriched Music-Supported Therapy (eMST) may not be beneficial for improving dexterity, performance of activities of daily living, and muscle strength after stroke when compared to Graded Repetitive Arm Supplementary Program; the literature is mixed regarding motor function.

- Task-oriented training with conventional therapy may be beneficial for improving performance of activities of daily living, but not dexterity, after stroke when compared to Progressive resistance exercise with conventional therapy; the literature is mixed regarding motor function.
- Smart reminder wristwatch telerehabilitation with Conventional therapy may not be beneficial for improving motor function, performance of activities of daily living, and range of motion after stroke when compared to Conventional therapy.
- Cognitive motor rehabilitation with specific UE exercises may be beneficial for improving motor function after stroke when compared to Specific UE exercises.
- Dry Needling with exercise therapy may not be beneficial for improving motor function and spasticity after stroke when compared to Exercise therapy; the literature is mixed regarding range of motion.
- Graded Motor Imagery (included implicit and explicit motor imagery plus mirror therapy) with conventional rehabilitation may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Upper limb exercise with conventional rehabilitation.
- High intensity interval training (HIIT) may not be beneficial for improving dexterity and muscle strength after stroke when compared to Moderate intensity constant-load exercise (MICE).
- Botox with movement training may be beneficial for improving muscle strength, but not dexterity, performance of activities of daily living, spasticity, and range of motion, after stroke when compared to Botox plus excercise handout.
- Home-Based (Virtual) Rehabilitation with Treatment As Usual may not be beneficial for improving dexterity after stroke when compared to Graded Repetitive Arm Supplementary Program with Treatment As Usual.
- Upper extremity aerobic exercise with conventional physiotherapy may be beneficial for improving performance of activities of daily living, but not spasticity and stroke severity, after stroke when compared to Conventional physiotherapy.
- Augmented Community Telerehabilitation may not be beneficial for improving performance of activities of daily living and muscle strength after stroke when compared to Conventional Therapy.
- The literature is mixed regarding the effect of Stretching with Joint-stabilizing exercises on improvement of performance of activities of daily living after stroke when compared to exercise.
- Stretching with Joint-stabilizing exercises may be less beneficial than Stretching for improving performance of activities of daily living after stroke.
- Traditional Chinese medicine with Tuina treatment (massage techniques), Acupuncture kinesiotherapy and Basic stroke treatment may be beneficial for improving performance of activities of daily living and spasticity after stroke when compared to Basic stroke treatment with modern rehabilitation techniques.
- Electroacupuncture with cycling may be beneficial for improving performance of activities of daily living, stroke severity, and muscle strength after stroke when compared to Electroacupuncture.
- Radial extracorporeal shock wave therapy (radial extracorporeal shockwave therapy) with Designed physical therapy program for shoulder may be beneficial for improving performance of activities of daily living after stroke when compared to Sham radial extracorporeal shockwave therapy with Designed physical therapy program for shoulder.
- Kinesio taping with graded repetitive arm supplementary program (home program) may be beneficial for improving performance of activities of daily living after stroke when compared to graded repetitive arm supplementary program (Home program).
- Dorsal hand splint with home-based exercise program may not be beneficial for improving spasticity and range of motion after stroke when compared to Home-based exercise program.
- Electroacupuncture with strength training may be beneficial for improving spasticity after stroke when compared to Strength training.
- Proprioceptive neuromuscular facilitation exercises with neuromobilization of the affected upper extremity may be beneficial for improving proprioception after stroke when compared to proprioceptive neuromuscular facilitation exercises without neuromobilization or conventional care.
- Arm cycling with conventional physiotherapy may be beneficial for improving stroke severity and muscle strength after stroke when compared to conventional physiotherapy.
- 'BOOST' Intensive Arm-Hand Training Protocol may be beneficial for improving motor function, but not dexterity, after stroke when compared to Lower-Limb Strengthening And Reconditioning.

- Real bilateral tDCS with resistance training exercise may not be beneficial for improving motor function, muscle strength, spasticity, performance of activities of daily living, and dexterity after stroke when compared to sham tDCS with resistance training exercise.
- Mirror and strength training therapy may not be beneficial for improving performance of activities of daily living after stroke when compared to Strength training.
- UE function training may be beneficial for improving motor function, but not muscle strength and spasticity, after stroke when compared to lower extremity function training.
- Aerobic exercise may be beneficial for improving muscle strength, but not motor function, after stroke when compared to Stretching exercise.
- Community-based upper extremity exercise program may be beneficial for improving motor function, but not muscle strength and performance of activities of daily living, after stroke when compared to Lower extremity exercise program.
- Alternating hot-cold water immersion (AHCWI) with Standard rehabilitation may be beneficial for improving motor function and muscle strength, but not spasticity and performance of activities of daily living, after stroke when compared to Upper limb cycling exercises with Standard rehabilitation.
- Cognitive Orientation to Daily Occupaitonal Performance may be beneficial for improving performance of activities of daily living, but not motor function and dexterity, after stroke when compared to Conventional occupational therapy.
- Ergotact system (Videogames) may not be beneficial for improving motor function, spasticity, performance of activities of daily living, and dexterity after stroke when compared to Home-based self-rehabilitation program.
- Sensory Relearning with Task-Specific Training and home exercise may not be beneficial for improving motor function, performance of activities of daily living, and dexterity after stroke when compared to Task-Specific Training with strength training; the literature is mixed regarding proprioception.
- Task-Oriented Training may be beneficial for improving motor function, but not performance of activities of daily living, after stroke when compared to Table-Top Activity Training.
- Virtual Reality Training (Nintendo Wii) with general physical therapy may be beneficial for improving muscle strength, but not motor function and performance of activities of daily living, after stroke when compared to OT with general physical therapy.
- TNRS with GRASP may be beneficial for improving motor function, but not stroke severity and performance of activities of daily living, after stroke when compared to Sham tRNS with GRASP.
- Functional Training may not be beneficial for improving motor function, muscle strength, spasticity, and performance of activities of daily living after stroke when compared to Strength Training.
- Botox with intensive rehabilitation program may not be beneficial for improving spasticity, performance of activities of daily living, and dexterity after stroke when compared to Botox.
- Focal muscle vibration with progressive modular rebalancing may not be beneficial for improving motor function, muscle strength, and spasticity after stroke when compared to Conventional physiotherapy.
- The literature is mixed regarding the effect of Forced aerobic exercise with Repetitive task practice(RTP) on motor function after stroke when compared to Voluntary exercise with RTP.
- The literature is mixed regarding the effect of Forced aerobic exercise with Repetitive task practice(RTP) on motor function after stroke when compared to RTP.
- Voluntary exercise with RTP may not be beneficial for improving motor function after stroke when compared to RTP.
- Superficial needling acupuncture plus club swing exercise with conventional therapy may be beneficial for improving performance of activities of daily living after stroke when compared to Conventional therapy; the literature is mixed regarding range of motion.
- Video game self training may not be beneficial for improving motor function, performance of activities of daily living, and dexterity after stroke when compared to Graded repetitive arm supplementary program.
- Repetitive Task Practice may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Occupation-Based Intervention.
- VR (YOUgrabber) may not be beneficial for improving performance of activities of daily living and dexterity after stroke when compared to Gym training.

- VR based rehab may be beneficial for improving motor function, but not performance of activities of daily living and dexterity, after stroke when compared to Group based rehab.
- Music glove may be beneficial for improving dexterity, but not motor function and muscle strength, after stroke when compared to Conventional care.
- Isometric hand therapy may not be beneficial for improving motor function, muscle strength, and dexterity after stroke when compared to Conventional care.
- Music glove may not be beneficial for improving motor function, muscle strength, and dexterity after stroke when compared to Isometric hand therapy.
- Repetitive peripheral nerve sensory stim (RPSS) with Motor Training may be beneficial for improving motor function after stroke when compared to Sham with Motor Training.
- Standard Acupuncture with Shixuan & Xiaohai acupoints with Functional training may be beneficial for improving motor function and muscle strength after stroke when compared to Standard Acupuncture only with Functional training.
- CIMT may not be beneficial for improving motor function, muscle strength, range of motion, and performance of activities of daily living after stroke when compared to Therapeutic Climbing.
- CIMT may not be beneficial for improving motor function, stroke severity, muscle strength, range of motion, and performance of activities of daily living after stroke when compared to Conventional neurological therapy.
- Therapeutic Climbing may not be beneficial for improving motor function, stroke severity, muscle strength, range of motion, and performance of activities of daily living after stroke when compared to Conventional neurological therapy.
- Robotic therapy (MIT-Manus) with conventional therapy may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Occupational therapy.
- Strength training may be beneficial for improving motor function and muscle strength after stroke when compared to Standard care.
- Lower-Limb Task-Specific Circuit Training may not be beneficial for improving muscle strength and dexterity after stroke when compared to Upper-Limb Task-Specific Training.
- EMG triggered NMS (EMG-Stim) with Wrist Strengthening Exercises may be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Wrist Exercises.
- High intensity FES assisted exercise therapy may not be beneficial for improving performance of activities of daily living after stroke when compared to Low FES assisted exercise therapy; the literature is mixed regarding motor function.
- Exercise and custom physiotherapy protocols: some approaches may be more beneficial than others for improving stroke severity; different approaches to exercise and custom physiotherapy protocols may not have a difference in efficacy when compared with one another for improving motor function, muscle strength, performance of activities of daily living, and dexterity; the literature is mixed regarding spasticity.
- Strength training: some approaches may be more beneficial than others for improving performance of activities of daily living; different approaches to strength training may not have a difference in efficacy when compared with one another for improving muscle strength, spasticity, and range of motion; the literature is mixed regarding motor function.
- Tilt table affected knee belt with Conventional Therapy may not be beneficial for improving muscle strength after stroke when compared to Tilt table alone (both knee belts) with Conventional Therapy; the literature is mixed regarding motor function.
- Tilt table with task oriented training with Conventional Therapy may be beneficial for improving motor function and muscle strength after stroke when compared to Tilt table alone (both knee belts) with Conventional Therapy.
- Cognitive Orientation to Daily Occupaitonal Performance may be beneficial for improving performance of activities of daily living, but not motor function and dexterity, after stroke when compared to Progressive exercise program (strenght, functional, balance, and endurance training).
- Enhanced upper limb therapy may be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Usual care.
- Robot-assisted training may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Usual care.

- High-Intensity Interval Training may be beneficial for improving performance of activities of daily living after stroke when compared to Rest control.
- Robot-assisted training may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Enhanced upper limb therapy.

A.4 Task-Specific Training (Table 4)

Key Points

- Task-related Training (Grasping or Retrieving Objects) may not be beneficial for improving motor function and spasticity after stroke when compared to Progressive Resistive Exercises.
- Task-specific training combined with other interventions may be beneficial for improving muscle strength, range of motion, proprioception, and dexterity, but not stroke severity, spasticity, and performance of activities of daily living, after stroke when compared to task-specific training; the literature is mixed regarding motor function.
- Task-specific training may be beneficial for improving dexterity, but not motor function, stroke severity, and performance of activities of daily living, after stroke when compared to conventional therapy.
- Structured, task-oriented upper extremity training (Accelerated Skill Acquisition Program) may not be beneficial for improving motor function after stroke when compared to Dose-equivalent usual occupational therapy.
- Impairment oriented training Arm BASIS with usual treatment may not be beneficial for improving motor function and spasticity after stroke when compared to usual treatment.
- Impairment oriented training Arm BASIS with usual treatment may not be beneficial for improving spasticity after stroke when compared to Bobath therapy with usual treatment; the literature is mixed regarding motor function.
- Group Circuit may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to high intensity physio or usual physiotherapy.
- Task-specific training combined with other interventions may be beneficial for improving motor function, stroke severity, spasticity, and dexterity, but not muscle strength, after stroke when compared to conventional therapy; the literature is mixed regarding performance of activities of daily living.
- Constraint induced movement therapy (constraint-induced movement therapy) with Conventional rehabilitation may be beneficial for improving motor function, performance of activities of daily living, and spasticity after stroke when compared to Upper limb task-oriented training with Conventional rehabilitation.
- Arm ability training with knowledge of results (feedback on their performance presented as charts to them) may not be beneficial for improving motor function after stroke when compared to arm ability training without knowledge of results.
- Task-specific training combined with other interventions may be beneficial for improving dexterity, but not spasticity, after stroke when compared to task-specific training or sham; the literature is mixed regarding motor function.
- Reaching task training in a 3D virtual environment may not be beneficial for improving motor function after stroke when compared to Reaching task training in physical environment (PE).
- Task-specific training may be beneficial for improving performance of activities of daily living, but not muscle strength and range of motion, after stroke when compared to no treatment; the literature is mixed regarding motor function.
- Task-Specific Circuit Training may not be beneficial for improving motor function and muscle strength after stroke when compared to Stretching with Memory exercises and Education.
- Task-specific training combined with other interventions may be beneficial for improving motor function after stroke when compared to sham or task-specific training.
- Task Specific Training may be beneficial for improving motor function and spasticity after stroke when compared to Proprioceptive Neuromuscular Facilitation.
- Unilateral and bilateral task oriented exercises may not be beneficial for improving motor function, dexterity, performance of activities of daily living, and muscle strength after stroke when compared to Walking tasks.

- Task-specific training may be beneficial for improving motor function and performance of activities of daily living after stroke when compared to training using the Bobath approach.
- Personalized reach training (active control-restricted range) with anodal transcranial direct current stimulation and Virtual reality games may not be beneficial for improving motor function and range of motion after stroke when compared to Personal reach training (active control-restricted range) with Sham transcranial direct current stimulation and video games.
- Autonomy support (training with more-affected arm and could actively adjust task difficulty) with Verbal feedback may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Training with more-affected arm with no opportunity to adjust difficulty with General verbal feedback.
- Task-oriented training with conventional therapy may be beneficial for improving performance of activities of daily living, but not dexterity, after stroke when compared to Progressive resistance exercise with conventional therapy; the literature is mixed regarding motor function.
- Dynamic resistance training (POWER) may not be beneficial for improving motor function, performance of activities of daily living, spasticity, range of motion, and stroke severity after stroke when compared to Functional Task Practice (FTP).
- Mirror therapy with Mesh glove (afferent stimulation, primarily neuromuscular electrical stimulation) may be beneficial for improving motor function, but not performance of activities of daily living, after stroke when compared to task oriented exercise.
- Mirror therapy with Mesh glove (afferent stimulation, primarily neuromuscular electrical stimulation) may be less beneficial than task oriented exercise for improving dexterity after stroke.
- Mirror therapy with Mesh glove (afferent stimulation, primarily neuromuscular electrical stimulation) may be beneficial for improving dexterity, but not motor function and performance of activities of daily living, after stroke when compared to Mirror therapy.
- Botulinum Toxin A with Task Specific Training may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Task-Specific Training.
- Whole-body vibration with Task Oriented Training and Conventional physical therapy may be beneficial for improving motor function and muscle strength after stroke when compared to Upper- and lower-Cycle group with Task Specific Training and Conventional physical therapy.
- Task-oriented training with non-immersive virtual reality with conventional rehabilitation may not be beneficial for improving motor function, performance of activities of daily living, and muscle strength after stroke when compared to task-oriented training with simple recreational activities with conventional rehabilitation.
- Task-oriented training with non-immersive virtual reality with conventional rehabilitation may be less beneficial than task-oriented training with simple recreational activities with conventional rehabilitation for improving dexterity after stroke.
- Impairment-oriented training may not be beneficial for improving motor function after stroke when compared to Conventional therapy.
- Task-oriented Robotic arm training (Haptic Master) may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Task oriented arm training.
- 120min electrical stimulation with repetitive task specific practice may be beneficial for improving motor function and performance of activities of daily living after stroke when compared to 60min electrical stimulation therapy with repetitive task specific practice or 30min electrical stimulation therapy and repetitive task specific practice.
- Repetitive motor task under vibratory feedback may be beneficial for improving motor function, but not range of motion, after stroke when compared to Repetitive motor task.
- Functional electrical stimulation with Task-specific training may not be beneficial for improving dexterity after stroke when compared to Task-specific training; the literature is mixed regarding motor function.
- Received modifed constraint-induced movement therapy with task-specific training 3hr may be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Traditional therapy.
- Received modifed constraint-induced movement therapy with task-specific training 3hr may not be beneficial for improving motor function and performance of activities of daily living after stroke when

compared to constraint-induced movement therapy-received 300 repetitions of task specific training or constraint-induced movement therapy with 600 repetitions task specific training.

- Repetitive transcranial magnetic stimulation with Task Based occupational Therapy may not be beneficial for improving motor function, dexterity, performance of activities of daily living, spasticity, stroke severity, and muscle strength after stroke when compared to Sham repetitive transcranial magnetic stimulation with Task Based Occupational Therapy.
- High-dose electrical somatosensory stimulation with task oriented training may not be beneficial for improving motor function, dexterity, proprioception, stroke severity, and muscle strength after stroke when compared to Sham (Low dose) with task oriented training.
- Nintendo Wii virtual reality training with Usual Care (conventional occupational therapy) may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to dose matched task oriented therapy (as Conventional therapy) with Usual Care (conventional occupational therapy) or Usual Care (conventional occupational therapy).
- Low frequency repetitive transcranial magnetic stimulation with reach-to-grasp (RTG) training may be beneficial for improving motor function after stroke when compared to Sham stimulation with reach-to-grasp (RTG) training.
- Virtual reality keypad or glove (PneuGlove) may not be beneficial for improving motor function and muscle strength after stroke when compared to Task Specific Training Occupational Therapy.
- Contralaterally controlled functional electrical stimulation with Task specific training may be beneficial for improving motor function, dexterity, performance of activities of daily living, and range of motion after stroke when compared to Cyclic neuromuscular electrical stimulation with Task specific training.
- Functional task practice with repetitive transcranial magnetic stimulation may not be beneficial for improving motor function, performance of activities of daily living, spasticity, range of motion, and muscle strength after stroke when compared to Functional task practice with Sham repetitive transcranial magnetic stimulation.
- Mirror therapy with task-oriented functional practice may be beneficial for improving motor function, but not performance of activities of daily living and proprioception, after stroke when compared to task-oriented functional practice.
- Somatosensory (peripheral nerve) stimulation with task specific training may be beneficial for improving motor function, but not performance of activities of daily living, after stroke when compared to Sham stimulation with task specific training.
- Repetitive task exercise with sensory amplitude electrical stimulation (SES) may not be beneficial for improving motor function, proprioception, and performance of activities of daily living after stroke when compared to repetitive task exercise with Sham stimulation.
- Sensorimotor Training with conventional therapy may not be beneficial for improving motor function, proprioception, and performance of activities of daily living after stroke when compared to Motor Training (Task-specific Training ands table top games) with conventional therapy.
- Myoelectric Continuous Control of Functional Electrical Stimulation with Task Oriented Therapy may not be beneficial for improving motor function after stroke when compared to Task Oriented Therapy.
- Electrical Epidural Motor Cortex Stimulation (EECS) with Task specific Training may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Task-specific training.
- Anodal transcranial direct current stimulation with visuomotor gripforce tracking task may not be beneficial for improving motor function and dexterity after stroke when compared to Sham transcranial direct current stimulation with visuomotor gripforce tracking task.
- Electrically assisted movement therapy (functional electrical stimulation with task specific) may be beneficial for improving performance of activities of daily living, but not spasticity, after stroke when compared to care; the literature is mixed regarding motor function.
- Electromyography-Triggered Neuromuscular Stimulation with Task-Oriented Training may be beneficial for improving dexterity after stroke when compared to electromyography-Triggered Neuromuscular Stimulation; the literature is mixed regarding motor function.

- High Frequency repetitive transcranial magnetic stimulation with Motor Task Training may not be beneficial for improving motor function after stroke when compared to Sham repetitive transcranial magnetic stimulation with Motor Task Training.
- Home-based mirror therapy and task specific training may not be beneficial for improving motor function, dexterity, performance of activities of daily living, and proprioception after stroke when compared to Clinic-based mirror therapy and task specific training.
- Bilateral UE Training with Unilateral task-oriented training may not be beneficial for improving motor function, spasticity, and dexterity after stroke when compared to Unilateral task-oriented Training (using a hand orthosis).
- Constraint-induced movement therapy with bilateral arm training may not be beneficial for improving motor function, dexterity, and performance of activities of daily living after stroke when compared to Bimanual task-related training.
- Joystim virtual reality with real instrumentation training may not be beneficial for improving motor function, spasticity, and dexterity after stroke when compared to Conventional therapy; the literature is mixed regarding muscle strength.
- Myomo electromyography powered orthosis with repetitive task-specific practice (RTP) may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Repetitive task-specific practice.
- Robot-Assisted Therapy with Bilateral Practice with Task-Specific Training may be beneficial for improving motor function after stroke when compared to Conventional Care with Task-Specific Training; the literature is mixed regarding performance of activities of daily living.
- The literature is mixed regarding the effect of Robot therapy with task training (Inmotion) on improvement of motor function after stroke when compared to Robot therapy.
- Transcutaneous Electrical Nerve Stimulation and Task-Related Training may be beneficial for improving motor function, range of motion, and muscle strength after stroke when compared to Sham Transcutaneous Electrical Nerve Stimulation and Task-Related Training.
- Robot-assisted Group Therapy with Individual Arm Therapy may not be beneficial for improving dexterity, performance of activities of daily living, spasticity, and muscle strength after stroke when compared to Individual arm therapy; the literature is mixed regarding motor function.
- Leg rehab training may be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Immobilization therapy with inflatable pressure splint (arm and leg with splints).
- Low frequency repetitive transcranial magnetic stimulation with Motor Training may not be beneficial for improving motor function after stroke when compared to Sham repetitive transcranial magnetic stimulation with Motor Training.
- Task Specific training with Trunk restraint training may be beneficial for improving motor function and range of motion after stroke when compared to Task Specific Training without Trunk restraint.
- Repetitive peripheral sensory stimulation with functional electrical stimulation and task specific training may not be beneficial for improving motor function, performance of activities of daily living, spasticity, range of motion, and muscle strength after stroke when compared to Sham RPSS with functional electrical stimulation and TST.
- Rejoyce system with occupational therapy may not be beneficial for improving motor function and stroke severity after stroke when compared to task based exercises with occupational therapy.
- Forearm rotation orthosis with occupational therapy Task-Oriented (OTTO) may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to occupational therapy Task-Oriented (OTTO).
- Anodal transcranial direct current stimulation with Repetitive Functional Task-Oriented Programme (RFTOP) may be beneficial for improving dexterity, but not motor function, after stroke when compared to Repetitive Functional Task Oriented Programme.
- Transcutaneous electrical nerve stimulation with Task oriented occupational therapy and conventional therapy may not be beneficial for improving performance of activities of daily living and spasticity after stroke when compared to Sham transcutaneous electrical nerve stimulation with Task oriented occupational therapy and conventional therapy; the literature is mixed regarding motor function.

- Sensorimotor therapy with conventional therapy may not be beneficial for improving motor function and proprioception after stroke when compared to motor therapy with conventional rehab.
- Bi-transcutaneous electrical nerve stimulation with Task Oriented Training (TOT) may be beneficial for improving motor function after stroke when compared to No Treatment.
- Electromyography-driven Robot-assisted Hand Training may not be beneficial for improving motor function after stroke when compared to Task-Oriented intervention; the literature is mixed regarding performance of activities of daily living.
- Tenodesis-induced-group-exoskeleton robot (TIGER) training with Regular task-specific motor training may be beneficial for improving motor function, but not dexterity, performance of activities of daily living, and spasticity, after stroke when compared to Conventional occupational therapy with Regular task-specific motor training.
- Anodal transcranial direct current stimulation with motor imagery and upper-limb functional training may be beneficial for improving motor function after stroke when compared to sham tCDS with motor imagery and upper-limb functional training.
- Low-frequency repetitive transcranial magnetic stimulation with motor task practice may be beneficial for improving motor function, but not muscle strength, after stroke when compared to sham repetitive transcranial magnetic stimulation with motor task practice; the literature is mixed regarding dexterity.
- Action observation with task-specific training may be beneficial for improving performance of activities of daily living, but not motor function and dexterity, after stroke when compared to Sham observation with task-specific training.
- Virtual reality with task based training may be beneficial for improving motor function and muscle strength after stroke when compared to Task-specific Training.
- CNMES with task oriented training and conventional rehab may not be beneficial for improving motor function and dexterity after stroke when compared to electromyography-triggered neuromuscular electrical stimulation with task oriented training and conventional rehab.
- Exoskeleton training Armule with TST may be beneficial for improving motor function after stroke when compared to Conventional Rehab; the literature is mixed regarding performance of activities of daily living.
- Repetitive transcranial magnetic stimulation with TST may not be beneficial for improving motor function and stroke severity after stroke when compared to Sham repetitive transcranial magnetic stimulation with TST.
- The literature is mixed regarding the effect of Bilateral transcranial direct current stimulation with TST on improvement of motor function after stroke when compared to Sham transcranial direct current stimulation with TST.
- Orthosis assistance TIGER with conventional rehab may not be beneficial for improving motor function, spasticity, proprioception, performance of activities of daily living, and dexterity after stroke when compared to Task specific training at home with conventional; the literature is mixed regarding range of motion.
- Bilateral robotic priming training with mirror training (R-mirr) may be beneficial for improving motor function, but not performance of activities of daily living and muscle strength, after stroke when compared to Bilateral robotic priming training with movement oriented training.
- Bilateral upper limb robot-assisted training with Conventional Therapy may be beneficial for improving performance of activities of daily living, but not motor function, after stroke when compared to Task-specific Therapy with Conventional Therapy.
- Portable brain-computer interface-based hand robot system with Conventional therapy and neuromuscular electrical stimulation may be beneficial for improving motor function after stroke when compared to Task-specific training with Conventional therapy and neuromuscular electrical stimulation.
- Gamified training with ArmAble with Conventional therapy may not be beneficial for improving stroke severity and muscle strength after stroke when compared to UE task-based training with Conventional therapy; the literature is mixed regarding motor function.
- Virtual reality-based robot therapy with smart glove with task-oriented therapy may be beneficial for improving motor function after stroke when compared to Task-oriented therapy; the literature is mixed regarding performance of activities of daily living.

- Forced-rate exercise with Repetitive task practice may not be beneficial for improving motor function after stroke when compared to Repetitive task practice.
- Robotic hand therapy (with objects) with Task-Oriented training and Conventional therapy may be beneficial for improving motor function, dexterity, range of motion, and muscle strength, but not spasticity, after stroke when compared to Robotic hand therapy (without objects) with Conventional therapy.
- Transcutaneous electrical nerve stimulation with wrist extensor taping and Tast-related training may be beneficial for improving motor function and spasticity, but not muscle strength, after stroke when compared to transcutaneous electrical nerve stimulation with task-related training.
- Bilateral repetitive transcranial magnetic stimulation (high-frequency repetitive transcranial magnetic stimulation with low-frequency repetitive transcranial magnetic stimulation) and Task-oriented therapy may be beneficial for improving motor function, but not spasticity, after stroke when compared to Sham high-frequency repetitive transcranial magnetic stimulation with Sham low-frequency repetitive transcranial magnetic stimulation and Task-oriented therapy.
- Bilateral repetitive transcranial magnetic stimulation (high-frequency repetitive transcranial magnetic stimulation with low-frequency repetitive transcranial magnetic stimulation) and Task-oriented therapy may not be beneficial for improving motor function and spasticity after stroke when compared to Excitatory repetitive transcranial magnetic stimulation (high-frequency repetitive transcranial magnetic stimulation with sham low-frequency repetitive transcranial magnetic stimulation) and Task-oriented therapy.
- Bilateral repetitive transcranial magnetic stimulation (high-frequency repetitive transcranial magnetic stimulation with low-frequency repetitive transcranial magnetic stimulation) and Task-oriented therapy may not be beneficial for improving motor function and spasticity after stroke when compared to Inhibitory repetitive transcranial magnetic stimulation (sham high-frequency repetitive transcranial magnetic stimulation with low-frequency repetitive transcranial magnetic stimulation) and Task-oriented therapy.
- Excitatory repetitive transcranial magnetic stimulation (high-frequency repetitive transcranial magnetic stimulation with sham low-frequency repetitive transcranial magnetic stimulation) and Task-oriented therapy may not be beneficial for improving motor function and spasticity after stroke when compared to Inhibitory repetitive transcranial magnetic stimulation (sham high-frequency repetitive transcranial magnetic stimulation with low-frequency repetitive transcranial magnetic stimulation) and Task-oriented therapy.
- Three-Dimensional Printed Dynamic Hand Device with Task-Specific Training may not be beneficial for improving dexterity and muscle strength after stroke when compared to Task-Specific Training.
- Motor Imagery with Audio Feedback and Task Specific Training may not be beneficial for improving dexterity after stroke when compared to Task-specific Training.
- Motor Imagery with Audio Feedback and Task Specific Training may not be beneficial for improving dexterity after stroke when compared to Motor imagery with TST.
- Functional integrative rehabilitation approache may not be beneficial for improving performance of activities of daily living after stroke when compared to sensorimotor integrative rehabilitation approache.
- Electrical stim with repetitive task practice may be beneficial for improving performance of activities of daily living after stroke when compared to Sham electrical with repetitive task practice.
- Dual transcranial direct current stimulation with bimanual cooperative task training may not be beneficial for improving performance of activities of daily living after stroke when compared to sham dual tDCS with bimanual cooperative task training.
- Electromyography biofeedback with task practice may not be beneficial for improving range of motion after stroke when compared to Sham biofeedback with task practice.
- Low frequency repetitive transcranial magnetic stimulation with pinch motor training (a metronome-paced pinch of their index finger and thumb of the affected hand as fast as possible) may be beneficial for improving muscle strength after stroke when compared to pinch motor training with sham repetitive transcranial magnetic stimulation.
- Progressive unsupported reaching tasks may not be beneficial for improving muscle strength after stroke when compared to Supported reaching tasks.
- Dextrain Manipulandum exercises (dexterity specific exercises with real-time feedback) with Conventional therapy may not be beneficial for improving muscle strength, proprioception, performance of activities of

daily living, and dexterity after stroke when compared to Conventional therapy; the literature is mixed regarding motor function.

- Task-Oriented Training may be beneficial for improving motor function, but not performance of activities of daily living, after stroke when compared to Table-Top Activity Training.
- The literature is mixed regarding the effect of Forced aerobic exercise with Repetitive task practice(RTP) on motor function after stroke when compared to Voluntary exercise with RTP.
- Auditory imagery with task specific training may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Cumulative imagery with task specific training.
- Visual imagery with task specific training may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Cumulative imagery with task specific training.
- Task specific training with action observation may be beneficial for improving performance of activities of daily living after stroke when compared to No treatment.
- Saebo flex Orthotic splint with intensive training may be beneficial for improving dexterity after stroke when compared to Orthotic splint; the literature is mixed regarding motor function.
- Task-specific training combined with other interventions may not be beneficial for improving motor function, muscle strength, spasticity, and performance of activities of daily living after stroke when compared to exercise and custom physiotherapy protocols.
- Task-specific training combined with other interventions may not be beneficial for improving motor function after stroke when compared to neurodevelopmental techniques (bobath approach); the literature is mixed regarding performance of activities of daily living.
- Reach-To-Grasp with robot feedback with Conventional therapy may be beneficial for improving motor function, but not performance of activities of daily living, after stroke when compared to Conventional therapy.
- Reach-To-Grasp with computer feedback with Conventional therapy may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Conventional therapy.
- Reach-To-Grasp with robot feedback with Conventional therapy may not be beneficial for improving motor function after stroke when compared to Reach-To-Grasp with computer feedback with Conventional therapy.
- Transcutaneous auricular vagus nerve stimulation with task-oriented training may be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Task-oriented training.
- EMG paired taVNS with TST may not be beneficial for improving motor function after stroke when compared to Active unpaired taVNS with TST.
- Sensory Relearning with Task-Specific Training and home exercise may not be beneficial for improving motor function, performance of activities of daily living, and dexterity after stroke when compared to Task-Specific Training with strength training; the literature is mixed regarding proprioception.
- Robotic Therapy (Armeo Spring & Amadeo) with Task Oriented Training with Active Learning Program for Stroke (ALPS) may not be beneficial for improving spasticity and performance of activities of daily living after stroke when compared to Robotic Therapy with Active Learning Program for Stroke (ALPS); the literature is mixed regarding motor function.
- Kinesiotaping with stretching & task specific trainings and conventional rehab may not be beneficial for improving stroke severity and spasticity after stroke when compared to stretching & task specific trainings with conventional rehab and Conventional Therapy; the literature is mixed regarding motor function.
- Occupation-based bilateral upper extremity training may be beneficial for improving performance of activities of daily living after stroke when compared to Task-based bilateral upper extremity training.
- Bilateral robotic priming (Bi-Manu-Track) with task oriented exercises may not be beneficial for improving motor function, stroke severity, muscle strength, performance of activities of daily living, and dexterity after stroke when compared to Task oriented exercises.
- Atomoxetine with Task Oriented Upper Extremity Training may not be beneficial for improving motor function after stroke when compared to Placebo with Task Oriented Upper Extremity Training.

- Action observation with task-specific training may be beneficial for improving motor function, performance of activities of daily living, and dexterity, but not spasticity, after stroke when compared to Task-specific training.
- 1 Hz rTMS with task oriented exercise may not be beneficial for improving motor function, performance of activities of daily living, and dexterity after stroke when compared to Sham rTMS with task oriented exercise.
- Taping with Task specific training may not be beneficial for improving motor function and stroke severity after stroke when compared to Task specific training.
- High frequency (10Hz) rTMS with task-oriented training may be beneficial for improving motor function after stroke when compared to Sham rTMS with task-oriented training.
- Robotic orthosis with Task-Specific training and Videogames (Unilateral) may not be beneficial for improving motor function, muscle strength, spasticity, performance of activities of daily living, and dexterity after stroke when compared to Usual Physical Therapy.
- Robotic orthosis with Task-Specific Training and Videogames (Bilateral) may not be beneficial for improving motor function, muscle strength, spasticity, performance of activities of daily living, and dexterity after stroke when compared to Usual Physical Therapy.
- Myomo brace (EMG triggered micro robot device) with repetitive task practice may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Repetitive task practice.
- FES with Task specific training may be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Sham with Task specific training.
- Dynamic Wrist hand orthosis (wearing while doing reach and grasp practice) with home exercise may not be beneficial for improving motor function, muscle strength, and dexterity after stroke when compared to Manual-assisted reach and grasp training therapy with home exercise.
- PNES with Task Specific Training may not be beneficial for improving motor function, muscle strength, and dexterity after stroke when compared to Task-Specific Training.
- FES with botulinum toxin-A and home based task-oriented exercise may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Botulinum toxin-A with home-based exercise program.
- FES with Standard task-specific training may be beneficial for improving motor function and dexterity after stroke when compared to Standard task-specific training.
- Cable orthosis with Virtual Reality may not be beneficial for improving motor function, muscle strength, spasticity, range of motion, and dexterity after stroke when compared to Virtual Reality.
- Pneumatic orthosis with Virtual Reality may not be beneficial for improving motor function, muscle strength, spasticity, range of motion, and dexterity after stroke when compared to Virtual Reality.
- Task-specific training with Peripheral Nerve Stimulation may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Task-specific training with Sham Stimulation; the literature is mixed regarding muscle strength.
- Active-assistive reaching exercise using a robotic device (Arm Guide) may not be beneficial for improving stroke severity after stroke when compared to Task-matched amount of reaching without assistance.
- Bilateral dexterity training with usual rehabilitation may not be beneficial for improving dexterity after stroke when compared to Unilateral dexterity training with usual rehabilitation.
- NMES with repetitive facilitative exercise may not be beneficial for improving motor function, spasticity, and range of motion after stroke when compared to Conventional Therapy.
- Repetitive facilitative exercise may be beneficial for improving motor function, but not spasticity and range of motion, after stroke when compared to Conventional Therapy.
- Different approaches to task-specific training combined with other interventions may not have a difference in efficacy when compared with one another for improving motor function, muscle strength, and range of motion.
- Different approaches to task-specific training may not have a difference in efficacy when compared with one another for improving motor function, muscle strength, and performance of activities of daily living.

- Taping with Task specific training may be less beneficial than Task specific training for improving performance of activities of daily living after stroke.
- Whole-Body Vibration (5-15 Hz) may not be beneficial for improving muscle strength and spasticity after stroke when compared to Conventional Physical Therapy; the literature is mixed regarding motor function.
- Whole-Body Vibration with Task-Related Training may be beneficial for improving motor function, muscle strength, and spasticity after stroke when compared to Conventional Physical Therapy.
- Task specific training with action observation may be beneficial for improving performance of activities of daily living after stroke when compared to Task specific training.
- ARMEO exoskeleton with conventional care may be beneficial for improving range of motion, but not motor function, spasticity, and performance of activities of daily living, after stroke when compared to Tabletop assisted exercises with conventional therapy.

A.5 Sensorimotor Training (Table 5)

Key Points

- Sensorimotor training may not be beneficial for improving motor function, performance of activities of daily living, and dexterity after stroke when compared to conventional therapy.
- Sensorimotor training combined with other interventions may not be beneficial for improving motor function, performance of activities of daily living, and proprioception after stroke when compared to task-specific training.
- 5 sessions may be beneficial for improving motor function after stroke when compared to Visual Deprivation Training or 3 sessions.
- Visual Deprivation Training may be less beneficial than 3 sessions for improving motor function after stroke.
- Functional strength training may not be beneficial for improving motor function and muscle strength after stroke when compared to Movement performance therapy.
- Intensive Sensorimotor Arm Training Mediated by robot may not be beneficial for improving motor function and spasticity after stroke when compared to Intensive Sensorimotor Arm Training Mediated by Therapist.
- Proprioception Training with Conventional Therapy may be beneficial for improving motor function, spasticity, and proprioception, but not performance of activities of daily living, after stroke when compared to Conventional Therapy.
- Dual transcranial direct current stimulation with Sensorimotor training may be beneficial for improving motor function, dexterity, performance of activities of daily living, and proprioception after stroke when compared to Sham transcranial direct current stimulation with Sensorimotor training.
- Functional integrative rehabilitation approache may not be beneficial for improving performance of activities of daily living after stroke when compared to sensorimotor integrative rehabilitation approache.
- Sensorimotor training with conventional therapy may be beneficial for improving stroke severity after stroke when compared to conventional therapy alone.
- Sensory Relearning with Task-Specific Training and home exercise may not be beneficial for improving motor function, performance of activities of daily living, and dexterity after stroke when compared to Task-Specific Training with strength training; the literature is mixed regarding proprioception.
- Proprioceptive Training (involving passive and active movements with visual feedback) may be beneficial for improving motor function and proprioception, but not performance of activities of daily living and dexterity, after stroke when compared to Nonspecific sensory stimulation.
- Stochastic resonance stimulation (subthreshold electrical with vibration stimulations) and Conventional occupational therapy may not be beneficial for improving motor function, proprioception, and performance of activities of daily living after stroke when compared to Sham stimulation with Conventional occupational therapy.
- Perturbation-Based Pinch Task-Specific Training with Sensorimotor Stimulation training may be beneficial for improving proprioception and dexterity, but not motor function, spasticity, and performance of activities of daily living, after stroke when compared to Upper Extremity Task-Specific Training with Sensorimotor Stimulation Training.

A.6 Constraint-Induced Movement Therapy (CIMT) (Table 6)

Key Points

- Received modifed constraint-induced movement therapy with task-specific training 3hr may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to constraint-induced movement therapy-received 300 repetitions of task specific training or constraint-induced movement therapy with 600 repetitions task specific training.
- Constraint-induced movement therapy: some approaches may be more beneficial than others for improving muscle strength and performance of activities of daily living; different approaches to constraint-induced movement therapy may not have a difference in efficacy when compared with one another for improving motor function and proprioception.
- Constraint-induced movement therapy may not be beneficial for improving motor function, stroke severity, muscle strength, spasticity, range of motion, and dexterity after stroke when compared to conventional therapy; the literature is mixed regarding performance of activities of daily living.
- Left-Modified Constraint Induced Movement Therapy with Conventional therapy may not be beneficial for improving motor function, dexterity, and performance of activities of daily living after stroke when compared to Right-Modified Constraint Induced Movement Therapy with Conventional therapy.
- Modified constraint-induced movement therapy with daily physical therapy may not be beneficial for improving motor function after stroke when compared to self-regulated constraint-induced movement therapy with daily physical therapy.
- Modified constraint-induced movement therapy with daily physical therapy may be less beneficial than self-regulated constraint-induced movement therapy with daily physical therapy for improving performance of activities of daily living after stroke.
- Constraint-induced movement therapy combined with other interventions may be beneficial for improving motor function, range of motion, and performance of activities of daily living, but not spasticity, after stroke when compared to constraint-induced movement therapy.
- Constraint-induced movement therapy combined with other interventions may be beneficial for improving spasticity, but not muscle strength and performance of activities of daily living, after stroke when compared to constraint-induced movement therapy or sham; the literature is mixed regarding motor function and dexterity.
- The literature is mixed regarding the effect of Constraint-induced movement therapy on improvement of motor function after stroke when compared to conventional therapy or no treatment.
- Modified constraint-induced movement therapy may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Bilateral training.
- Constraint-induced movement therapy combined with other interventions may be beneficial for improving spasticity, but not stroke severity, muscle strength, range of motion, proprioception, performance of activities of daily living, and dexterity, after stroke when compared to conventional therapy; the literature is mixed regarding motor function.
- Robotic self training with constraint-induced movement therapy may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Robotic self training with conventional care.
- Distributed Constraint-Induced Movement Therapy with Trunk Restraint may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Distributed Constraint-Induced Movement Therapy.
- Constraint-induced movement therapy combined with other interventions may be beneficial for improving performance of activities of daily living, but not motor function and dexterity, after stroke when compared to motor relearning programmes.
- Constraint-induced movement therapy may be beneficial for improving motor function after stroke when compared to no treatment or conventional therapy.
- Expanded constraint-induced movement therapy may be beneficial for improving performance of activities of daily living after stroke when compared to usual care or placebo treatment; the literature is mixed regarding motor function.

- Constraint-induced movement therapy may not be beneficial for improving motor function after stroke when compared to Bobath therapy; the literature is mixed regarding performance of activities of daily living.
- Donepezil with constraint-induced movement therapy may not be beneficial for improving motor function, dexterity, and performance of activities of daily living after stroke when compared to Placebo with constraint-induced movement therapy.
- Mental practice with modified constraint-induced movement therapy may be beneficial for improving motor function and performance of activities of daily living after stroke when compared to modified constraint-induced movement therapy.
- Scalp cluster acupuncture with constraint-induced movement therapy may be beneficial for improving motor function after stroke when compared to Body acupuncture with traditional rehabilitation.
- Constraint-induced movement therapy with bilateral arm training may not be beneficial for improving motor function, dexterity, and performance of activities of daily living after stroke when compared to Bimanual task-related training.
- Constraint-induced movement therapy with Conventional therapy and Hand mitt may be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Conventional therapy with Hand mitt.
- Modified constraint-induced movement therapy with conventional physical therapy may be beneficial for improving motor function after stroke when compared to HABIT (hand arm bimanual intensive training) with conventional physical therapy.
- BtxA (Dysport) with modified constraint-induced movement therapy may be beneficial for improving motor function and performance of activities of daily living, but not spasticity, after stroke when compared to BtxA (Dysport) with conventional rehabilitation.
- Botox with modified constraint-induced movement therapy may be beneficial for improving motor function and performance of activities of daily living, but not spasticity, after stroke when compared to Botox with Conventional therapy (high dose).
- High frequency repetitive transcranial magnetic stimulation with constraint-induced movement therapy may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Sham repetitive transcranial magnetic stimulation with constraint-induced movement therapy.
- Unilateral robot assisted therapy with modified constraint-induced movement therapy may not be beneficial for improving motor function after stroke when compared to Robot assist therapy; the literature is mixed regarding performance of activities of daily living.
- Unilateral robot assisted therapy with modified constraint-induced movement therapy may not be beneficial for improving motor function after stroke when compared to Bilateral robot assisted therapy with bilateral arm training.
- Unilateral robot assisted therapy with modified constraint-induced movement therapy may be less beneficial than Bilateral robot assisted therapy with bilateral arm training for improving performance of activities of daily living after stroke.
- The literature is mixed regarding the effect of Robot-Assisted Therapy with Modified Constraint-Induced Therapy on improvement of motor function and performance of activities of daily living after stroke when compared to Robot-Assisted Therapy.
- Nintendo Wii-based movement therapy may be beneficial for improving performance of activities of daily living, but not motor function, dexterity, spasticity, and range of motion, after stroke when compared to Modified constraint-induced movement therapy.
- Unilateral robot assisted therapy with constraint-induced movement therapy (unilateral arm) may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Robot assisted therapy alone (both modes).
- Unilateral robot assisted therapy with constraint-induced movement therapy (unilateral arm) may not be beneficial for improving performance of activities of daily living after stroke when compared to Bilateral robot assisted therapy with BAT (Bimanual tracking).

- Unilateral robot assisted therapy with constraint-induced movement therapy (unilateral arm) may be less beneficial than Bilateral robot assisted therapy with BAT (Bimanual tracking) for improving motor function after stroke.
- Shaping training with constraint-induced movement therapy transfer package (TP) may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Shaping training.
- Robot therapy with distributed constraint induced therapy may not be beneficial for improving performance of activities of daily living after stroke when compared to Conventional Therapy; the literature is mixed regarding motor function.
- Robot therapy with distributed constraint induced therapy may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to robot therapy alone.
- Distributed Constraint-Induced Therapy may be beneficial for improving motor function, but not performance of activities of daily living, after stroke when compared to conventional care.
- Distributed constraint-induced therapy may be beneficial for improving motor function, but not performance of activities of daily living, after stroke when compared to bilateral arm training.
- The literature is mixed regarding the effect of Distributed constraint-induced therapy on improvement of motor function and performance of activities of daily living after stroke when compared to control treatment.
- Low frequency repetitive transcranial magnetic stimulation with occupational therapy training may be beneficial for improving motor function after stroke when compared to constraint-induced movement therapy.
- Tele-Health constraint-induced movement therapy may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to In-Lab constraint-induced movement therapy.
- Robot-assisted Therapy with conventional rehab may not be beneficial for improving motor function, performance of activities of daily living, and spasticity after stroke when compared to Constraint induced movement therapy with conventional rehab.
- Bilateral transcranial direct current stimulation with modified constraint-induced movement therapy and conventional rehab may be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Sham transcranial direct current stimulation with modified constraint-induced movement therapy and conventional rehab.
- Anodal transcranial direct current stimulation with constraint-induced movement therapy may not be beneficial for improving motor function after stroke when compared to Sham transcranial direct current stimulation with constraint-induced movement therapy.
- Constraint-induced movement therapy in-person may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Constraint-induced movement therapy via telerehabilitation.
- Mirror Therapy may be beneficial for improving motor function after stroke when compared to modified constraint-induced movement therapy.
- Constraint induced movement therapy (constraint-induced movement therapy) with Conventional rehabilitation may be beneficial for improving motor function, performance of activities of daily living, and spasticity after stroke when compared to Conventional rehabilitation.
- Constraint induced movement therapy (constraint-induced movement therapy) with Conventional rehabilitation may be beneficial for improving motor function, performance of activities of daily living, and spasticity after stroke when compared to Upper limb task-oriented training with Conventional rehabilitation.
- Constraint-induced movement therapy combined with other interventions may be beneficial for improving dexterity and muscle strength, but not stroke severity, after stroke when compared to constraint-induced movement therapy alone.
- Constraint-induced movement therapy may be beneficial for improving spasticity after stroke when compared to Motor learning programme.
- Modified constraint-induced movement therapy with trunk restraint may be beneficial for improving range of motion after stroke when compared to modified constraint-induced movement therapy.

- CIMT may not be beneficial for improving motor function, muscle strength, range of motion, and performance of activities of daily living after stroke when compared to Therapeutic Climbing.
- Kinesiotape with mCIMT may not be beneficial for improving motor function, stroke severity, spasticity, and dexterity after stroke when compared to Sham Kinesiotape with mCIMT.
- Dual tDCS with mCIMT and conventional rehabilitation may not be beneficial for improving motor function after stroke when compared to Sham Dual tDCS with mCIMT and conventional rehabilitation; the literature is mixed regarding performance of activities of daily living.
- Dual-tDCS combined with PNMES with CIMT may be beneficial for improving motor function after stroke when compared to CIMT; the literature is mixed regarding performance of activities of daily living.
- Anodal tDCS with Modified CIMT may not be beneficial for improving muscle strength after stroke when compared to Sham tDCS with CIMT; the literature is mixed regarding motor function.
- Trunk training with mCIMT may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to mCIMT.
- CIMT-6hr with cycloserine may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to CIMT-6hr with placebo.
- Modified Constraint-Induced Movement Therapy with Exercise/custom physiotherapy (Telerehabilitation) may be beneficial for improving motor function, muscle strength, performance of activities of daily living, and dexterity after stroke when compared to Home exercise program.
- Constraint-induced movement therapy combined with other interventions may be beneficial for improving performance of activities of daily living, but not dexterity, after stroke when compared to bilateral arm training; the literature is mixed regarding motor function and muscle strength.
- Cathodal tDCS with Modified CIMT may not be beneficial for improving motor function and muscle strength after stroke when compared to Sham tDCS with CIMT.
- Kinesiotape may not be beneficial for improving motor function, stroke severity, spasticity, and dexterity after stroke when compared to Sham Kinesiotape with mCIMT.

A.7 Trunk Restraint (Table 7)

Key Points

- Balance Training with Affected Hand at Low Back may be beneficial for improving motor function and spasticity, but not performance of activities of daily living, after stroke when compared to Balance Training.
- Task Specific training with Trunk restraint training may be beneficial for improving motor function and range of motion after stroke when compared to Task Specific Training without Trunk restraint.
- Trunk support with visual feedback SMART upper limb training system may be beneficial for improving motor function and performance of activities of daily living, but not range of motion, after stroke when compared to Trunk restraint with visual feedback SMART upper limb training system; the literature is mixed regarding muscle strength.
- Task-related Training with Trunk Restraint may not be beneficial for improving motor function and range of motion after stroke when compared to Resistive Exercises with Trunk Restraint.
- Modified constraint-induced movement therapy with trunk restraint may be beneficial for improving motor function, performance of activities of daily living, and range of motion after stroke when compared to modified constraint-induced movement therapy.
- Task specific training with trunk restraint may be beneficial for improving motor function, but not dexterity and muscle strength, after stroke when compared to Task specific training.
- Distributed Constraint-Induced Movement Therapy with Trunk Restraint may be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Conventional Therapy.
- Distributed Constraint-Induced Movement Therapy with Trunk Restraint may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Distributed Constraint-Induced Movement Therapy.
- Robot-assisted therapy (Armeo Spring system) with trunk restraint and general physical therapy may be beneficial for improving motor function after stroke when compared to Robot-assisted therapy (RT) with

sham trunk restraint and general physical therapy; the literature is mixed regarding performance of activities of daily living and muscle strength.

- Bilateral transcranial direct current stimulation with trunk restraint or training and Conventional physical therapy may be beneficial for improving motor function after stroke when compared to Conventional physical therapy.
- Bilateral transcranial direct current stimulation with trunk restraint or training and Conventional physical therapy may be beneficial for improving motor function after stroke when compared to Sham transcranial direct current stimulation with trunk restraint or training and Conventional physical therapy.
- Robotic rehab with trunk rehab may not be beneficial for improving motor function after stroke when compared to Conventional rehab with trunk rehab.
- Trunk training with mCIMT may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to mCIMT.
- MCIMT with trunk restraint may be beneficial for improving motor function, range of motion, and performance of activities of daily living after stroke when compared to mCIMT alone.
- Distributed constraint-induced therapy (dCIT) with trunk restraint may be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Conventional Therapy.
- DCIT may be beneficial for improving performance of activities of daily living, but not motor function, after stroke when compared to Conventional Therapy.
- Trunk Restraint Training with auditory feedback may not be beneficial for improving motor function, muscle strength, range of motion, and performance of activities of daily living after stroke when compared to Trunk Restraint Training with tactile feedback.
- Modified Constraint Induced Movement Therapy (mCIMT) with Trunk Restraint may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to modified constraint Induced Movement Therapy (mCIMT).

A.8 Stretching Programs (Table 8)

Key Points

- Passive stretching and joint mobilization: some approaches may be more beneficial than others for improving performance of activities of daily living; different approaches to passive stretching and joint mobilization may not have a difference in efficacy when compared with one another for improving motor function, muscle strength, and spasticity.
- Stretching and positioning programs may be beneficial for improving motor function, but not muscle strength, spasticity, range of motion, and performance of activities of daily living, after stroke when compared to conventional therapy; the literature is mixed regarding dexterity.
- Static arm positioning with neuromuscular electrical stimulation may not be beneficial for improving motor function, spasticity, range of motion, and performance of activities of daily living after stroke when compared to Sham positioning and sham neuromuscular electrical stimulation.
- Chiropractic spinal adjustments with physical therapy may be beneficial for improving motor function, but not stroke severity, after stroke when compared to Sham Chiro with physical therapy.
- Upper limb training with position changes, bedside exercise and resistance bands with Conventional rehabilitation may be beneficial for improving motor function and muscle strength after stroke when compared to Basic Upper limb training with Conventional rehabilitation.
- Acupuncture with neuromuscular joint facilitation may be beneficial for improving motor function and range of motion, but not performance of activities of daily living, after stroke when compared to Acupuncture.
- Isokinetic strengthening may not be beneficial for improving dexterity, performance of activities of daily living, spasticity, and muscle strength after stroke when compared to Passive joint mobilization.
- Isokinetic strengthening may be less beneficial than Passive joint mobilization for improving motor function after stroke.
- Muscle strength trainining and task specific exercise may not be beneficial for improving motor function and dexterity after stroke when compared to Traditional passive stretch and Range of Motion exercises.

- Mirror therapy may be beneficial for improving proprioception after stroke when compared to Passive mobilization; the literature is mixed regarding motor function.
- Task-Specific Circuit Training may not be beneficial for improving motor function and muscle strength after stroke when compared to Stretching with Memory exercises and Education.
- Games-based training using an exoskeleton with usual rehab may not be beneficial for improving motor function, performance of activities of daily living, and spasticity after stroke when compared to basic stretching and active exercises with usual rehab.
- Boxing training may be beneficial for improving motor function after stroke when compared to No intervention or therapy.
- Boxing training may be beneficial for improving motor function after stroke when compared to Scapular stabilization training.
- Botulinum toxin A injection with structured stretching exercises and conventional rehabilitation may be beneficial for improving performance of activities of daily living and spasticity, but not motor function, after stroke when compared to Self-stretching exercises with conventional rehabilitation.
- Upper limb control of less-affected side with real-time feedback may be beneficial for improving performance of activities of daily living, but not motor function, after stroke when compared to Upper limb control of affected side with real-time feedback; the literature is mixed regarding range of motion and muscle strength.
- Sling-suspension-based active shoulder joint exercises with General rehab (physcial therapy and functional electrical stimulation) may be beneficial for improving motor function after stroke when compared to Motorized upper extremity exercise (passive exercises) with General rehab (physcial therapy and functional electrical stimulation); the literature is mixed regarding muscle strength.
- Blocked neuromuscular electrical stimulation training (neuromuscular electrical stimulation with Hand range of motion training) may be beneficial for improving dexterity and muscle strength after stroke when compared to Hand range of motion exercises (Passive movements, voluntary UE extensions or abduction).
- Blocked neuromuscular electrical stimulation training (neuromuscular electrical stimulation with Hand range of motion training) may not be beneficial for improving dexterity after stroke when compared to Random neuromuscular electrical stimulation training (neuromuscular electrical stimulation with Hand range of motion training).
- The literature is mixed regarding the effect of Stretching with Joint-stabilizing exercises on improvement of performance of activities of daily living after stroke when compared to exercise.
- Stretching with Joint-stabilizing exercises may be less beneficial than Stretching for improving performance of activities of daily living after stroke.
- Botox-A with adhesive taping may be beneficial for improving spasticity after stroke when compared to Botox-A with Manual Stretching (with splint to maintain maximum stretching); the literature is mixed regarding performance of activities of daily living.
- High intensity laser (HILT) with therapeutic exercise program and regular rehab may be beneficial for improving performance of activities of daily living and stroke severity, but not spasticity and range of motion, after stroke when compared to therapeutic exercise program with regular rehab.
- Nurse supervised or assisted range of motion exercise programs may be beneficial for improving performance of activities of daily living and range of motion after stroke when compared to usual care.
- Muscle vibration may be beneficial for improving spasticity after stroke when compared to Stretch control or Rest control.
- Radial Shock Wave Therapy with Infrared therapy and Static Stretching may be beneficial for improving spasticity after stroke when compared to Infrared therapy with Static Stretching.
- Static positional stretching may not be beneficial for improving spasticity after stroke when compared to conventional care.
- Positioning in Neutral may be beneficial for improving range of motion after stroke when compared to Conventional Positioning.
- Muscle stretching regime with standard arm care may not be beneficial for improving range of motion after stroke when compared to standard arm care.

- Sustained positioning with a multidisciplinary rehabilitation program may not be beneficial for improving range of motion after stroke when compared to a multidisciplinary rehabilitation program alone.
- Proprioceptive neuromuscular facilitation exercises with neuromobilization of the affected upper extremity may be beneficial for improving proprioception after stroke when compared to proprioceptive neuromuscular facilitation exercises without neuromobilization or conventional care.
- Gloreha Aria (Robotic exoskeleton) with Virtual reality and Conventional therapy may not be beneficial for improving motor function, muscle strength, and performance of activities of daily living after stroke when compared to Self mobilization with Conventional therapy.
- Aerobic exercise may be beneficial for improving muscle strength, but not motor function, after stroke when compared to Stretching exercise.
- NMES may be beneficial for improving motor function after stroke when compared to Passive extension exercises.
- Passive stretching and joint mobilization may be beneficial for improving motor function, performance of activities of daily living, and dexterity, but not stroke severity and spasticity, after stroke when compared to conventional therapy.

A.9 Orthotics and Taping (Table 9)

Key Points

- Orthotics may not be beneficial for improving motor function, spasticity, range of motion, and performance of activities of daily living after stroke when compared to conventional therapy; the literature is mixed regarding muscle strength.
- Orthotics may be beneficial for improving spasticity, but not range of motion, after stroke when compared to no treatment; the literature is mixed regarding motor function.
- Actimove Sling may not be beneficial for improving spasticity after stroke when compared to Shoulderlift Sling.
- Actimove Sling may be less beneficial than Shoulderlift Sling for improving motor function after stroke.
- Kinesio taping may not be beneficial for improving motor function, range of motion, and performance of activities of daily living after stroke when compared to sham.
- Impairment-oriented training may not be beneficial for improving motor function after stroke when compared to Conventional therapy.
- Shoulder sling exercise (Sling Suspension System on Shoulder Subluxation) may be beneficial for improving motor function and proprioception after stroke when compared to bilateral arm training.
- Mod wheelchair arm support with services may be beneficial for improving performance of activities of daily living, but not motor function, after stroke when compared to traditional wheelchair arm support with services.
- Kinesio taping may be beneficial for improving motor function, but not performance of activities of daily living, spasticity, range of motion, and stroke severity, after stroke when compared to conventional therapy.
- Orthotics combined with other interventions may not be beneficial for improving motor function, dexterity, performance of activities of daily living, and muscle strength after stroke when compared to task-specific training.
- Sling-suspension-based active shoulder joint exercises with General rehab (physcial therapy and functional electrical stimulation) may be beneficial for improving motor function after stroke when compared to Motorized upper extremity exercise (passive exercises) with General rehab (physcial therapy and functional electrical stimulation); the literature is mixed regarding muscle strength.
- Intramuscular neuromuscular electrical stimulation may not be beneficial for improving motor function, performance of activities of daily living, and spasticity after stroke when compared to Sling.
- Kinesio tape with acupuncture may not be beneficial for improving motor function, spasticity, and range of motion after stroke when compared to Acupuncture.
- Robot-mediated therapy (GENTLE/s) may be beneficial for improving motor function, but not performance of activities of daily living and range of motion, after stroke when compared to Sling suspension phase.

- Task specific exercises with wrist or finger extension splint may be beneficial for improving motor function and dexterity after stroke when compared to Traditional passive stretch and range of motion exercises.
- Constraint-induced movement therapy with Conventional therapy and Hand mitt may be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Conventional therapy with Hand mitt.
- Transcutaneous electrical nerve stimulation with wrist extensor taping and Tast-related training may be beneficial for improving motor function and spasticity, but not muscle strength, after stroke when compared to transcutaneous electrical nerve stimulation with task-related training.
- Longitudinal strapping may not be beneficial for improving performance of activities of daily living and spasticity after stroke when compared to Circumferential strapping.
- Therapeutic strapping may not be beneficial for improving performance of activities of daily living, spasticity, and range of motion after stroke when compared to Placebo or care.
- Orthotics combined with other interventions may be beneficial for improving performance of activities of daily living, but not spasticity and range of motion, after stroke when compared to exercise and custom physiotherapy protocols.
- Jeonbuk Tri-pull taping (Shoulder kinesiology taping) with Conventional therapy may be beneficial for improving performance of activities of daily living, but not range of motion, after stroke when compared to Sham taping with Conventional therapy.
- Botox-A with adhesive taping may be beneficial for improving spasticity after stroke when compared to Botox-A with Manual Stretching (with splint to maintain maximum stretching); the literature is mixed regarding performance of activities of daily living.
- Electrical Stimulation to Wrist and Finger Extensors with Splint may not be beneficial for improving performance of activities of daily living, spasticity, range of motion, and muscle strength after stroke when compared to Splint.
- Cryotherapy on spastic wrist flexors with Kinesiotherapy may not be beneficial for improving muscle strength after stroke when compared to neuromuscular electrical stimulation on wrist extensors.
- Kinesiotape with mCIMT may not be beneficial for improving motor function, stroke severity, spasticity, and dexterity after stroke when compared to Sham Kinesiotape with mCIMT.
- Kinesiotaping with stretching & task specific trainings and conventional rehab may not be beneficial for improving stroke severity and spasticity after stroke when compared to stretching & task specific trainings with conventional rehab and Conventional Therapy; the literature is mixed regarding motor function.
- Taping with Task specific training may not be beneficial for improving motor function and stroke severity after stroke when compared to Task specific training.
- Dynamic Wrist hand orthosis (wearing while doing reach and grasp practice) with home exercise may not be beneficial for improving motor function, muscle strength, and dexterity after stroke when compared to Manual-assisted reach and grasp training therapy with home exercise.
- Integrated volitional electrical stimulator (IVES) with wrist splint may be beneficial for improving motor function, but not performance of activities of daily living, after stroke when compared to wrist splint.
- Cable orthosis with Virtual Reality may not be beneficial for improving motor function, muscle strength, spasticity, range of motion, and dexterity after stroke when compared to Virtual Reality.
- Pneumatic orthosis with Virtual Reality may not be beneficial for improving motor function, muscle strength, spasticity, range of motion, and dexterity after stroke when compared to Virtual Reality.
- Thermoplastic resting splint (5wk) may not be beneficial for improving muscle strength after stroke when compared to Thermoplastic resting splint (6wk).
- Spint 22hr/d may not be beneficial for improving spasticity after stroke when compared to Splint 6hr/d.
- Splint 12hr/d may not be beneficial for improving spasticity after stroke when compared to Splint 6hr/d.
- Orthotics combined with other interventions may not be beneficial for improving motor function, muscle strength, performance of activities of daily living, and dexterity after stroke when compared to conventional therapy.
- Task oriented training with Lycra glove may not be beneficial for improving motor function, muscle strength, spasticity, performance of activities of daily living, and dexterity after stroke when compared to Task oriented training.

- Botulinum toxin A injection with Lycra splint orthotic and upper-limb rehabilitation may not be beneficial for improving motor function, muscle strength, spasticity, proprioception, and dexterity after stroke when compared to Botulinum toxin-A injection with rehab.
- Saebo flex Orthotic splint with intensive training may be beneficial for improving dexterity after stroke when compared to Orthotic splint; the literature is mixed regarding motor function.
- Orthotics: some approaches may be more beneficial than others for improving motor function, spasticity, and range of motion; different approaches to Orthotics may not have a difference in efficacy when compared with one another for improving muscle strength and performance of activities of daily living.
- Taping with Task specific training may be less beneficial than Task specific training for improving performance of activities of daily living after stroke.
- Kinesiotape may not be beneficial for improving motor function, stroke severity, spasticity, and dexterity after stroke when compared to Sham Kinesiotape with mCIMT.

A.10 Mirror Therapy (Table 10)

Key Points

- Mirror Therapy may be beneficial for improving motor function, stroke severity, performance of activities of daily living, and dexterity, but not muscle strength and spasticity, after stroke when compared to conventional therapy; the literature is mixed regarding proprioception.
- Video augmented mirror therapy with conventional therapy may not be beneficial for improving dexterity after stroke when compared to traditional mirror therapy with conventional therapy; the literature is mixed regarding motor function.
- Mirror Therapy may be beneficial for improving motor function, muscle strength, performance of activities of daily living, and dexterity, but not spasticity, after stroke when compared to sham; the literature is mixed regarding stroke severity.
- Individual mirror therapy may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Group mirror therapy; the literature is mixed regarding spasticity.
- Mirror Therapy combined with other interventions may be beneficial for improving motor function and dexterity after stroke when compared to sham.
- Leap motion virtual reality with mirror therapy may be beneficial for improving motor function after stroke when compared to Mirror therapy.
- Mirror therapy with high frequency repetitive transcranial magnetic stimulation and Traditional physical therapy may be beneficial for improving motor function and dexterity after stroke when compared to Mirror therapy with Traditional physical therapy.
- Mirror Therapy combined with other interventions may be beneficial for improving motor function, but not performance of activities of daily living and proprioception, after stroke when compared to task-specific training.
- Mirror Therapy combined with other interventions may be less beneficial than task-specific training for improving dexterity after stroke.
- Mirror therapy with Mesh glove (afferent stimulation, primarily neuromuscular electrical stimulation) may be beneficial for improving dexterity, but not motor function and performance of activities of daily living, after stroke when compared to Mirror therapy.
- Home-based mirror therapy and task specific training may not be beneficial for improving motor function, dexterity, performance of activities of daily living, and proprioception after stroke when compared to Clinic-based mirror therapy and task specific training.
- Functional Electrical Stimulation may be beneficial for improving motor function, but not performance of activities of daily living, after stroke when compared to Mirror Therapy.
- Functional Electrical Stimulation may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Functional Electrical Stimulation with Mirror Therapy.
- Mirror Therapy may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Functional Electrical Stimulation with Mirror Therapy.

- Mirror therapy with Mesh glove afferent stimulation may be beneficial for improving dexterity and performance of activities of daily living, but not motor function, spasticity, and proprioception, after stroke when compared to Mirror therapy.
- Mirror therapy with usual care may not be beneficial for improving motor function, dexterity, spasticity, proprioception, and muscle strength after stroke when compared to Lower-limb exercise with usual care.
- Mirror therapy may be beneficial for improving proprioception after stroke when compared to Passive mobilization; the literature is mixed regarding motor function.
- Mirror Therapy combined with other interventions may be beneficial for improving motor function and performance of activities of daily living, but not dexterity, after stroke when compared to bilateral arm training.
- Mirror Therapy combined with other interventions may be beneficial for improving muscle strength, but not motor function and performance of activities of daily living, after stroke when compared to sham or robotics.
- Virtual reality-based mirror therapy (virtual reality-mirror therapy) with conventional occupational therapy may not be beneficial for improving motor function, dexterity, and performance of activities of daily living after stroke when compared to conventional occupational therapy.
- Virtual reality-based mirror therapy (virtual reality-mirror therapy) with conventional occupational therapy may be beneficial for improving dexterity, but not motor function and spasticity, after stroke when compared to mirror therapy with conventional occupational therapy.
- Mirror therapy with TOT may be beneficial for improving motor function after stroke when compared to Conventional therapy (TOT).
- Mirror therapy with TOT may not be beneficial for improving motor function after stroke when compared to Cognitive therapeutic exercise with TOT.
- Unilateral mirror therapy with Unimanual training may not be beneficial for improving motor function, performance of activities of daily living, and proprioception after stroke when compared to Mirror therapy.
- Unilateral mirror therapy with Unimanual training may not be beneficial for improving motor function, performance of activities of daily living, and proprioception after stroke when compared to Unilateral mirror therapy with Bimanual training.
- Unilateral mirror therapy with Bimanual training may not be beneficial for improving motor function and proprioception after stroke when compared to Bilateral mirror therapy with Bimanual training; the literature is mixed regarding performance of activities of daily living.
- Mirror Therapy combined with other interventions may be beneficial for improving motor function after stroke when compared to constraint-induced movement therapy.
- Functional Electrical Stimulation with Mirror Therapy may not be beneficial for improving dexterity after stroke when compared to Functional Electrical Stimulation with Sham Mirror Therapy; the literature is mixed regarding motor function and stroke severity.
- Bilateral electromyography-triggered multi-channel electrostimulation with mirror therapy may not be beneficial for improving motor function, dexterity, performance of activities of daily living, and proprioception after stroke when compared to bilateral electromyography-triggered multi-channel electrostimulation.
- Immediate Mirror therapy with electromyography-triggered neuromuscular electrical stimulation and Physical and Occupational therapy may be beneficial for improving motor function and range of motion after stroke when compared to delayed Mirror therapy with electromyography-triggered neuromuscular electrical stimulation and Physical and Occupational therapy.
- Bilateral arm training; visual fb mirror therapy may not be beneficial for improving motor function after stroke when compared to bilateral arm training without mirror therapy.
- Robotic Priming with mirror therapy (RMT) may not be beneficial for improving motor function, proprioception, and performance of activities of daily living after stroke when compared to Robotic Priming with Bilateral Upper Limb Training (RBULT).
- RMT may not be beneficial for improving motor function and muscle strength after stroke when compared to mirror therapy.

- Functional electrical stimulation-Biofeedback mirror therapy with conventional may be beneficial for improving motor function and range of motion, but not performance of activities of daily living and stroke severity, after stroke when compared to Mirror therapy with conventional rehab.
- Bilateral robotic priming training with mirror training (R-mirr) may be beneficial for improving motor function, but not performance of activities of daily living and muscle strength, after stroke when compared to Bilateral robotic priming training with movement oriented training.
- Virtual reality-based mirror therapy with conventional physical therapy may be beneficial for improving motor function and dexterity after stroke when compared to Conventional physical therapy.
- Virtual reality-based mirror therapy with conventional physical therapy may be beneficial for improving motor function and dexterity after stroke when compared to Traditional mirror therapy with conventional physical therapy.
- Contralaterally controlled functional electrical stimulation with CT may not be beneficial for improving motor function, performance of activities of daily living, and muscle strength after stroke when compared to Conventional therapy.
- Mirror therapy with conventional therapy may be beneficial for improving motor function and spasticity after stroke when compared to conventional therapy alone.
- Brunnstrom movement therapy with conventional therapy may be beneficial for improving motor function and stroke severity after stroke when compared to mirror therapy with conventional therapy.
- Mental practice combined with other interventions may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to mirror therapy.
- High-frequency repetitive transcranial magnetic stimulation with Task-oriented mirror therapy may not be beneficial for improving dexterity after stroke when compared to High-frequency repetitive transcranial magnetic stimulation; the literature is mixed regarding muscle strength.
- Motor learning program may be beneficial for improving performance of activities of daily living after stroke when compared to Mirror therapy.
- Mirror Therapy with Conventional Therapy may be beneficial for improving stroke severity after stroke when compared to Conventional Therapy.
- Mirror therapy may be beneficial for improving motor function after stroke when compared to No treatment/not mentioned.
- Virtual Reality Mirror Therapy may not be beneficial for improving motor function after stroke when compared to Standard Mirror Therapy.
- Movement based mirror therapy with conventional therapy may not be beneficial for improving spasticity and performance of activities of daily living after stroke when compared to Task based mirror therapy with conventional therapy; the literature is mixed regarding motor function.
- Mirror therapy may not be beneficial for improving motor function after stroke when compared to Vibration therapy.
- Mirror therapy may not be beneficial for improving motor function, muscle strength, and dexterity after stroke when compared to EMG-triggered neuromuscular stimulation.
- Functional electrical stimulation with biofeedback with mirror therapy may be beneficial for improving motor function, muscle strength, and dexterity, but not range of motion and performance of activities of daily living, after stroke when compared to FES with mirror therapy.
- Mirror Therapy combined with other interventions may be beneficial for improving motor function and performance of activities of daily living, but not muscle strength, spasticity, and range of motion, after stroke when compared to conventional therapy; the literature is mixed regarding dexterity.
- Mirror Therapy combined with other interventions may be beneficial for improving motor function and dexterity, but not spasticity and performance of activities of daily living, after stroke when compared to mirror therapy.
- Robot-assisted training (Bi-Manu-Track BMT robotic arm) with BoNT-A injection and functional practice may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to conventional task-oriented movement training with BoNT-A injection and functional practice.

- Mirror therapy with BoNT-A injection and functional practice may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to conventional task-oriented movement training with BoNT-A injection and functional practice.
- Sequential Combination of Anodal tDCS with Mirror Therapy may be beneficial for improving performance of activities of daily living, but not motor function, after stroke when compared to Sham tDCS with Mirror Therapy.
- Mirror and strength training therapy may not be beneficial for improving performance of activities of daily living after stroke when compared to Strength training.
- Bilateral tDCS before mirror therapy may not be beneficial for improving dexterity after stroke when compared to tDCS during mirror therapy.
- Bilateral tDCS before mirror therapy may not be beneficial for improving motor function and dexterity after stroke when compared to Sham tDCS with mirror therapy.
- TDCS during mirror therapy may not be beneficial for improving dexterity after stroke when compared to Sham tDCS with mirror therapy; the literature is mixed regarding motor function.
- Dual tDCS with Mirror therapy may be beneficial for improving muscle strength and dexterity, but not motor function, after stroke when compared to tDCS with Sham mirror.
- Mirror Therapy: some approaches may be more beneficial than others for improving motor function and performance of activities of daily living; different approaches to Mirror Therapy may not have a difference in efficacy when compared with one another for improving dexterity; the literature is mixed regarding muscle strength.
- Different approaches to mirror Therapy combined with other interventions may not have a difference in efficacy when compared with one another for improving motor function, spasticity, proprioception, performance of activities of daily living, and dexterity.
- Bilateral tDCS before mirror therapy may be less beneficial than tDCS during mirror therapy for improving motor function after stroke.
- Concurrent Combination of tDCS with Mirror Therapy may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Sham tDCS with Mirror Therapy.

A.11 Mental Practice (Table 11)

Key Points

- Mental practice combined with other interventions may be beneficial for improving motor function, but not spasticity, range of motion, and performance of activities of daily living, after stroke when compared to fes.
- Mental Practice with activities of daily living training session may be beneficial for improving motor function after stroke when compared to Sham Relaxation Exercise with activities of daily living training session.
- Mental Practice with electromyography neuromuscular electrical stimulation and Conventional Rehab may be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Conventional Rehab.
- Mental practice may be beneficial for improving motor function, but not dexterity and performance of activities of daily living, after stroke when compared to sham.
- Mental Imagery internal may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Mental imagery external.
- Mental practice may be beneficial for improving motor function and muscle strength after stroke when compared to conventional therapy; the literature is mixed regarding performance of activities of daily living.
- Mental practice combined with other interventions may be beneficial for improving muscle strength, but not dexterity, after stroke when compared to mental practice; the literature is mixed regarding motor function, stroke severity, and performance of activities of daily living.
- Graded motor imagery with repetitive transcranial magnetic stimulation and conventional rehabilitation may not be beneficial for improving motor function after stroke when compared to repetitive transcranial

magnetic stimulation with conventional rehabilitation; the literature is mixed regarding performance of activities of daily living.

- Low frequence repetitive transcranial magnetic stimulation with mental practice may be beneficial for improving motor function, dexterity, and performance of activities of daily living after stroke when compared to repetitive transcranial magnetic stimulation with audiotape-led relaxation.
- Motor Imagery & mental practice may not be beneficial for improving motor function, dexterity, performance of activities of daily living, and muscle strength after stroke when compared to Attention-placebo control or Normal care.
- Electromyography neuromuscular electrical stimulation with mental imagery training may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to electromyography neuromuscular electrical stimulation.
- The literature is mixed regarding the effect of Motor Imagery with Action Observation and occupational therapy on improvement of motor function and performance of activities of daily living after stroke when compared to Action Observation with occupational therapy.
- Motor imagery with conventional therapy may be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Health education on stroke with conventional therapy.
- Graded Motor Imagery (included implicit and explicit motor imagery plus mirror therapy) with conventional rehabilitation may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Upper limb exercise with conventional rehabilitation.
- Mental practice with Modified Constraint Induced Movement Therapy may be beneficial for improving motor function after stroke when compared to Modified Constraint Induced Movement Therapy.
- The literature is mixed regarding the effect of Motor Imagery-based Brain-computer Interface with functional electrical stimulation on improvement of motor function after stroke when compared to functional electrical stimulation.
- Virtual reality game (Wii) with mental practice may be beneficial for improving motor function, dexterity, and performance of activities of daily living after stroke when compared to virtual reality game (Wii).
- Mental practice with modified constraint-induced movement (modified constraint-induced movement therapy) therapy may be beneficial for improving performance of activities of daily living, but not motor function, after stroke when compared to modified constraint-induced movement therapy therapy.
- Bilateral transcranial direct current stimulation with motor imagery brain-computer interface may not be beneficial for improving motor function after stroke when compared to Sham transcranial direct current stimulation with motor imagery brain-computer interface.
- EEG-based motor imargery brain-computer interface with Haptic Knob robotic arm rehabilitation may not be beneficial for improving motor function after stroke when compared to arm therapy.
- EEG-based Motor Imagery Brain-Computer Interface with Robotic Feedback (MIT-MANUS) may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Traditional Robotic Therapy.
- Brain computer interface motor imagery with MITManus robotic training may not be beneficial for improving motor function after stroke when compared to MIT-Manus robotic training.
- Mental practice with modified constraint-induced movement therapy may be beneficial for improving motor function and performance of activities of daily living after stroke when compared to modified constraint-induced movement therapy.
- External focus with robotic arm may not be beneficial for improving motor function after stroke when compared to Internal focus with robot.
- The literature is mixed regarding the effect of Virtual Reality (Wii) on improvement of motor function after stroke when compared to Conventional therapy.
- Virtual Reality (Wii) may not be beneficial for improving motor function after stroke when compared to Motor Imagery Training.
- Motor Imagery based brain-computer interface with conventional rehab may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Motor Imagery with conventional rehab.

- Anodal transcranial direct current stimulation with motor imagery and upper-limb functional training may be beneficial for improving motor function after stroke when compared to sham tCDS with motor imagery and upper-limb functional training.
- Task oriented training with mental practice may not be beneficial for improving motor function after stroke when compared to Task oriented training.
- Brain-computer interface motor imagery training with conventional rehab may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Conventional rehab.
- Motor imagery brain-computer interface with conventional rehab may be beneficial for improving motor function and performance of activities of daily living after stroke when compared to functional electrical stimulation with conventional rehab.
- Brain-computer interface controlled hand exoskeleton with Mental practice and Occupational therapy may not be beneficial for improving motor function, dexterity, and performance of activities of daily living after stroke when compared to Occupational therapy.
- Action observation with Motor imagery and Conventional therapy may be beneficial for improving muscle strength, but not motor function and range of motion, after stroke when compared to Conventional therapy with passive video exposure (without guided action observation or motor imagery).
- Brain-computer interface-motor imagery system with Conventional therapy may be beneficial for improving motor function after stroke when compared to Conventional therapy.
- Mental imagery training may not be beneficial for improving motor function after stroke when compared to functional training.
- Mental practice of hand movement with Bobath therapy may be beneficial for improving motor function after stroke when compared to Bobath therapy alone.
- Mental practice combined with other interventions may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to mirror therapy.
- Low-frequency rTMS with motor imagery and electrical stimulation may be beneficial for improving motor function, but not performance of activities of daily living and dexterity, after stroke when compared to low-frequency rTMS with motor imagery and sham electrical stimulation.
- EEG brain-computer interface with hand robotic orthosis may not be beneficial for improving motor function after stroke when compared to motor imagery tasks.
- Motor imagery with neurofeedback may not be beneficial for improving proprioception and performance of activities of daily living after stroke when compared to motor imagery with sham feedback; the literature is mixed regarding motor function.
- Imagery training with conventional occupational therapy may be beneficial for improving motor function after stroke when compared to conventional occupational therapy alone.
- Music therapy combined with motor imagery may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to music therapy alone.
- Mental practice combined with other interventions may not be beneficial for improving dexterity after stroke when compared to task-specific training.
- Motor Imagery with Audio Feedback and Task Specific Training may not be beneficial for improving dexterity after stroke when compared to Motor imagery with TST.
- Paired associative stimulation (PAS) with Motor imagery may not be beneficial for improving range of motion after stroke when compared to Sham PAS with motor imagery.
- Auditory imagery with task specific training may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Task specific training.
- Visual imagery with task specific training may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Task specific training.
- Cumulative imagery with task specific training may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Task specific training.
- Auditory imagery with task specific training may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Cumulative imagery with task specific training.

- Visual imagery with task specific training may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Cumulative imagery with task specific training.

A.12 Action Observation (Table 12)

Key Points

- Action observation may be beneficial for improving motor function and dexterity, but not spasticity, after stroke when compared to sham; the literature is mixed regarding performance of activities of daily living.
- Action observation may be beneficial for improving performance of activities of daily living, but not muscle strength, after stroke when compared to conventional therapy; the literature is mixed regarding motor function.
- Action Observation with EEG-Mediated Functional Electrical Stimulation Brain-Computer Interface may be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Functional Electrical Stimulation.
- Functional electrical stimulation with Action observation training and brain computer interface may be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Conventional therapy.
- Action observation with task-specific training may be beneficial for improving performance of activities of daily living, but not motor function and dexterity, after stroke when compared to Sham observation with task-specific training.
- First-Person Action Observation Training with conventional occupational therapy may be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Third-person Action Observation Training with conventional occupational therapy.
- Action observation with Motor imagery and Conventional therapy may be beneficial for improving muscle strength, but not motor function and range of motion, after stroke when compared to Conventional therapy with passive video exposure (without guided action observation or motor imagery).
- Low frequency repetitive transcranial magnetic stimulation with Action Observation may not be beneficial for improving motor function and muscle strength after stroke when compared to Low frequency repetitive transcranial magnetic stimulation.
- Action observation with EEG-guided robot-hand training may not be beneficial for improving motor function after stroke when compared to robot-hand training without action observation and EEG guidance.
- The literature is mixed regarding the effect of Motor Imagery with Action Observation and occupational therapy on improvement of motor function and performance of activities of daily living after stroke when compared to Action Observation with occupational therapy.
- Action observation therapy with routine rehabilitation may be beneficial for improving motor function, performance of activities of daily living, and spasticity after stroke when compared to routine rehabilitation alone.
- Same arm movement therapy may not be beneficial for improving motor function after stroke when compared to constraint-induced movement therapy.
- Action observation therapy with conventional treatment may be beneficial for improving motor function and performance of activities of daily living, but not dexterity and spasticity, after stroke when compared to task-oriented training with conventional treatment.
- Action observation with task-specific training may be beneficial for improving motor function, performance of activities of daily living, and dexterity, but not spasticity, after stroke when compared to Task-specific training.
- Task specific training with action observation may be beneficial for improving performance of activities of daily living after stroke when compared to No treatment.
- Task specific training with action observation may be beneficial for improving performance of activities of daily living after stroke when compared to Action observation.

A.13 Cognitive and Dual-Task Training (Table 13)

Key Points

- Dual-Task Training with Conventional occupational therapy may be beneficial for improving motor function after stroke when compared to Single Task Training (combining sensory stimulation, UE muscle strength, cognitive and perceptual training, and fine hand movement) with Conventional occupational therapy.
- Occupation-Based Bilateral Upper Limb Training with Cognitive Behavioral Therapy may not be beneficial for improving motor function after stroke when compared to Occupation-Based Bilateral Upper Limb Training with Conventional occupational therapy; the literature is mixed regarding performance of activities of daily living.
- Cognitive motor rehabilitation with specific UE exercises may be beneficial for improving motor function after stroke when compared to Specific UE exercises.
- Robot-Assisted Neurocognitive Therapy using a haptic device with Conventional Neurocognitive Therapy may not be beneficial for improving motor function, dexterity, spasticity, and proprioception after stroke when compared to Conventional Neurocognitive Therapy.
- Cognitive orientation to daily occupational performance (CO-OP) may be beneficial for improving motor function, dexterity, and performance of activities of daily living after stroke when compared to taskspecific upper extremity training (TUET).
- Mirror therapy with TOT may be beneficial for improving motor function after stroke when compared to Conventional therapy (TOT).
- Mirror therapy with TOT may not be beneficial for improving motor function after stroke when compared to Cognitive therapeutic exercise with TOT.
- Cognitive Exercise Therapy may be beneficial for improving proprioception, but not performance of activities of daily living, after stroke when compared to Conventional Occupational Therapy.
- Proprioceptive neuromuscular facilitation early may be beneficial for improving muscle strength, but not performance of activities of daily living, after stroke when compared to Cognitive therapeutic exercise (CTE) early or proprioceptive neuromuscular facilitation late or CTE late.
- Proprioceptive neuromuscular facilitation early may not be beneficial for improving stroke severity after stroke when compared to Cognitive therapeutic exercise (CTE) early or late.
- Cognitive Orientation to Daily Occupaitonal Performance may be beneficial for improving performance of activities of daily living, but not motor function and dexterity, after stroke when compared to Conventional occupational therapy.
- Cognitive training may not be beneficial for improving motor function, muscle strength, and proprioception after stroke when compared to conventional therapy.
- Robotic Therapy (Armeo Spring & Amadeo) with Task Oriented Training with Active Learning Program for Stroke (ALPS) may not be beneficial for improving spasticity and performance of activities of daily living after stroke when compared to Robotic Therapy with Active Learning Program for Stroke (ALPS); the literature is mixed regarding motor function.
- Cognitive Orientation to Daily Occupaitonal Performance may be beneficial for improving performance of activities of daily living, but not motor function and dexterity, after stroke when compared to Progressive exercise program (strenght, functional, balance, and endurance training).

A.14 Music Therapy and Rhythmic Auditory Stimulation (Table 14)

Key Points

- Rhythmic Auditory Stimulation may be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Conventional Rehabilitation.
- Music therapy may not be beneficial for improving motor function, dexterity, performance of activities of daily living, spasticity, stroke severity, and muscle strength after stroke when compared to conventional therapy.
- Rhythmic auditory cueing may be beneficial for improving motor function after stroke when compared to Conventional therapy.

- Rhythmic auditory cueing may not be beneficial for improving motor function after stroke when compared to Visual cueing.
- Home based music therapy may not be beneficial for improving motor function and dexterity after stroke when compared to waitlist.
- Bilateral Leg Training with Rhythmic Auditory Cueing may not be beneficial for improving motor function after stroke when compared to Bilateral Arm Training with Rhythmic Auditory Cueing.
- Enriched Music-Supported Therapy (eMST) may not be beneficial for improving dexterity, performance of activities of daily living, and muscle strength after stroke when compared to Graded Repetitive Arm Supplementary Program; the literature is mixed regarding motor function.
- Modified constraint-induced movement therapy may not be beneficial for improving motor function, dexterity, performance of activities of daily living, proprioception, and muscle strength after stroke when compared to Dose-matched conventional treatment.
- Bilateral arm training with rythmic auditory cueing may not be beneficial for improving motor function and muscle strength after stroke when compared to Dose matched theraupetic unilateral therapeutic exercises.
- Bilateral arm training with rhythmic auditory cueing may not be beneficial for improving motor function and muscle strength after stroke when compared to Conventional therapy.
- Music therapy combined with motor imagery may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to music therapy alone.
- Robot-assisted rehabilitation with music therapy may not be beneficial for improving motor function after stroke when compared to robot-assisted rehabilitation or conventional care alone; the literature is mixed regarding performance of activities of daily living.
- Music upper limb therapy-integrated (MULT-I) may not be beneficial for improving motor function, performance of activities of daily living, proprioception, and stroke severity after stroke when compared to a home exercise program.
- The literature is mixed regarding the effect of Audible musical instrument training on motor function after stroke when compared to mute musical instrument training.
- Virtual reality keypad or glove (PneuGlove) may not be beneficial for improving motor function and muscle strength after stroke when compared to Task Specific Training Occupational Therapy.
- Music movement therapy may be beneficial for improving range of motion after stroke when compared to routine treatment.

A.15 Telerehabilitation and Education (Table 15)

Key Points

- Exercise and custom physiotherapy protocols may not be beneficial for improving motor function, performance of activities of daily living, range of motion, and muscle strength after stroke when compared to conventional therapy.
- Telerehabilitation may not be beneficial for improving motor function after stroke when compared to In clinic Rehabilitation.
- Tracking training of finger and wrist (temporospatial processing) may be beneficial for improving dexterity and range of motion, but not motor function, after stroke when compared to repetitive simple Movement training.
- Bimanual robotic training with error augmentation may not be beneficial for improving motor function after stroke when compared to Bimanual robotic training.
- Remote virtual reality treatment may be beneficial for improving performance of activities of daily living, but not motor function and spasticity, after stroke when compared to Traditional physical therapy.
- Glove orthosis graded repetitive arm supplementary program with Virtual reality with home based rehab with occupational therapy may be beneficial for improving performance of activities of daily living, but not motor function and dexterity, after stroke when compared to Conventional Rehab.

- Modified Constraint-Induced Movement Therapy with Exercise or custom physiotherapy (Telerehabilitation) may be beneficial for improving motor function, dexterity, performance of activities of daily living, and muscle strength after stroke when compared to Home exercise program.
- Coaching based teleoccupational guidance (CTG) via WeChat (coaching sessions with OT) may be beneficial for improving performance of activities of daily living, but not motor function, after stroke when compared to conventional rehab (routine teleocupiational guidance via WeChat).
- Different approaches to constraint-induced movement therapy may not have a difference in efficacy when compared with one another for improving motor function and performance of activities of daily living.
- Class-based in person body awareness & movement education may be beneficial for improving motor function, but not proprioception and performance of activities of daily living, after stroke when compared to Home-based in person body awareness & movement education.

A.16 Robotics (Table 16)

Key Points

- Robotics may be beneficial for improving range of motion and dexterity, but not motor function, muscle strength, spasticity, proprioception, and performance of activities of daily living, after stroke when compared to conventional therapy; the literature is mixed regarding stroke severity.
- Bi-Manu-Track(Bilateral robot training) may not be beneficial for improving motor function, performance of activities of daily living, spasticity, and muscle strength after stroke when compared to INMotion 3.0 (unilateral robot training).
- Unilateral robot-assisted arm training may be beneficial for improving motor function, but not performance of activities of daily living, after stroke when compared to Bilateral robot-assisted arm training.
- High intensity robotic therapy (BiManu-Track) may be beneficial for improving motor function after stroke when compared to Low intensity robotic therapy.
- Unilateral Robotic Training (MIME) may not be beneficial for improving motor function, spasticity, and performance of activities of daily living after stroke when compared to Bilateral Robotic Training (MIME) or Combined Unilateral and Bilateral Robotic Training (MIME).
- Different approaches to exoskeleton robotics may not have a difference in efficacy when compared with one another for improving motor function.
- Unilateral robot-assisted training with conventional therapy may not be beneficial for improving performance of activities of daily living after stroke when compared to Bilateral robot-assisted training with conventional therapy.
- Unilateral robot-assisted training with conventional therapy may be less beneficial than Bilateral robot-assisted training with conventional therapy for improving motor function after stroke.
- Non-robotic electromechanical devices combined with other interventions may not be beneficial for improving motor function, performance of activities of daily living, spasticity, and muscle strength after stroke when compared to conventional therapy.
- IronHand Assistive Glove may be less beneficial than No IronHand Glove for improving dexterity after stroke; the literature is mixed regarding motor function and muscle strength.
- IronHand Assistive Glove may be beneficial for improving motor function and dexterity after stroke when compared to IronHand Therapeutic Glove.
- IronHand Assistive Glove may be less beneficial than IronHand Therapeutic Glove for improving muscle strength after stroke.
- Fast training may be beneficial for improving motor function, but not performance of activities of daily living and spasticity, after stroke when compared to Slow training.
- Robot-aided Progressive Resistance Training may not be beneficial for improving motor function, spasticity, and muscle strength after stroke when compared to Robot-aided Active-assisted Training.
- Robotics combined with other interventions may be beneficial for improving motor function after stroke when compared to exercise and custom physiotherapy protocols.

- Robotic arm therapy (NeReBot) with conventional therapy may not be beneficial for improving motor function, dexterity, performance of activities of daily living, spasticity, and muscle strength after stroke when compared to Conventional therapy with proximal paretic arm exercise.
- Robotics combined with other interventions may not be beneficial for improving motor function, stroke severity, muscle strength, spasticity, performance of activities of daily living, and dexterity after stroke when compared to task-specific training.
- Robot-Assisted Neurocognitive Therapy using a haptic device with Conventional Neurocognitive Therapy may not be beneficial for improving motor function, dexterity, spasticity, and proprioception after stroke when compared to Conventional Neurocognitive Therapy.
- Robotics may be beneficial for improving muscle strength and performance of activities of daily living, but not motor function and spasticity, after stroke when compared to sham.
- Exoskeleton robotics combined with other interventions may be beneficial for improving range of motion, but not motor function, spasticity, performance of activities of daily living, and dexterity, after stroke when compared to task-specific training.
- Mechanical arm trainer may be beneficial for improving dexterity, but not motor function, spasticity, and muscle strength, after stroke when compared to Electrical muscle stimulation of paretic wrist extensors.
- Telemonitored hand robotic-assisted therapy (Hand mentor pro) with home exercise program may not be beneficial for improving motor function after stroke when compared to Home exercise program only.
- Robotic orthosis may be beneficial for improving range of motion, but not muscle strength, after stroke when compared to conventional therapy; the literature is mixed regarding motor function, spasticity, performance of activities of daily living, and dexterity.
- Intensive Sensorimotor Arm Training Mediated by robot may not be beneficial for improving motor function and spasticity after stroke when compared to Intensive Sensorimotor Arm Training Mediated by Therapist.
- Robotic orthosis combined with other interventions may not be beneficial for improving motor function, muscle strength, spasticity, performance of activities of daily living, and dexterity after stroke when compared to conventional therapy.
- Soft Robotic Glove with Conventional therapy may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Low frequency repetitive transcranial magnetic stimulation with Conventional therapy.
- Robotic Assisted Therapy (Bi-Manu-track robot) may be beneficial for improving motor function and muscle strength, but not spasticity, after stroke when compared to electromyography-initiated electrical stimulation.
- Exoskeleton robotics combined with other interventions may not be beneficial for improving motor function, performance of activities of daily living, and spasticity after stroke when compared to exercise and custom physiotherapy protocols.
- Exoskeleton robotics combined with other interventions may be beneficial for improving motor function and dexterity, but not performance of activities of daily living and muscle strength, after stroke when compared to conventional therapy.
- Robotics combined with other interventions may not be beneficial for improving motor function, spasticity, and performance of activities of daily living after stroke when compared to conventional therapy.
- Robot therapy with distributed constraint induced therapy may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to robot therapy alone.
- Robot-Assisted Therapy may not be beneficial for improving motor function and spasticity after stroke when compared to Dose-matched Intensive Comparison Therapy.
- Robot therapy with Electroymography-triggered neuromuscular electrical stimulation (ENMES) may be beneficial for improving motor function after stroke when compared to Robot therapy or ENMES.
- Neuromuscular electrical stimulation robotic to distal fingers may be beneficial for improving spasticity after stroke when compared to neuromuscular electrical stimulation robotic to proximal wrist-elbow joints; the literature is mixed regarding motor function.
- External focus with robotic arm may not be beneficial for improving motor function after stroke when compared to Internal focus with robot.

- Robot hand and arm separate training with virtual reality may not be beneficial for improving motor function after stroke when compared to Robot hand and arm together training with virtual reality.
- AMES robot with torque biofeedback and muscle vibration may not be beneficial for improving motor function and dexterity after stroke when compared to AMES robot with electromyography biofeedback and muscle vibration.
- Robotics combined with other interventions may be beneficial for improving motor function, but not muscle strength, spasticity, performance of activities of daily living, and dexterity, after stroke when compared to sham or robotics.
- X-Glove Orthosis Prolonged Stretching may not be beneficial for improving motor function and muscle strength after stroke when compared to Resting.
- Robot-mediated therapy (GENTLE/s) may be beneficial for improving motor function, but not performance of activities of daily living and range of motion, after stroke when compared to Sling suspension phase.
- Robotics combined with other interventions may not be beneficial for improving motor function, spasticity, range of motion, performance of activities of daily living, and dexterity after stroke when compared to robotics.
- Unilateral robot assisted therapy with modified constraint-induced movement therapy may not be beneficial for improving motor function after stroke when compared to Bilateral robot assisted therapy with bilateral arm training.
- Unilateral robot assisted therapy with modified constraint-induced movement therapy may be less beneficial than Bilateral robot assisted therapy with bilateral arm training for improving performance of activities of daily living after stroke.
- Unilateral robot assisted therapy with constraint-induced movement therapy (unilateral arm) may not be beneficial for improving performance of activities of daily living after stroke when compared to Bilateral robot assisted therapy with BAT (Bimanual tracking).
- Unilateral robot assisted therapy with constraint-induced movement therapy (unilateral arm) may be less beneficial than Bilateral robot assisted therapy with BAT (Bimanual tracking) for improving motor function after stroke.
- Neuromuscular electrical stimulation electromyography robotic hand may be beneficial for improving spasticity, but not motor function and performance of activities of daily living, after stroke when compared to electromyography robotic hand.
- Robot assisted training with Botox may be beneficial for improving motor function, muscle strength, and spasticity after stroke when compared to Conventional treatment with Botox.
- Progressive abduction loading therapy with horizontal-plance viscous resistance device may not be beneficial for improving motor function and muscle strength after stroke when compared to Progressive abduction loading therapy.
- Robotic orthosis combined with other interventions may not be beneficial for improving motor function, spasticity, proprioception, performance of activities of daily living, and dexterity after stroke when compared to task-specific training; the literature is mixed regarding range of motion.
- Distal (wrist or hand Functional Electrical Stimulation) may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to functional electrical stimulation with Robot assisted Whole arm.
- Distal (wrist or hand Functional Electrical Stimulation) may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Proximal (Shoulder or elbow) (Functional Electrical Stimulation with inMotion robot).
- End-effector robot with occupational therapy may not be beneficial for improving motor function after stroke when compared to Exoskeleton robot with occupational therapy.
- Robotics combined with other interventions may not be beneficial for improving motor function, muscle strength, spasticity, performance of activities of daily living, and dexterity after stroke when compared to robotics or sham.
- Robotic training (InMotion ARM) with motor learning may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Motor learning.

- Robotics combined with other interventions may not be beneficial for improving dexterity after stroke when compared to robotics or augmented feedback training; the literature is mixed regarding motor function.
- Robot-Assisted Therapy with Bilateral Practice with Task-Specific Training may be beneficial for improving motor function after stroke when compared to Conventional Care with Task-Specific Training; the literature is mixed regarding performance of activities of daily living.
- Condensed Robot-assisted training with botulinum toxin A and Functional training may not be beneficial for improving motor function, performance of activities of daily living, and spasticity after stroke when compared to Distributed robot-assisted training with botulinum toxin A and Functional training.
- Robotic glove therapy may be beneficial for improving motor function and dexterity, but not stroke severity, after stroke when compared to conventional therapy; the literature is mixed regarding muscle strength and performance of activities of daily living.
- Rejoyce system with occupational therapy may not be beneficial for improving motor function and stroke severity after stroke when compared to task based exercises with occupational therapy.
- Games-based training using an exoskeleton with usual rehab may not be beneficial for improving motor function, performance of activities of daily living, and spasticity after stroke when compared to basic stretching and active exercises with usual rehab.
- Robotic Priming with mirror therapy (RMT) may not be beneficial for improving motor function, proprioception, and performance of activities of daily living after stroke when compared to Robotic Priming with Bilateral Upper Limb Training (RBULT).
- Robot-assisted Therapy with conventional rehab may not be beneficial for improving motor function, performance of activities of daily living, and spasticity after stroke when compared to Constraint induced movement therapy with conventional rehab.
- Patient-centered Robot-assisted occupational therapy with conventional rehab may be beneficial for improving performance of activities of daily living, but not range of motion and muscle strength, after stroke when compared to Robot-centered Robot-assisted therapy with conventional rehab or conventional rehab; the literature is mixed regarding motor function.
- Assisted Motion, Biofeedback, and Antagonist Muscle Vibration delivered by a Robotic Device with UL rehabilitation may be beneficial for improving motor function, but not muscle strength, spasticity, and range of motion, after stroke when compared to Placebo intervention with UL rehabilitation.
- Exoskeleton robotics combined with other interventions may not be beneficial for improving stroke severity, muscle strength, spasticity, and performance of activities of daily living after stroke when compared to exoskeleton robotics or sham; the literature is mixed regarding motor function.
- RMT may not be beneficial for improving motor function and muscle strength after stroke when compared to mirror therapy.
- Smart hand joint training device with bilateral transcranial direct current stimulation may be beneficial for improving motor function and stroke severity after stroke when compared to Smart hand joint training device.
- Bilateral robotic priming training with mirror training (R-mirr) may be beneficial for improving motor function, but not performance of activities of daily living and muscle strength, after stroke when compared to Bilateral robotic priming training with movement oriented training.
- Robotic rehab with trunk rehab may not be beneficial for improving motor function after stroke when compared to Conventional rehab with trunk rehab.
- Exoskeleton robotics combined with other interventions may be beneficial for improving motor function, range of motion, performance of activities of daily living, and dexterity, but not stroke severity and spasticity, after stroke when compared to exoskeleton robotics; the literature is mixed regarding muscle strength.
- Robotic training with Rebless may be beneficial for improving motor function, but not performance of activities of daily living, spasticity, range of motion, and muscle strength, after stroke when compared to UE training with Motomed ergometer.
- Virtual reality-based robot therapy with smart glove with task-oriented therapy may be beneficial for improving motor function after stroke when compared to Task-oriented therapy; the literature is mixed regarding performance of activities of daily living.

- Robotic training with force fields for error augmentation with Video game therapy and Conventional therapy may be beneficial for improving motor function after stroke when compared to Robotic training without force fields for error augmentation with Video game therapy and Conventional therapy.
- Robot assisted therapy (InMotion WRIST Robot) with Anodal transcranial direct current stimulation may not be beneficial for improving motor function, dexterity, spasticity, and muscle strength after stroke when compared to Robot assisted therapy with sham transcranial direct current stimulation.
- Anodal transcranial direct current stimulation with Robot-Assisted Arm Training may not be beneficial for improving motor function, dexterity, performance of activities of daily living, spasticity, and muscle strength after stroke when compared to Sham stimulation with Robot-Asssited Arm Training.
- Robot therapy with task specific training may not be beneficial for improving muscle strength after stroke when compared to Robot therapy with impairment oriented training; the literature is mixed regarding motor function.
- Electromyography-driven Robot may be beneficial for improving spasticity, but not performance of activities of daily living, after stroke when compared to Passive motion robot device on wrist; the literature is mixed regarding motor function.
- Anodal transcranial direct current stimulation on affected hemisphere with robot assisted arm training may be beneficial for improving spasticity, but not motor function and performance of activities of daily living, after stroke when compared to Cathodal transcranial direct current stimulation on unaffected hemisphere with robot assisted arm training.
- EEG-based motor imargery brain-computer interface with Haptic Knob robotic arm rehabilitation may not be beneficial for improving motor function after stroke when compared to arm therapy.
- EEG-based Motor Imagery Brain-Computer Interface with Robotic Feedback (MIT-MANUS) may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Traditional Robotic Therapy.
- Brain computer interface motor imagery with MITManus robotic training may not be beneficial for improving motor function after stroke when compared to MIT-Manus robotic training.
- Bimanual robotic training with error augmentation may not be beneficial for improving motor function after stroke when compared to Bimanual robotic training.
- Therapist-based Bilateral Arm Training may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Control treatment.
- The literature is mixed regarding the effect of Brain-computer interfaces-Exoskeleton-Based Training on improvement of motor function after stroke when compared to Sham exoskeleton Training.
- Transcutaneous Auricular Vagus Nerve Stimulation with Robotic Training may be beneficial for improving spasticity, but not motor function and muscle strength, after stroke when compared to Sham transcutaneous auricular vagus nerve stimulation with Robotic Training.
- Brain-computer interface Therapy with Robotic Hand Orthosis may not be beneficial for improving motor function and muscle strength after stroke when compared to Conventional Care.
- Mirror Visual Feedback with Robot-Assisted Training may be beneficial for improving muscle strength, but not performance of activities of daily living, after stroke when compared to Sham-Mirror Visual Feedback with Robot-Assisted Training; the literature is mixed regarding motor function.
- Trunk support with visual feedback SMART upper limb training system may be beneficial for improving motor function and performance of activities of daily living, but not range of motion, after stroke when compared to Trunk restraint with visual feedback SMART upper limb training system; the literature is mixed regarding muscle strength.
- Brain-computer interface - Robotic with Conventional Rehab may be beneficial for improving motor function, but not spasticity, after stroke when compared to Conventional Rehab.
- Robotic self training with constraint-induced movement therapy may be beneficial for improving performance of activities of daily living, but not motor function, after stroke when compared to Conventional self training with conventional care.
- Robotic self training with constraint-induced movement therapy may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Robotic self training with conventional care.

- The literature is mixed regarding the effect of Continuous theta burst stimulation with intermittent theta burst stimulation and robot assisted therapy on improvement of motor function after stroke when compared to sham continuous theta burst stimulation with sham intermittent theta burst stimulation and robot-assisted therapy.
- Continuous theta burst stimulation with intermittent theta burst stimulation and robot assisted therapy may not be beneficial for improving motor function after stroke when compared to sham continuous theta burst stimulation with intermittent theta burst stimulation and robot assisted training.
- Glove orthosis graded repetitive arm supplementary program with Virtual reality with home based rehab with occupational therapy may be beneficial for improving performance of activities of daily living, but not motor function and dexterity, after stroke when compared to Conventional Rehab.
- Mirror therapy with robot assisted training HOH(Hand of Hope) may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Sham mirror therapy with robot assisted training HOH.
- Portable brain-computer interface-based hand robot system with Conventional therapy and neuromuscular electrical stimulation may be beneficial for improving motor function after stroke when compared to Task-specific training with Conventional therapy and neuromuscular electrical stimulation.
- Brain-computer interface controlled hand exoskeleton with Mental practice and Occupational therapy may not be beneficial for improving motor function, dexterity, and performance of activities of daily living after stroke when compared to Occupational therapy.
- Immersive virtual reality (CUREO) with Conventional therapy may be beneficial for improving motor function after stroke when compared to Electromechanically assisted training (ARMEOSpring) with Conventional therapy.
- Cyproheptadine with EMG-controlled VAEDA glove may not be beneficial for improving motor function after stroke when compared to Placebo with EMG-controlled VAEDA glove or Placebo with passive stretching VAEDA with glove.
- Task-oriented training with force feedback hand rehab robot with Conventional upper limb rehabilitation may be beneficial for improving motor function and range of motion, but not stroke severity, muscle strength, spasticity, and performance of activities of daily living, after stroke when compared to Task-oriented training assisted by a therapist with Conventional upper limb rehabilitation.
- Non-robotic electromechanical devices may be beneficial for improving stroke severity, but not motor function, performance of activities of daily living, spasticity, and range of motion, after stroke when compared to conventional therapy.
- Robotics therapy (consisted a glove detecting hand movements) may not be beneficial for improving dexterity and proprioception after stroke when compared to Conventional therapy.
- Virtual Relaity Game (Vision Based Tracking) may be less beneficial than Virtual Reality (Haptic Feedback) for improving dexterity after stroke.
- Virtual Reality (Haptic Feedback) may be beneficial for improving dexterity after stroke when compared to Virtual Reality (Exoskelton).
- Virtual Relaity Game (Vision Based Tracking) may not be beneficial for improving dexterity after stroke when compared to Virtual Reality (Exoskelton).
- SMART arm with electrical stim may be beneficial for improving performance of activities of daily living and spasticity after stroke when compared to No Treatment.
- Bimanual motor skill learning with robot-assisted training and transcranial direct current stimulation may not be beneficial for improving muscle strength after stroke when compared to bimanual motor skill learning with sham stimulation.
- Bilateral Arm Light Exoskeleton Rehab Station (ALEx RS) with Conventional Therapy may not be beneficial for improving motor function, muscle strength, and spasticity after stroke when compared to Unilateral Arm Light Exoskeleton Rehab Station (ALEx RS) with Conventional Therapy.
- Robotic Therapy (Armeo Spring & Amadeo) with Task Oriented Training with Active Learning Program for Stroke (ALPS) may not be beneficial for improving spasticity and performance of activities of daily living after stroke when compared to Robotic Therapy with Active Learning Program for Stroke (ALPS); the literature is mixed regarding motor function.

- Robotic training (Armeo) with Muscle vibration may be beneficial for improving motor function, spasticity, and performance of activities of daily living after stroke when compared to Robotic training (Armeo) with Sham muscle vibration.
- Single joint arm exoskeleton may not be beneficial for improving motor function, performance of activities of daily living, and dexterity after stroke when compared to Multijoint arm exoskeleton; the literature is mixed regarding muscle strength.
- Exoskeleton robotics combined with other interventions may not be beneficial for improving motor function, muscle strength, and performance of activities of daily living after stroke when compared to stretching and positioning programs.
- Robotics combined with other interventions may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to botulinum toxin (botox).
- Robotics combined with other interventions may not be beneficial for improving motor function, muscle strength, spasticity, range of motion, and performance of activities of daily living after stroke when compared to robotics or video game training.
- Repetitive sensory stimulation with Robot-assisted arm training may not be beneficial for improving motor function, muscle strength, proprioception, and dexterity after stroke when compared to Sham stimulation with Robot-assisted arm training.
- The literature is mixed regarding the effect of High-definition tDCS with EMG-driven robotic hand (EMG-RH) on motor function and spasticity after stroke when compared to Sham tDCS with EMG-RH.
- EMG-Controlled FES during task oriented training with Robotic training may be beneficial for improving motor function, but not dexterity, after stroke when compared to Conventional rehab (TST).
- EMG driven NMES Robot arm may be beneficial for improving spasticity, but not performance of activities of daily living, after stroke when compared to Conventional Therapy; the literature is mixed regarding motor function.
- CTBS with robotic therapy may be beneficial for improving motor function after stroke when compared to Sham stimulation with robotic therapy.
- SMART Arm with outcome-triggered (OT) electrical stimulation may be beneficial for improving performance of activities of daily living after stroke when compared to SMART arm alone.
- Exoskeleton robotics may be beneficial for improving range of motion, but not motor function, stroke severity, muscle strength, spasticity, and performance of activities of daily living, after stroke when compared to conventional therapy; the literature is mixed regarding dexterity.
- Different approaches to robotics may not have a difference in efficacy when compared with one another for improving motor function, stroke severity, muscle strength, spasticity, range of motion, performance of activities of daily living, and dexterity.
- The literature is mixed regarding the effect of IronHand Assistive Glove on motor function and muscle strength after stroke when compared to No IronHand Glove.
- Different approaches to robotics combined with other interventions may not have a difference in efficacy when compared with one another for improving spasticity; the literature is mixed regarding motor function.
- The literature is mixed regarding the effect of robot training with forced field on spasticity after stroke when compared to robot training without force field.
- Enhanced upper limb therapy may be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Usual care.
- Robot-assisted training may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Usual care.
- Robot-assisted training may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Enhanced upper limb therapy.

A.17 Virtual Reality (Table 17)

Key Points

- Smart Glove Upper Extremity Training (RAPAEL) with rehab may be beneficial for improving motor function, but not dexterity, performance of activities of daily living, and muscle strength, after stroke when compared to Upper Extremity Self-Training at home with rehab.
- Virtual reality training may be beneficial for improving muscle strength and range of motion, but not stroke severity, spasticity, performance of activities of daily living, and dexterity, after stroke when compared to conventional therapy; the literature is mixed regarding motor function.
- Different approaches to video game training may not have a difference in efficacy when compared with one another for improving motor function.
- Virtual reality training combined with other interventions may be beneficial for improving motor function and performance of activities of daily living, but not dexterity, spasticity, and muscle strength, after stroke when compared to conventional therapy.
- Virtual reality-based mirror therapy with conventional physical therapy may be beneficial for improving motor function and dexterity after stroke when compared to Traditional mirror therapy with conventional physical therapy.
- Virtual Reality (Wii) may not be beneficial for improving motor function after stroke when compared to Motor Imagery Training.
- Task-oriented training with non-immersive virtual reality with conventional rehabilitation may not be beneficial for improving motor function, performance of activities of daily living, and muscle strength after stroke when compared to task-oriented training with simple recreational activities with conventional rehabilitation.
- Task-oriented training with non-immersive virtual reality with conventional rehabilitation may be less beneficial than task-oriented training with simple recreational activities with conventional rehabilitation for improving dexterity after stroke.
- Multiuser virtual reality Therapy may not be beneficial for improving motor function after stroke when compared to Single user virtual reality Therapy.
- Smart gaming gloves may be beneficial for improving motor function, spasticity, and performance of activities of daily living, but not dexterity, after stroke when compared to conventional therapy; the literature is mixed regarding range of motion.
- Nintendo Wii virtual reality training with Usual Care (conventional occupational therapy) may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to dose matched task oriented therapy (as Conventional therapy) with Usual Care (conventional occupational therapy) or Usual Care (conventional occupational therapy).
- Virtual reality keypad or glove (PneuGlove) may not be beneficial for improving motor function and muscle strength after stroke when compared to Task Specific Training Occupational Therapy.
- Virtual reality training combined with other interventions may be beneficial for improving dexterity, but not motor function, performance of activities of daily living, spasticity, and stroke severity, after stroke when compared to virtual reality training.
- Virtual reality training combined with other interventions may be beneficial for improving dexterity and muscle strength after stroke when compared to bilateral arm training; the literature is mixed regarding motor function and proprioception.
- Virtual reality training may be beneficial for improving motor function and performance of activities of daily living, but not dexterity and spasticity, after stroke when compared to sham.
- Non-immersive virtual reality smart glove training (RAPAEL) may be beneficial for improving dexterity and muscle strength after stroke when compared to Recreational video games with Conventional rehabilitation; the literature is mixed regarding motor function.
- Virtual Reality Boxing (Xbox Kinect) may not be beneficial for improving motor function and dexterity after stroke when compared to Boxing Practice with Therapist.
- Nintendo Wii-based movement therapy may be beneficial for improving performance of activities of daily living, but not motor function, dexterity, spasticity, and range of motion, after stroke when compared to Modified constraint-induced movement therapy.
- Proprioceptive neuromuscular facilitation with virtual reality (Nintendo Wii) may not be beneficial for improving motor function after stroke when compared to proprioceptive neuromuscular facilitation or Wii.

- Video game training combined with other interventions may not be beneficial for improving motor function, dexterity, and performance of activities of daily living after stroke when compared to graded repetitive arm supplementary program.
- Neuroanimation therapy using ARMEO exoskeleton may not be beneficial for improving motor function and muscle strength after stroke when compared to Modified Occupational therapy (stretching, task specific training).
- Video game training combined with other interventions may be beneficial for improving motor function, but not stroke severity, after stroke when compared to task-specific training; the literature is mixed regarding muscle strength.
- Virtual reality games with Audio feedback and conventional therapy may be beneficial for improving dexterity, but not motor function, range of motion, and muscle strength, after stroke when compared to Conventional Rehab.
- Immersive virtual reality (CUREO) with Conventional therapy may be beneficial for improving motor function after stroke when compared to Electromechanically assisted training (ARMEOSpring) with Conventional therapy.
- Virtual reality games (Leap Motion Controller) - enhanced motivation, gradually increasing difficulty may not be beneficial for improving motor function after stroke when compared to Virtual reality games (Leap Motion Controller) - algorithm control, difficulty was modified using adaptive algorithms based on maintaining 80% success rate.
- Weight supported Arm training (ArmeoBoom device is a sling suspension system) may not be beneficial for improving motor function after stroke when compared to Conventional therapy.
- Cathodal transcranial direct current stimulation with virtual reality may be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Sham transcranial direct current stimulation with virtual reality.
- The literature is mixed regarding the effect of Motion tracking device with virtual reality game on improvement of motor function after stroke when compared to Conventional therapy.
- Motion tracking device with virtual reality game may be less beneficial than Motion tracking device with braincomputer interface attention monitoring electroencephalogram device and virtual reality game for improving motor function after stroke.
- Remote virtual reality treatment may be beneficial for improving performance of activities of daily living, but not motor function and spasticity, after stroke when compared to Traditional physical therapy.
- Leap motion virtual reality with mirror therapy may be beneficial for improving motor function after stroke when compared to Sham.
- Leap motion virtual reality with mirror therapy may be beneficial for improving motor function after stroke when compared to Mirror therapy.
- Robot hand and arm separate training with virtual reality may not be beneficial for improving motor function after stroke when compared to Robot hand and arm together training with virtual reality.
- Low frequency repetitive transcranial magnetic stimulation with virtual reality may be beneficial for improving motor function, but not performance of activities of daily living, after stroke when compared to Sham repetitive transcranial magnetic stimulation with virtual reality.
- Intermittent theta burst stimulation with Virtual reality-based cycling training (bilateral upper limb) may be beneficial for improving spasticity, but not motor function and dexterity, after stroke when compared to sham intermittent theta burst stimulation with VCT; the literature is mixed regarding performance of activities of daily living.
- Virtual reality with arm exoskeleton may be beneficial for improving motor function, but not performance of activities of daily living, after stroke when compared to conventional physiotherapy.
- Anodal transcranial direct current stimulation with virtual reality-based therapy and conventional physical therapy may be beneficial for improving motor function and proprioception after stroke when compared to conventional physiotherapy.
- Anodal transcranial direct current stimulation with Virtual Reality may be beneficial for improving dexterity, but not motor function, after stroke when compared to sham transcranial direct current stimulation with Virtual Reality.

- Glove orthosis graded repetitive arm supplementary program with Virtual reality with home based rehab with occupational therapy may be beneficial for improving performance of activities of daily living, but not motor function and dexterity, after stroke when compared to Conventional Rehab.
- Personalized reach training (active control-restricted range) with anodal transcranial direct current stimulation and Virtual reality games may not be beneficial for improving motor function and range of motion after stroke when compared to Personal reach training (active control-restricted range) with Sham transcranial direct current stimulation and video games.
- Graded repetitive arm supplementary program may be beneficial for improving motor function and muscle strength after stroke when compared to Virtual reality.
- Contralaterally controlled functional electrical stimulation with Hand therapy video games may not be beneficial for improving motor function, dexterity, and performance of activities of daily living after stroke when compared to contralaterally controlled functional electrical stimulation.
- Vitrual Arm Boot Camp (home exercise program with feedback from TENZR and conventional therpay) may be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Waitlist (conventional care).
- Robotic training with force fields for error augmentation with Video game therapy and Conventional therapy may be beneficial for improving motor function after stroke when compared to Robotic training without force fields for error augmentation with Video game therapy and Conventional therapy.
- Virtual reality training may be beneficial for improving motor function, performance of activities of daily living, and dexterity after stroke when compared to no treatment; the literature is mixed regarding muscle strength.
- Virtual Relaity Game (Vision Based Tracking) may be less beneficial than Virtual Reality (Haptic Feedback) for improving dexterity after stroke.
- Virtual Reality (Haptic Feedback) may be beneficial for improving dexterity after stroke when compared to Virtual Reality (Exoskelton).
- Virtual Relaity Game (Vision Based Tracking) may not be beneficial for improving dexterity after stroke when compared to Virtual Reality (Exoskelton).
- Nintendo Wii Sports may be beneficial for improving range of motion, but not dexterity and spasticity, after stroke when compared to Neutral warmth.
- Playstation EyeToy games with conventional therapy may be beneficial for improving performance of activities of daily living, but not stroke severity, after stroke when compared to Sham therapy with conventional therapy.
- Constraint-induced movement therapy using augmented reality "Nintendo Wii" may be beneficial for improving performance of activities of daily living after stroke when compared to Conventional physiotherapy.
- Virtual reality training (ArmeoSenso with monetary feedback rewards) and conventional care may not be beneficial for improving range of motion after stroke when compared to virtual reality training (without rewards) with conventional care.
- Game-based virtual reality rehabilitation using a smart glove may be beneficial for improving muscle strength after stroke when compared to conventional physiotherapy.
- Immersive virtual reality (VR)-based upper limb exercise system with Conventional therapy may not be beneficial for improving motor function, muscle strength, and range of motion after stroke when compared to Commercial video games with Conventional therapy.
- Virtual Reality Training (Nintendo Wii) with general physical therapy may be beneficial for improving muscle strength, but not motor function and performance of activities of daily living, after stroke when compared to OT with general physical therapy.
- Virtual Reality with Functional Electrical Stimulation may not be beneficial for improving motor function and dexterity after stroke when compared to Functional Electrical Stimulation.
- Video game self training may not be beneficial for improving motor function, performance of activities of daily living, and dexterity after stroke when compared to Graded repetitive arm supplementary program.
- VR based rehab may be beneficial for improving motor function, but not performance of activities of daily living and dexterity, after stroke when compared to Group based rehab.

- Virtual reality Wii gaming may not be beneficial for improving motor function after stroke when compared to Conventional therapy.
- Music glove may be beneficial for improving dexterity, but not motor function and muscle strength, after stroke when compared to Conventional care.
- Isometric hand therapy may not be beneficial for improving motor function, muscle strength, and dexterity after stroke when compared to Conventional care.
- Music glove may not be beneficial for improving motor function, muscle strength, and dexterity after stroke when compared to Isometric hand therapy.
- Virtual reality with aNodal tDCS may not be beneficial for improving motor function, muscle strength, and spasticity after stroke when compared to virtual reality with sham.
- VR gaming Gloves with Standard rehabilitation may be beneficial for improving motor function, but not muscle strength and performance of activities of daily living, after stroke when compared to Intensive Occupational therapy (the same movement in the VR gaming group without any game).
- Video game training combined with other interventions may not be beneficial for improving motor function, spasticity, performance of activities of daily living, and dexterity after stroke when compared to exercise and custom physiotherapy protocols.
- Video game training combined with other interventions may not be beneficial for improving motor function, muscle strength, spasticity, and dexterity after stroke when compared to conventional therapy.
- Video game training may not be beneficial for improving motor function, stroke severity, performance of activities of daily living, and dexterity after stroke when compared to sham.
- Smart gaming gloves combined with other interventions may not be beneficial for improving performance of activities of daily living and dexterity after stroke when compared to exercise and custom physiotherapy protocols.
- Gloreha Aria (Robotic exoskeleton) with Virtual reality and Conventional therapy may not be beneficial for improving motor function, muscle strength, and performance of activities of daily living after stroke when compared to Self mobilization with Conventional therapy.
- Low dose exoskeleton robot HEXORR II (12 sessions) with videogames may not be beneficial for improving motor function, muscle strength, spasticity, range of motion, and performance of activities of daily living after stroke when compared to High dose exoskeleton robot HEXORR II (24 sessions) with video games.
- Hand orthosis with computerised gaming exercises may not be beneficial for improving motor function, muscle strength, performance of activities of daily living, and dexterity after stroke when compared to Conventional home exercise.
- Cathodal tDCS with VR may be beneficial for improving motor function, but not spasticity, performance of activities of daily living, and dexterity, after stroke when compared to VR:.
- Cathodal tDCS with VR may be beneficial for improving motor function, but not spasticity, performance of activities of daily living, and dexterity, after stroke when compared to Cathodal tDCS.
- Cathodal tDCS may be beneficial for improving motor function, but not spasticity, performance of activities of daily living, and dexterity, after stroke when compared to VR:.
- Robotic orthosis with Task-Specific training and Videogames (Unilateral) may not be beneficial for improving motor function, muscle strength, spasticity, performance of activities of daily living, and dexterity after stroke when compared to Usual Physical Therapy.
- Robotic orthosis with Task-Specific Training and Videogames (Bilateral) may not be beneficial for improving motor function, muscle strength, spasticity, performance of activities of daily living, and dexterity after stroke when compared to Usual Physical Therapy.
- Video game training may be beneficial for improving stroke severity, but not motor function, muscle strength, spasticity, range of motion, and performance of activities of daily living, after stroke when compared to conventional therapy; the literature is mixed regarding dexterity.
- Virtual reality training: some approaches may be more beneficial than others for improving muscle strength, range of motion, and dexterity; different approaches to virtual reality training may not have a difference in efficacy when compared with one another for improving motor function and performance of activities of daily living; the literature is mixed regarding spasticity.

A.18 Brain Computer Interfaces (Table 18)

Key Points

- Brain-computer interface combined with other interventions may not be beneficial for improving motor function and spasticity after stroke when compared to fes.
- The literature is mixed regarding the effect of Brain-computer interface combined with other interventions on improvement of motor function after stroke when compared to sham.
- Brain-computer interface combined with other interventions may not be beneficial for improving motor function, dexterity, performance of activities of daily living, spasticity, and muscle strength after stroke when compared to conventional therapy.
- Brain-computer interface combined with other interventions may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to robotics.
- Functional electrical stimulation with brain-computer interface may be beneficial for improving motor function and muscle strength, but not performance of activities of daily living, after stroke when compared to neuromuscular electrical stimulation.
- Motor Imagery based brain-computer interface with conventional rehab may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Motor Imagery with conventional rehab.
- Motor imagery brain-computer interface with conventional rehab may be beneficial for improving motor function and performance of activities of daily living after stroke when compared to functional electrical stimulation with conventional rehab.
- Portable brain-computer interface-based hand robot system with Conventional therapy and neuromuscular electrical stimulation may be beneficial for improving motor function after stroke when compared to Task-specific training with Conventional therapy and neuromuscular electrical stimulation.
- Brain-computer interface with functional electrical stimulation may be beneficial for improving motor function, but not range of motion and muscle strength, after stroke when compared to Sham brain-computer interface with functional electrical stimulation.
- The literature is mixed regarding the effect of Motor Imagery-based Brain-computer Interface with functional electrical stimulation on improvement of motor function after stroke when compared to functional electrical stimulation.
- Motor imagery with Brain-computer interface with stroke treatment may be beneficial for improving motor function, stroke severity, and muscle strength after stroke when compared to Motor imagery with stroke treatment.
- The literature is mixed regarding the effect of Motion tracking device with virtual reality game on improvement of motor function after stroke when compared to Conventional therapy.
- Motion tracking device with virtual reality game may be less beneficial than Motion tracking device with braincomputer interface attention monitoring electroencephalogram device and virtual reality game for improving motor function after stroke.
- Bilateral transcranial direct current stimulation with motor imagery brain-computer interface may not be beneficial for improving motor function after stroke when compared to Sham transcranial direct current stimulation with motor imagery brain-computer interface.
- Action Observation with EEG-Mediated Functional Electrical Stimulation Brain-Computer Interface may be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Functional Electrical Stimulation.
- Functional electrical stimulation with Action observation training and brain computer interface may be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Conventional therapy.
- Isometric myoelectric computer interface may not be beneficial for improving motor function, performance of activities of daily living, and spasticity after stroke when compared to Non-restrained (freely moved) myoelectric computer Interface.
- Action observation with EEG-guided robot-hand training may not be beneficial for improving motor function after stroke when compared to robot-hand training without action observation and EEG guidance.

- Brain-computer interface training may not be beneficial for improving dexterity after stroke when compared to no treatment.

A.19 EMG Biofeedback (Table 19)

Key Points

- Electromyography biofeedback may be beneficial for improving motor function, stroke severity, muscle strength, spasticity, range of motion, and performance of activities of daily living after stroke when compared to conventional therapy.
- Electromyography-driven Robot may be beneficial for improving spasticity, but not performance of activities of daily living, after stroke when compared to Passive motion robot device on wrist; the literature is mixed regarding motor function.
- Electromyography biofeedback may be beneficial for improving motor function and range of motion, but not stroke severity, after stroke when compared to sham.
- Integrated behavioural and physical therapy with electromyography biofeedback may not be beneficial for improving motor function after stroke when compared to Exercise physical therapy (Bobath approach).
- Isometric myoelectric computer interface may not be beneficial for improving motor function, performance of activities of daily living, and spasticity after stroke when compared to Non-restrained (freely moved) myoelectric computer Interface.
- Ocupational Therapy may not be beneficial for improving motor function after stroke when compared to Ocupational Therapy with electromyography-biofeedback; Neurofeedback or Ocupational Therapy and Neurofeedback Therapy.
- FMRI neurofeedback may not be beneficial for improving motor function after stroke when compared to Sham fMRI neurofeedback.
- Electromyography bridge therapy with conventional therapy may not be beneficial for improving motor function, performance of activities of daily living, range of motion, and muscle strength after stroke when compared to neuromuscular electrical stimulation with conventional rehab.
- Functional electrical stimulation-Biofeedback mirror therapy with conventional may be beneficial for improving motor function and range of motion, but not performance of activities of daily living and stroke severity, after stroke when compared to Mirror therapy with conventional rehab.
- Electromyography neuromuscular electrical stimulation robot may not be beneficial for improving spasticity after stroke when compared to electromyography robot; the literature is mixed regarding motor function.
- Neuromuscular electrical stimulation electromyography robotic hand may be beneficial for improving spasticity, but not motor function and performance of activities of daily living, after stroke when compared to electromyography robotic hand.
- Electromyography-driven Robot-assisted Hand Training may not be beneficial for improving motor function after stroke when compared to Task-Oriented intervention; the literature is mixed regarding performance of activities of daily living.
- Electromyography- driven Exoskeleton Hand Robot with Rehabilitation Program may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Rehabilitation Program.
- AI-based electromyography hand robotic may be beneficial for improving motor function and performance of activities of daily living, but not spasticity, after stroke when compared to Passive robot hand robotic(no electromyography).
- Electromyography biofeedback may be beneficial for improving range of motion after stroke when compared to Sham Biofeedback or care.
- Electromyography biofeedback with task practice may not be beneficial for improving range of motion after stroke when compared to Sham biofeedback with task practice.
- Surface electromyography biofeedback may be beneficial for improving muscle strength after stroke when compared to sham biofeedback.
- EMG biofeedback (unilateral) may not be beneficial for improving motor function and dexterity after stroke when compared to EMG biofeedback (bilateral).

- The literature is mixed regarding the effect of High-definition tDCS with EMG-driven robotic hand (EMG-RH) on motor function and spasticity after stroke when compared to Sham tDCS with EMG-RH.
- AMES robot with torque biofeedback and muscle vibration may not be beneficial for improving motor function and dexterity after stroke when compared to AMES robot with EMG biofeedback and muscle vibration.

A.20 Feedback-Based Training (Table 20)

Key Points

- Repetitive motor task under vibratory feedback may be beneficial for improving motor function, but not range of motion, after stroke when compared to Repetitive motor task.
- The literature is mixed regarding the effect of Motion tracking device with virtual reality game on improvement of motor function after stroke when compared to Conventional therapy.
- Motion tracking device with virtual reality game may be less beneficial than Motion tracking device with braincomputer interface attention monitoring electroencephalogram device and virtual reality game for improving motor function after stroke.
- Wearable movement monitoring device (providing visual and audio feedback) may not be beneficial for improving motor function after stroke when compared to rehabilitation treatment; the literature is mixed regarding range of motion.
- Pointing movement practice with feedback may be beneficial for improving motor function, but not spasticity, after stroke when compared to Pointing movement practice without feedback.
- Upper limb control of less-affected side with real-time feedback may be beneficial for improving performance of activities of daily living, but not motor function, after stroke when compared to Upper limb control of affected side with real-time feedback; the literature is mixed regarding range of motion and muscle strength.
- Reinforced feedback in Virtual Reality environment with traditional neuromotor rehabilitation may be beneficial for improving motor function and performance of activities of daily living, but not spasticity, after stroke when compared to traditional neuromotor rehabilitation.
- The literature is mixed regarding the effect of Arm ability training with knowledge of results (feedback on their performance presented as charts to them) on improvement of motor function after stroke when compared to Rehab.
- Arm ability training with knowledge of results (feedback on their performance presented as charts to them) may not be beneficial for improving motor function after stroke when compared to arm ability training without knowledge of results.
- Rhythmic auditory cueing may be beneficial for improving motor function after stroke when compared to Conventional therapy.
- Rhythmic auditory cueing may not be beneficial for improving motor function after stroke when compared to Visual cueing.
- Bilateral Isometric Handgrip Force Training with Visual Feedback may be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Therapy.
- Pointing exercise with feedback at end may be beneficial for improving motor function after stroke when compared to Conventional care; the literature is mixed regarding spasticity.
- Robot Assisted Arm Training with high inertia (RAT-WAM) may not be beneficial for improving motor function and dexterity after stroke when compared to Robot Assisted Arm Training with low-inertia Proficio (RAT-P).
- Robot therapy with assistance as needed may be beneficial for improving motor function, but not dexterity, after stroke when compared to Robot therapy with guidance forces all times.
- AMES robot with torque biofeedback and muscle vibration may not be beneficial for improving motor function and dexterity after stroke when compared to AMES robot with electromyography biofeedback and muscle vibration.
- Virtual reality training (ArmeoSenso with monetary feedback rewards) and conventional care may be beneficial for improving dexterity, but not motor function, performance of activities of daily living, range of

motion, and stroke severity, after stroke when compared to virtual reality training (without rewards) with conventional care.

- Teacher-supervised Virtual reality with conventional rehab may not be beneficial for improving motor function, dexterity, performance of activities of daily living, and spasticity after stroke when compared to Non-supervised virtual reality with conventional rehab.
- Virtual reality games with Audio feedback and conventional therapy may be beneficial for improving dexterity, but not motor function, range of motion, and muscle strength, after stroke when compared to Conventional Rehab.
- Autonomy support (training with more-affected arm and could actively adjust task difficulty) with Verbal feedback may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Training with more-affected arm with no opportunity to adjust difficulty with General verbal feedback.
- Cycling exercise with feedback and Conventional therapy may be beneficial for improving spasticity, but not motor function and performance of activities of daily living, after stroke when compared to Conventional therapy; the literature is mixed regarding stroke severity.
- Visual feedback therapy may be beneficial for improving motor function and performance of activities of daily living after stroke when compared to conventional therapy.
- Virtual Relaity Game (Vision Based Tracking) may be less beneficial than Virtual Reality (Haptic Feedback) for improving dexterity after stroke.
- Virtual Reality (Haptic Feedback) may be beneficial for improving dexterity after stroke when compared to Virtual Reality (Exoskelton).
- Virtual Relaity Game (Vision Based Tracking) may not be beneficial for improving dexterity after stroke when compared to Virtual Reality (Exoskelton).
- Reach-To-Grasp with robot feedback with Conventional therapy may not be beneficial for improving motor function after stroke when compared to Reach-To-Grasp with computer feedback with Conventional therapy.
- Visual feedback correction with conventional therapy may not be beneficial for improving dexterity after stroke when compared to Placebo video treatment with conventional therapy.
- Trunk Restraint Training with auditory feedback may not be beneficial for improving motor function, muscle strength, range of motion, and performance of activities of daily living after stroke when compared to Trunk Restraint Training with tactile feedback.
- Augmented feedback training combined with other interventions may not be beneficial for improving performance of activities of daily living after stroke when compared to conventional therapy; the literature is mixed regarding motor function.
- MCIMT with auditory feedback may be beneficial for improving motor function and performance of activities of daily living, but not spasticity, after stroke when compared to mCIMT alone.
- Spatial target reaching training based on visual biofeedback with Routine therapy may be beneficial for improving motor function after stroke when compared to Routine Therapy.
- SMART Arm with outcome-triggered (OT) electrical stimulation may be beneficial for improving performance of activities of daily living after stroke when compared to SMART arm alone.

A.21 Wearable Cueing and Reminder Devices (Table 21)

Key Points

- Remind to Move group (using cueing wristwatch device) may not be beneficial for improving dexterity and performance of activities of daily living after stroke when compared to usual care; the literature is mixed regarding motor function.
- Remind to Move group (using cueing wristwatch device) may not be beneficial for improving dexterity and performance of activities of daily living after stroke when compared to Sham device; the literature is mixed regarding motor function.
- Cueing or remind to move with exercise or custom physiotherapy protocols may not be beneficial for improving motor function, dexterity, performance of activities of daily living, stroke severity, and muscle strength after stroke when compared to Sham with exercise or custom physiotherapy protocols.

- Neuro-X (Robotic exoskeleton) with Visual and Audio feedback may be beneficial for improving motor function, dexterity, and performance of activities of daily living, but not spasticity, stroke severity, and muscle strength, after stroke when compared to Neuro-X (Robotic exoskeleton).
- Home-based custom exercise program with Visual feedback and Vibrotactile Reminders may not be beneficial for improving motor function, performance of activities of daily living, and stroke severity after stroke when compared to Home-based custom exercise program.
- Motor Imagery with Audio Feedback and Task Specific Training may not be beneficial for improving dexterity after stroke when compared to Task-specific Training.
- Motor Imagery with Audio Feedback and Task Specific Training may not be beneficial for improving dexterity after stroke when compared to Motor imagery with TST.

A.22 Neuromuscular Electrical Stimulation (NMES) (Table 22)

Key Points

- 120min electrical stimulation with repetitive task specific practice may be beneficial for improving motor function and performance of activities of daily living after stroke when compared to 60min electrical stimulation therapy with repetitive task specific practice or 30min electrical stimulation therapy and repetitive task specific practice.
- Bilateral arm training with functional electrical stimulation and conventional occupational therapy may be beneficial for improving motor function and range of motion, but not performance of activities of daily living, spasticity, and muscle strength, after stroke when compared to Bilateral arm training with sham functional electrical stimulation and conventional occupational therapy.
- Neuromuscular electrical stimulation combined with other interventions may be beneficial for improving motor function, range of motion, and muscle strength, but not spasticity, after stroke when compared to sham.
- Functional electrical stimulation may be beneficial for improving stroke severity, muscle strength, spasticity, and range of motion, but not motor function and performance of activities of daily living, after stroke when compared to conventional therapy.
- Functional electrical stimulation combined with other interventions may not be beneficial for improving motor function, dexterity, and performance of activities of daily living after stroke when compared to fes.
- Neuromuscular electrical stimulation may be beneficial for improving motor function, but not performance of activities of daily living, after stroke when compared to sham.
- Neuromuscular electrical stimulation may be less beneficial than sham for improving muscle strength after stroke.
- Neuromuscular electrical stimulation may be beneficial for improving motor function, muscle strength, range of motion, and dexterity, but not stroke severity, spasticity, and performance of activities of daily living, after stroke when compared to conventional therapy.
- High neuromuscular electrical stimulation may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Low neuromuscular electrical stimulation.
- Functional electrical stimulation combined with other interventions may be beneficial for improving range of motion, but not performance of activities of daily living and dexterity, after stroke when compared to neuromuscular electrical stimulation; the literature is mixed regarding motor function and muscle strength.
- Arm with Hand Contralaterally Controlled Functional Electrical Stimulation may not be beneficial for improving dexterity and performance of activities of daily living after stroke when compared to Hand contralaterally controlled functional electrical stimulation or Arm with Hand Cyclic Neuromuscular Electrical Stimulation; the literature is mixed regarding motor function.
- Neuromuscular Electrical Stimulation with Conventional Rehabilitation may not be beneficial for improving motor function, performance of activities of daily living, spasticity, and muscle strength after stroke when compared to Noxious Thermal Stimulation with Conventional Rehabilitation or Thermal Stimulation, Neuromuscular Electrical stimulation and Conventional Rehabilitation.

- Neuromuscular electrical stimulation with repetitive transcranial magnetic stimulation may be beneficial for improving dexterity and spasticity, but not motor function, after stroke when compared to Sham neuromuscular electrical stimulation with repetitive transcranial magnetic stimulation.
- Cyclic Neuromuscular Electrical Stimulation may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Electromyographically-triggered Neuromuscular Electrical Stimulatiom or Sensory Stimulation.
- Electromyography-triggered neuromuscular electrical stimulation with repetitive transcranial magnetic stimulation may not be beneficial for improving motor function, spasticity, and range of motion after stroke when compared to electromyography-triggered neuromuscular electrical stimulation with Sham repetitive transcranial magnetic stimulation.
- The literature is mixed regarding the effect of Functional electrical stimulation combined with other interventions on motor function and dexterity after stroke when compared to task-specific training.
- Neuromuscular electrical stimulation combined with other interventions may not be beneficial for improving motor function, performance of activities of daily living, spasticity, and muscle strength after stroke when compared to orthotics.
- Contralaterally controlled functional electrical stimulation with Task specific training may be beneficial for improving motor function, dexterity, performance of activities of daily living, and range of motion after stroke when compared to Cyclic neuromuscular electrical stimulation with Task specific training.
- Electromyography-triggered neuromuscular electrical stimulation may not be beneficial for improving motor function and muscle strength after stroke when compared to cyclic neuromuscular electrical stimulation.
- Motor electrical stimulation involving cyclic (neuromuscular electrical stimulation) and electromyography may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Percutaneous Sensory electrical stimulation.
- Functional Electrical Stimulation with Mirror Therapy may not be beneficial for improving dexterity after stroke when compared to Functional Electrical Stimulation with Sham Mirror Therapy; the literature is mixed regarding motor function and stroke severity.
- Electromyography-triggered neuromuscular electrical stimulation combined with other interventions may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to emg-triggered nmes; the literature is mixed regarding dexterity.
- Electromyogrpahical bridge may be beneficial for improving motor function and stroke severity, but not range of motion, after stroke when compared to Cyclic neuromuscular electrical stimulation.
- Neuromuscular electrical stimulation combined with other interventions may be beneficial for improving performance of activities of daily living, but not motor function, stroke severity, spasticity, and range of motion, after stroke when compared to conventional therapy.
- Neuromuscular electrical stimulation with Conventional therapy may not be beneficial for improving motor function after stroke when compared to Peripheral Pulse Electromagnetic Waves (rPMS) with Conventional therapy.
- Neuromuscular electrical stimulation with conventional rehabilitation may not be beneficial for improving motor function, performance of activities of daily living, spasticity, and range of motion after stroke when compared to transcutaneous electrical nerve stimulation with conventional rehabilitation.
- The literature is mixed regarding the effect of Functional electrical stimulation combined with other interventions on motor function, muscle strength, spasticity, and performance of activities of daily living after stroke when compared to conventional therapy.
- Electromyography-triggered neuromuscular electrical stimulation may be beneficial for improving dexterity, but not motor function, muscle strength, and performance of activities of daily living, after stroke when compared to conventional therapy.
- Electromuscular Stimulation may not be beneficial for improving motor function, performance of activities of daily living, and stroke severity after stroke when compared to Transcutaneous Electrical Nerve Stimulation; the literature is mixed regarding muscle strength.
- CNMES with task oriented training and conventional rehab may not be beneficial for improving motor function and dexterity after stroke when compared to electromyography-triggered neuromuscular electrical stimulation with task oriented training and conventional rehab.

- Functional electrical stimulation may not be beneficial for improving motor function after stroke when compared to No treatment.
- Position triggered ES with conventional rehabilitation may not be beneficial for improving motor function and muscle strength after stroke when compared to Passive ES with conventional rehabilitation.
- Arm hand function training (electromyography triggered biofeedback with movement imagery) and usual therapy may not be beneficial for improving motor function after stroke when compared to Electrical stimulation (without the electromyography-triggered feedback function) with usual therapy.
- Mental Practice with electromyography neuromuscular electrical stimulation and Conventional Rehab may be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Conventional Rehab.
- Mirror therapy with Mesh glove (afferent stimulation, primarily neuromuscular electrical stimulation) may be beneficial for improving motor function, but not performance of activities of daily living, after stroke when compared to task oriented exercise.
- Mirror therapy with Mesh glove (afferent stimulation, primarily neuromuscular electrical stimulation) may be less beneficial than task oriented exercise for improving dexterity after stroke.
- Mirror therapy with Mesh glove (afferent stimulation, primarily neuromuscular electrical stimulation) may be beneficial for improving dexterity, but not motor function and performance of activities of daily living, after stroke when compared to Mirror therapy.
- Functional electrical stimulation with Task-specific training may be beneficial for improving motor function and dexterity after stroke when compared to Task-specific training.
- Functional Electrical Stimulation may be beneficial for improving motor function, but not performance of activities of daily living, after stroke when compared to Mirror Therapy.
- Functional Electrical Stimulation may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Functional Electrical Stimulation with Mirror Therapy.
- Mirror Therapy may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Functional Electrical Stimulation with Mirror Therapy.
- Mechanical arm trainer may be beneficial for improving dexterity, but not motor function, spasticity, and muscle strength, after stroke when compared to Electrical muscle stimulation of paretic wrist extensors.
- Botulinum Toxin A injection with neuromuscular electrical stimulation may be beneficial for improving motor function after stroke when compared to Placebo with neuromuscular electrical stimulation; the literature is mixed regarding spasticity and range of motion.
- Brain-computer interface with functional electrical stimulation may not be beneficial for improving motor function and spasticity after stroke when compared to Functional Electrical Stimulation.
- Low frequency repetitive transcranial magnetic stimulation may not be beneficial for improving motor function, performance of activities of daily living, spasticity, stroke severity, and muscle strength after stroke when compared to Physical therapy.
- Robot-assisted arm therapy with hand functional electrical stimulation (RAT and functional electrical stimulation) may not be beneficial for improving motor function, dexterity, performance of activities of daily living, and spasticity after stroke when compared to Conventional Therapy.
- Robotic Assisted Therapy (Bi-Manu-track robot) may be beneficial for improving motor function and muscle strength, but not spasticity, after stroke when compared to electromyography-initiated electrical stimulation.
- Robot Exoskeleton with electromyography-Triggered functional electrical stimulation (RETRAINER) may be beneficial for improving motor function and dexterity, but not performance of activities of daily living and muscle strength, after stroke when compared to Conventional Therapy.
- Modified constraint-induced movement therapy may not be beneficial for improving motor function, performance of activities of daily living, proprioception, and muscle strength after stroke when compared to Usual care.
- Mental Imagery Training with electromyography-Triggered Electrical Stimulation may be beneficial for improving motor function, but not spasticity and performance of activities of daily living, after stroke when compared to Generalized Functional Electric Stimulation.

- Electromyography neuromuscular electrical stimulation robot may not be beneficial for improving spasticity after stroke when compared to electromyography robot; the literature is mixed regarding motor function.
- Action Observation with EEG-Mediated Functional Electrical Stimulation Brain-Computer Interface may be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Functional Electrical Stimulation.
- Neuromuscular electrical stimulation electromyography robotic hand may be beneficial for improving spasticity, but not motor function and performance of activities of daily living, after stroke when compared to electromyography robotic hand.
- Neuromuscular electrical stimulation robotic to distal fingers may be beneficial for improving spasticity after stroke when compared to neuromuscular electrical stimulation robotic to proximal wrist-elbow joints; the literature is mixed regarding motor function.
- Dual transcranial direct current stimulation with functional electrical stimulation may be beneficial for improving muscle strength, but not motor function and range of motion, after stroke when compared to Sham transcranial direct current stimulation with functional electrical stimulation.
- Bilateral active transcranial direct current stimulation with functional electrical stimulation may be beneficial for improving motor function, but not spasticity, after stroke when compared to sham transcranial direct current stimulation with functional electrical stimulation.
- Functional electrical stimulation with Action observation training and brain computer interface may be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Conventional therapy.
- Distal (wrist or hand Functional Electrical Stimulation) may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to functional electrical stimulation with Robot assisted Whole arm.
- Distal (wrist or hand Functional Electrical Stimulation) may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Proximal (Shoulder or elbow) (Functional Electrical Stimulation with inMotion robot).
- Neuromuscular electrical stimulation with robot therapy may not be beneficial for improving motor function, performance of activities of daily living, and spasticity after stroke when compared to Robot therapy with Sham.
- Robotic training (InMotion ARM) with motor learning may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Motor learning.
- Electrical stim with repetitive task practice may be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Sham electrical with repetitive task practice.
- Static arm positioning with neuromuscular electrical stimulation may not be beneficial for improving motor function, spasticity, range of motion, and performance of activities of daily living after stroke when compared to Sham positioning and sham neuromuscular electrical stimulation.
- Intermittent theta burst stimulation with Physical therapy may be beneficial for improving motor function, performance of activities of daily living, and stroke severity after stroke when compared to Physical Therapy.
- Intermittent theta burst stimulation with Physical therapy may not be beneficial for improving motor function, performance of activities of daily living, and stroke severity after stroke when compared to functional electrical stimulation with Physical therapy.
- Electromyography neuromuscular electrical stimulation with mental imagery training may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to electromyography neuromuscular electrical stimulation.
- Functional electrical stimulation with brain-computer interface may be beneficial for improving motor function and muscle strength, but not performance of activities of daily living, after stroke when compared to neuromuscular electrical stimulation.
- Repetitive peripheral sensory stimulation with functional electrical stimulation and task specific training may not be beneficial for improving motor function, performance of activities of daily living, spasticity,

range of motion, and muscle strength after stroke when compared to Sham RPSS with functional electrical stimulation and TST.

- Purposeful activity with electrical stimulation therapy (functional electrical stimulation) and occupational therapy may be beneficial for improving motor function and performance of activities of daily living, but not muscle strength, after stroke when compared to occupational therapy.
- Bilateral transcranial direct current stimulation with neuromuscular electrical stimulation and coventional care may not be beneficial for improving motor function, performance of activities of daily living, and spasticity after stroke when compared to Sham transcranial direct current stimulation and neuromuscular electrical stimulation with conventional care.
- Low-frequency repetitive transcranial magnetic stimulation with functional electrical stimulation and conventional rehab may be beneficial for improving motor function after stroke when compared to functional electrical stimulation with conventional rehab.
- Low-frequency repetitive transcranial magnetic stimulation with functional electrical stimulation and conventional rehab may be beneficial for improving motor function after stroke when compared to Low-frequency repetitive transcranial magnetic stimulation with conventional rehab.
- Electromyography bridge therapy with conventional therapy may not be beneficial for improving motor function, performance of activities of daily living, range of motion, and muscle strength after stroke when compared to neuromuscular electrical stimulation with conventional rehab.
- Brain-computer interface-functional electrical stimulation with Conventional rehab may not be beneficial for improving motor function after stroke when compared to functional electrical stimulation with Conventional Rehab.
- Functional electrical stimulation-Biofeedback mirror therapy with conventional may be beneficial for improving motor function and range of motion, but not performance of activities of daily living and stroke severity, after stroke when compared to Mirror therapy with conventional rehab.
- Motor imagery brain-computer interface with conventional rehab may be beneficial for improving motor function and performance of activities of daily living after stroke when compared to functional electrical stimulation with conventional rehab.
- Portable brain-computer interface-based hand robot system with Conventional therapy and neuromuscular electrical stimulation may be beneficial for improving motor function after stroke when compared to Task-specific training with Conventional therapy and neuromuscular electrical stimulation.
- Brain-computer interface with functional electrical stimulation may be beneficial for improving motor function, but not range of motion and muscle strength, after stroke when compared to Sham brain-computer interface with functional electrical stimulation.
- Robot therapy with Electroymography-triggered neuromuscular electrical stimulation (ENMES) may be beneficial for improving motor function after stroke when compared to Robot therapy or ENMES.
- Functional electrical stimulation may not be beneficial for improving motor function and range of motion after stroke when compared to routine therapy.
- Functional electrical therapy applied in the acute phase may be beneficial for improving motor function, but not performance of activities of daily living and spasticity, after stroke when compared to functional electrical therapy applied in the chronic phase.
- Cyclic neuromuscular electrical stimulation with mirror therapy may be beneficial for improving motor function, but not spasticity, after stroke when compared to neuromuscular electrical stimulation or mirror therapy alone.
- Blocked neuromuscular electrical stimulation training (neuromuscular electrical stimulation with Hand range of motion training) may be beneficial for improving dexterity and muscle strength after stroke when compared to Hand range of motion exercises (Passive movements, voluntary UE extensions or abduction).
- Blocked neuromuscular electrical stimulation training (neuromuscular electrical stimulation with Hand range of motion training) may not be beneficial for improving dexterity after stroke when compared to Random neuromuscular electrical stimulation training (neuromuscular electrical stimulation with Hand range of motion training).

- Short-term bilateral arm training with electromyography triggered neuromuscular electrical stimulation may be less beneficial than long-term bilateral arm training with electromyography triggered neuromuscular electrical stimulation for improving muscle strength and dexterity after stroke.
- Electromyography-Triggered neuromuscular electrical stimulation with Bilateral Arm Training may be beneficial for improving dexterity after stroke when compared to Sham Stimulation with Bilateral Arm Training.
- Electromyography-Triggered neuromuscular electrical stimulation with Bilateral Arm Training may be beneficial for improving dexterity after stroke when compared to electromyography-Triggered neuromuscular electrical stimulation with Bilateral Arm Training.
- Coupled bilateral training with load with electromyography-triggered neuromuscular electrical stimulation may be beneficial for improving dexterity after stroke when compared to unilateral arm training.
- Coupled bilateral training with load with electromyography-triggered neuromuscular electrical stimulation may not be beneficial for improving dexterity after stroke when compared to Coupled bilateral training with no load with electromyography-triggered neuromuscular electrical stimulation.
- Motor relearning with electrical stim may not be beneficial for improving dexterity and spasticity after stroke when compared to Bobath treatment with electrical stim.
- Motor relearning with electrical stim may be less beneficial than Bobath treatment with electrical stim for improving muscle strength after stroke.
- SMART arm with outcome triggered electrical stim and usual therapy may not be beneficial for improving performance of activities of daily living, spasticity, and muscle strength after stroke when compared to Usual therapy.
- SMART arm with electrical stim may be beneficial for improving performance of activities of daily living and spasticity after stroke when compared to No Treatment.
- Anodal transcranial direct current stimulation with functional electrical stimulation may be beneficial for improving spasticity after stroke when compared to Sham transcranial direct current stimulation with functional electrical stimulation.
- Electromyography-trigerred functional electrical stimulation may be beneficial for improving range of motion, but not spasticity, after stroke when compared to Conventional therapy.
- Botolinum Toxin-A with Extracorporeal shock wave therapy (extracorporeal shockwave therapy) may be beneficial for improving spasticity after stroke when compared to botulinum toxin A with electrical stimulation (ES).
- Neuromuscular electrical stimulation may be beneficial for improving spasticity after stroke when compared to passive stretching.
- EMG-triggered neuromuscular electrical stimulation may be beneficial for improving muscle strength, but not spasticity, after stroke when compared to conventional therapy.
- Electrical Stimulation to Wrist and Finger Extensors with Splint may not be beneficial for improving range of motion after stroke when compared to Splint.
- Botox 1000u with cyclic neuromuscular electrical stimulation may not be beneficial for improving proprioception after stroke when compared to Placebo.
- Bilateral electromyography-triggered multi-channel electrostimulation with mirror therapy may not be beneficial for improving proprioception after stroke when compared to bilateral electromyography-triggered multi-channel electrostimulation.
- Functional Electrical Stimulation with 1:1 On/Off Ratio may be less beneficial than Functional Electrical Stimulation with 1:3 On/Off Ratio or Functional Electrical Stimulation with 1:5 On/Off Ratio for improving muscle strength after stroke.
- Cryotherapy on spastic wrist flexors with Kinesiotherapy may not be beneficial for improving muscle strength after stroke when compared to neuromuscular electrical stimulation on wrist extensors.
- Different approaches to FES may not have a difference in efficacy when compared with one another for improving motor function.
- EMG-Controlled FES during task oriented training with Robotic training may be beneficial for improving motor function, but not dexterity, after stroke when compared to Conventional rehab (TST).

- EMG driven NMES Robot arm may be beneficial for improving spasticity, but not performance of activities of daily living, after stroke when compared to Conventional Therapy; the literature is mixed regarding motor function.
- Long NMES (12Hr) may be beneficial for improving motor function, but not spasticity, after stroke when compared to Short NMES (30min).
- High Frequency NMES (40Hz) may not be beneficial for improving muscle strength after stroke when compared to Low Frequency NMES (20Hz).
- FES with Task specific training may be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Sham with Task specific training.
- FES with botulinum toxin-A and home based task-oriented exercise may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Botulinum toxin-A with home-based exercise program.
- EMG triggered NMS (EMG-Stim) with Wrist Strengthening Exercises may be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Wrist Exercises.
- Neuromuscular electrical stimulation combined with other interventions may be beneficial for improving motor function after stroke when compared to stretching and positioning programs.
- Transcranial Random Noise stimulation (tRNS) with FES may not be beneficial for improving muscle strength after stroke when compared to Sham-tRNS with active FES; the literature is mixed regarding motor function.
- Task Specific EMG triggered ES therapy with Conventional PT may be beneficial for improving motor function, stroke severity, and muscle strength, but not performance of activities of daily living, after stroke when compared to Conventional PT.
- Virtual Reality with Functional Electrical Stimulation may not be beneficial for improving motor function and dexterity after stroke when compared to Functional Electrical Stimulation.
- Dual-tDCS combined with PNMES with CIMT may be beneficial for improving motor function after stroke when compared to CIMT; the literature is mixed regarding performance of activities of daily living.
- Mirror therapy may not be beneficial for improving motor function, muscle strength, and dexterity after stroke when compared to EMG-triggered neuromuscular stimulation.
- Functional electrical stimulation with biofeedback with mirror therapy may be beneficial for improving motor function, performance of activities of daily living, and dexterity, but not muscle strength, spasticity, and range of motion, after stroke when compared to Conventional rehabilitation.
- Functional electrical stimulation with biofeedback with mirror therapy may be beneficial for improving motor function, muscle strength, and dexterity, but not range of motion and performance of activities of daily living, after stroke when compared to FES with mirror therapy.
- Mental training linked with EMG triggered stimulation may be beneficial for improving motor function, but not spasticity, range of motion, and performance of activities of daily living, after stroke when compared to FES.
- PNF with NMES may be beneficial for improving stroke severity, spasticity, range of motion, and performance of activities of daily living after stroke when compared to PNF.
- Integrated volitional electrical stimulator (IVES) with wrist splint may be beneficial for improving motor function, but not performance of activities of daily living, after stroke when compared to wrist splint.
- Dry Needling with FES and conventional exercise may be beneficial for improving motor function, muscle strength, and dexterity, but not spasticity, after stroke when compared to Sham-Needling with FES and Conventional exercise.
- Functional electrical stimulation combined with other interventions: some approaches may be more beneficial than others for improving dexterity; different approaches to functional electrical stimulation combined with other interventions may not have a difference in efficacy when compared with one another for improving motor function and performance of activities of daily living.
- Different approaches to neuromuscular electrical stimulation may not have a difference in efficacy when compared with one another for improving motor function, muscle strength, spasticity, range of motion, and performance of activities of daily living.
- Electromyography-triggered neuromuscular electrical stimulation combined with other interventions: some approaches may be more beneficial than others for improving range of motion; different approaches to

electromyography-triggered neuromuscular electrical stimulation combined with other interventions may not have a difference in efficacy when compared with one another for improving motor function and dexterity.

- FES with Conventional rehab may be beneficial for improving motor function after stroke when compared to Sham FES with Conventional rehab.
- High Frequency NMES (40Hz) may be less beneficial than Low Frequency NMES (20Hz) for improving dexterity after stroke.
- Functional electrical stimulation: some approaches may be more beneficial than others for improving range of motion.
- EMG-triggered neuromuscular stimulation may not be beneficial for improving motor function, muscle strength, and dexterity after stroke when compared to Conventional care.

A.23 Transcutaneous Electrical Nerve Stimulation (TENS) (Table 23)

Key Points

- Transcutaneous electrical stimulation (transcutaneous electrical nerve stimulation) may be beneficial for improving performance of activities of daily living, but not motor function and spasticity, after stroke when compared to sham.
- Low-transcutaneous electrical nerve stimulation with physiotherapy may be beneficial for improving motor function, but not performance of activities of daily living, after stroke when compared to Physiotherapy.
- Transcutaneous electrical stimulation (transcutaneous electrical nerve stimulation) combined with other interventions may be beneficial for improving motor function, range of motion, and muscle strength, but not performance of activities of daily living and spasticity, after stroke when compared to sham or task-specific training.
- Movement science based training may not be beneficial for improving motor function, dexterity, performance of activities of daily living, and spasticity after stroke when compared to Bobath concept.
- Bi-transcutaneous electrical nerve stimulation with Task Oriented Training (TOT) may be beneficial for improving motor function after stroke when compared to No Treatment.
- Transcutaneous electrical nerve stimulation with wrist extensor taping and Tast-related training may be beneficial for improving motor function and spasticity, but not muscle strength, after stroke when compared to transcutaneous electrical nerve stimulation with task-related training.
- Task related training with transcutaneous electrical nerve stimulation may be beneficial for improving motor function and dexterity, but not spasticity, after stroke when compared to Task related training with Sham transcutaneous electrical nerve stimulation.
- Neuromuscular electrical stimulation with conventional rehabilitation may not be beneficial for improving performance of activities of daily living, spasticity, and range of motion after stroke when compared to Conventional rehabilitation; the literature is mixed regarding motor function.
- Neuromuscular electrical stimulation with conventional rehabilitation may not be beneficial for improving performance of activities of daily living, spasticity, and range of motion after stroke when compared to transcutaneous electrical nerve stimulation with conventional rehabilitation; the literature is mixed regarding motor function.
- Botulinumtoxin therapy in combination with dynamic electric neurostimulation (the explanation is consistent with transcutaneous electrical nerve stimulation) and basic therapy, including massage and therapeutic exercises may be beneficial for improving motor function and spasticity after stroke when compared to Basic Therapy.
- Botulinumtoxin therapy in combination with dynamic electric neurostimulation (the explanation is consistent with transcutaneous electrical nerve stimulation) and basic therapy, including massage and therapeutic exercises may be beneficial for improving motor function and spasticity after stroke when compared to Botulinum toxin therapy and basic therapy.
- Botulinumtoxin therapy in combination with dynamic electric neurostimulation (the explanation is consistent with transcutaneous electrical nerve stimulation) and basic therapy, including massage and therapeutic exercises may be beneficial for improving motor function and spasticity after stroke when compared to Dynamic electric neurostimulation and basic therapy.

- Electromuscular Stimulation may not be beneficial for improving motor function, performance of activities of daily living, and stroke severity after stroke when compared to Transcutaneous Electrical Nerve Stimulation; the literature is mixed regarding muscle strength.
- Electromyography-triggered neuromuscular electrical stimulation with BAT may not be beneficial for improving motor function after stroke when compared to transcutaneous electrical nerve stimulation with BAT.
- Task specific training with transcutaneous electrical nerve stimulation acupoint may not be beneficial for improving motor function and dexterity after stroke when compared to Task-specific training with Sham electrical stimulation.
- Transcutaneous electrical nerve stimulation with conventional rehab may not be beneficial for improving performance of activities of daily living, spasticity, and range of motion after stroke when compared to Suprascapular nerve block with conventional rehab.
- LASER therapy may not be beneficial for improving performance of activities of daily living after stroke when compared to Interferential current treatment.
- Triamcinolone acetonide with transcutaneous electrical nerve stimulation and Therapeutic exercise program may be beneficial for improving range of motion, but not performance of activities of daily living, spasticity, and stroke severity, after stroke when compared to transcutaneous electrical nerve stimulation with Therapeutic exercise program.
- Transcutaneous electrical nerve stimulation with BTA infiltration may not be beneficial for improving spasticity and range of motion after stroke when compared to transcutaneous electrical nerve stimulation with Placebo 2.5mL saline.
- Non invasive transcutaneous electrical nerve stimulation with conventional treatment (NSAID, Exercise and activities of daily living instructions) may be beneficial for improving range of motion and muscle strength after stroke when compared to Ultrasound therapy with conventional treatment (NSAID, Exercise and activities of daily living instructions).
- Transcutaneous electrical nerve stimulation (TENS) may be beneficial for improving muscle strength after stroke when compared to sham TENS.
- Transcutaneous auricular vagus nerve stimulation with task-oriented training may be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Task-oriented training.

A.24 Thermal Stimulation (Table 24)

Key Points

- Upper extremity thermal stimulation may be beneficial for improving motor function, but not performance of activities of daily living and spasticity, after stroke when compared to lower extremity thermal stimulation.
- Vibrational heated pressure therapy with Meridian dredging exercise and conventional rehab may be beneficial for improving motor function, performance of activities of daily living, and spasticity after stroke when compared to meridian dredging exercise with conventional treatment.
- Neuromuscular Electrical Stimulation with Conventional Rehabilitation may not be beneficial for improving motor function, performance of activities of daily living, spasticity, and muscle strength after stroke when compared to Noxious Thermal Stimulation with Conventional Rehabilitation or Thermal Stimulation, Neuromuscular Electrical stimulation and Conventional Rehabilitation.
- Nintendo Wii Sports may be beneficial for improving range of motion, but not dexterity and spasticity, after stroke when compared to Neutral warmth.
- Thermal stimulation may not be beneficial for improving spasticity and muscle strength after stroke when compared to conventional therapy; the literature is mixed regarding performance of activities of daily living and stroke severity.
- Paraffin wax thermal stimulation may be beneficial for improving spasticity, but not stroke severity, after stroke when compared to Placebo paraffin thermal stimulation (room temperature sand picks).
- Radial Shock Wave Therapy with Infrared therapy and Static Stretching may be beneficial for improving spasticity after stroke when compared to Infrared therapy with Static Stretching.

- Cryotherapy on spastic wrist flexors with Kinesiotherapy may not be beneficial for improving muscle strength after stroke when compared to neuromuscular electrical stimulation on wrist extensors.
- Alternating hot-cold water immersion (AHCWI) with Standard rehabilitation may be beneficial for improving motor function and muscle strength, but not spasticity and performance of activities of daily living, after stroke when compared to Upper limb cycling exercises with Standard rehabilitation.
- Heat/Cool Therapy with Accupuncture and routine rehabilitation may be beneficial for improving motor function, but not performance of activities of daily living, after stroke when compared to Accupuncture with routine rehabilitation.
- Different approaches to thermal stimulation may not have a difference in efficacy when compared with one another for improving motor function, muscle strength, spasticity, and performance of activities of daily living.

A.25 Muscle Vibration (Table 25)

Key Points

- Muscle vibration may not be beneficial for improving range of motion and muscle strength after stroke when compared to conventional therapy; the literature is mixed regarding motor function, performance of activities of daily living, spasticity, and stroke severity.
- Whole-body vibration with Task Oriented Training and Conventional physical therapy may be beneficial for improving motor function and muscle strength after stroke when compared to Upper- and lower-Cycle group with Task Specific Training and Conventional physical therapy.
- Muscle vibration may be beneficial for improving motor function, stroke severity, muscle strength, and performance of activities of daily living after stroke when compared to sham; the literature is mixed regarding spasticity.
- AMES robot with torque biofeedback and muscle vibration may not be beneficial for improving motor function and dexterity after stroke when compared to AMES robot with electromyography biofeedback and muscle vibration.
- Vibrational heated pressure therapy with Meridian dredging exercise and conventional rehab may be beneficial for improving motor function, performance of activities of daily living, and spasticity after stroke when compared to meridian dredging exercise with conventional treatment.
- Muscle vibration may be beneficial for improving spasticity after stroke when compared to Stretch control or Rest control.
- Muscle vibration may be beneficial for improving muscle strength after stroke when compared to rest.
- Focal muscle vibration with progressive modular rebalancing may not be beneficial for improving motor function, muscle strength, and spasticity after stroke when compared to Conventional physiotherapy.
- Mirror therapy may be beneficial for improving motor function after stroke when compared to Conventional therapy.
- Vibration therapy may be beneficial for improving motor function after stroke when compared to Conventional therapy.
- Mirror therapy may not be beneficial for improving motor function after stroke when compared to Vibration therapy.
- Robotic training (Armeo) with Muscle vibration may be beneficial for improving motor function, spasticity, and performance of activities of daily living after stroke when compared to Robotic training (Armeo) with Sham muscle vibration.
- Whole-Body Vibration (5-15 Hz) may not be beneficial for improving muscle strength and spasticity after stroke when compared to Conventional Physical Therapy; the literature is mixed regarding motor function.
- Whole-Body Vibration with Task-Related Training may be beneficial for improving motor function, muscle strength, and spasticity after stroke when compared to Conventional Physical Therapy.
- Segmental muscle vibration with standard therapy may not be beneficial for improving range of motion after stroke when compared to Standard Therapy.

A.26 Extracorporeal Shockwave Therapy (Table 26)

Key Points

- Extracorporeal shockwave therapy may be beneficial for improving spasticity, but not motor function, performance of activities of daily living, and range of motion, after stroke when compared to sham.
- Radial Shock Wave Therapy 3 session may be beneficial for improving motor function and spasticity after stroke when compared to Radial Shock Wave Therapy 1 session.
- Extracorporeal shockwave therapy may be beneficial for improving spasticity, but not motor function, muscle strength, and performance of activities of daily living, after stroke when compared to conventional therapy.
- Radial extracorporeal shockwave (rEWST) agonist muscle with conventional therapy may not be beneficial for improving motor function after stroke when compared to extracorporeal shockwave (rEWST) antagonist muscle with conventional therapy.
- Radial extracorporeal shockwave (rEWST) agonist muscle with conventional therapy may be less beneficial than extracorporeal shockwave (rEWST) antagonist muscle with conventional therapy for improving spasticity after stroke.
- Extracorpeal shockwave may be beneficial for improving motor function and range of motion, but not spasticity, after stroke when compared to Botox.
- Ultrasound-guided stellate ganglion block with Conventional Therapy may be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Conventional therapy.
- Ultrasound-guided stellate ganglion block with Conventional Therapy may not be beneficial for improving performance of activities of daily living after stroke when compared to Ultrasound-guided stellate ganglion block with Extracorporeal shock wave therapy and Conventional therapy.
- Ultrasound-guided stellate ganglion block with Conventional Therapy may be less beneficial than Ultrasound-guided stellate ganglion block with Extracorporeal shock wave therapy and Conventional therapy for improving motor function after stroke.
- Extracorporeal shock wave therapy with Conventional therapy may not be beneficial for improving performance of activities of daily living after stroke when compared to Ultrasound-guided stellate ganglion block with Extracorporeal shock wave therapy and Conventional therapy.
- Extracorporeal shock wave therapy with Conventional therapy may be less beneficial than Ultrasound-guided stellate ganglion block with Extracorporeal shock wave therapy and Conventional therapy for improving motor function after stroke.
- Ultrasound-guided stellate ganglion block with Conventional Therapy may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Extracorporeal shock wave therapy with Conventional therapy.
- Ultrasonic-guided betamethasone local injection with Rehabilitation may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Extracorporeal shock wave therapy with Rehabilitation.
- Botulinum toxin injection with Extracorporeal shock wave therapy (extracorporeal shockwave therapy) may not be beneficial for improving motor function, performance of activities of daily living, and spasticity after stroke when compared to Botulinum toxin injection.
- Radial extracorporeal shock wave therapy (radial extracorporeal shockwave therapy) with Designed physical therapy program for shoulder may be beneficial for improving performance of activities of daily living after stroke when compared to Sham radial extracorporeal shockwave therapy with Designed physical therapy program for shoulder.
- Botolinum Toxin-A with Extracorporeal shock wave therapy (extracorporeal shockwave therapy) may be beneficial for improving spasticity after stroke when compared to botulinum toxin A with electrical stimulation (ES).
- Extracorpeal shockwave on muscle belly may not be beneficial for improving spasticity after stroke when compared to Extracorpeal shockwave on myotendinous junction.
- Radial Shock Wave Therapy with Infrared therapy and Static Stretching may be beneficial for improving spasticity after stroke when compared to Infrared therapy with Static Stretching.

A.27 Additional Afferent and Peripheral Stimulation Methods (Table 27)

Key Points

- Functional Magnetic Stimulation (applied peripherally) may be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Low-Frequency repetitive transcranial magnetic stimulation.
- Repetitive Sensory Stimulation may be beneficial for improving muscle strength, but not motor function and proprioception, after stroke when compared to Sham Repetitive Sensory Stimulation; the literature is mixed regarding dexterity.
- High-dose electrical somatosensory stimulation with task oriented training may not be beneficial for improving motor function, dexterity, proprioception, stroke severity, and muscle strength after stroke when compared to Sham (Low dose) with task oriented training.
- Peripheral Nerve Stimulation may be beneficial for improving dexterity, but not motor function, after stroke when compared to sham.
- Peripheral Nerve Stimulation may be less beneficial than sham for improving range of motion and muscle strength after stroke.
- Somatosensory (peripheral nerve) stimulation with task specific training may be beneficial for improving motor function, but not performance of activities of daily living, after stroke when compared to Sham stimulation with task specific training.
- Repetitive task exercise with sensory amplitude electrical stimulation (SES) may not be beneficial for improving motor function, proprioception, and performance of activities of daily living after stroke when compared to repetitive task exercise with Sham stimulation.
- Intermittent pneumatic compression may be beneficial for improving motor function, but not muscle strength, after stroke when compared to conventional therapy.
- Paretic hand peripheral nerve (somatosensory) stimulation may be beneficial for improving motor function after stroke when compared to No stimulation.
- Vibratory Somatosensory Stimulation may be beneficial for improving motor function, dexterity, and muscle strength after stroke when compared to No Stimulation.
- Vibratory Somatosensory Stimulation may be beneficial for improving motor function and muscle strength, but not dexterity, after stroke when compared to Light Touch Somatosensory Stimulation (Brush) or Rough Touch Somatosensory Stimulation (Sand Paper).
- Intermittent pneumatic compression with conventional physiotherapy may be beneficial for improving motor function and proprioception, but not spasticity, after stroke when compared to Sham short wave therapy with conventional physiotherapy.
- Non-electrical somatosensory stimulation may be beneficial for improving motor function, spasticity, performance of activities of daily living, and dexterity, but not muscle strength, after stroke when compared to conventional therapy.
- Peripheral magnetic stimulation may be beneficial for improving motor function and performance of activities of daily living after stroke when compared to sham; the literature is mixed regarding spasticity.
- Repetitive peripheral sensory stimulation with functional electrical stimulation and task specific training may not be beneficial for improving motor function, performance of activities of daily living, spasticity, range of motion, and muscle strength after stroke when compared to Sham RPSS with functional electrical stimulation and TST.
- Ipsilesional Paired Associated Stimulation (PAS) may be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Conventional Care.
- Ipsilesional Paired Associated Stimulation (PAS) may be less beneficial than Contralesional PAS or Bilateral PAS for improving motor function and performance of activities of daily living after stroke.
- Transcutaneous Auricular Vagus Nerve Stimulation with Robotic Training may be beneficial for improving spasticity, but not motor function and muscle strength, after stroke when compared to Sham transcutaneous auricular vagus nerve stimulation with Robotic Training.

- Peripheral magnetic stimulation may be beneficial for improving performance of activities of daily living, but not spasticity and range of motion, after stroke when compared to conventional therapy; the literature is mixed regarding motor function.
- Transcutaneous auricular vagus nerve stimulation with conventional rehab may be beneficial for improving motor function after stroke when compared to Sham TA-VNS with conventional rehab.
- Low-frequency repetitive transcranial magnetic stimulation with peripheral repetitive magnetic stimulation (rPMS) and rehabilitation may be beneficial for improving motor function, performance of activities of daily living, and spasticity after stroke when compared to rehabilitation.
- Low-frequency repetitive transcranial magnetic stimulation with peripheral repetitive magnetic stimulation (rPMS) and rehabilitation may be beneficial for improving motor function, performance of activities of daily living, and spasticity after stroke when compared to low-frequency repetitive transcranial magnetic stimulation with rehabilitation.
- High intensity laser therapy (HILT) with therapeutic exercises may be beneficial for improving motor function and muscle strength after stroke when compared to Conventional exercise program.
- Repetitive peripheral magnetic stimulation (rPMS) with intermittent theta burst stimulation and rehabilitation may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to sham rPMS with intermittent theta burst stimulation and rehabilitation.
- Cyclic Neuromuscular Electrical Stimulation may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Electromyographically-triggered Neuromuscular Electrical Stimulatiom or Sensory Stimulation.
- Paired associative stimulation may not be beneficial for improving motor function after stroke when compared to Active peripheral electrical stimulation with Sham cortical stimulation.
- Mirror therapy with Mesh glove afferent stimulation may not be beneficial for improving motor function, spasticity, and proprioception after stroke when compared to Mirror therapy or Mirror Therapy with Sham.
- Mirror therapy with Mesh glove afferent stimulation may be less beneficial than Mirror therapy or Mirror Therapy with Sham for improving dexterity and performance of activities of daily living after stroke.
- Mirror therapy with Mesh glove afferent stimulation may be beneficial for improving dexterity and performance of activities of daily living, but not motor function, spasticity, and proprioception, after stroke when compared to Mirror therapy.
- Motor electrical stimulation involving cyclic (neuromuscular electrical stimulation) and electromyography may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Percutaneous Sensory electrical stimulation.
- Robot assisted therapy with Transcutaneous stim of vagus nerve tVNS may be beneficial for improving motor function after stroke when compared to Robot assisted therapy with sham tVNS.
- Peripheral nerve stimulation with modified constraint-induced movement therapy may be beneficial for improving motor function after stroke when compared to Sham peripheral nerve stimulation with modified constraint-induced movement therapy.
- Peripheral nerve stimulation with task oriented training may be beneficial for improving motor function after stroke when compared to Sham stimulation with task oriented training.
- Somatosensory Stimulation (peripheral nerve stimulation) with Intensive Task-Oriented Training may be beneficial for improving motor function after stroke when compared to Sham Stimulation with Intensive Task-Oriented Training.
- Assisted Motion, Biofeedback, and Antagonist Muscle Vibration delivered by a Robotic Device with UL rehabilitation may be beneficial for improving motor function, but not muscle strength, spasticity, and range of motion, after stroke when compared to Placebo intervention with UL rehabilitation.
- Intermittent theta burst stimulation with peripheral magnetic stimulation and conventional rehab may not be beneficial for improving spasticity after stroke when compared to peripheral magnetic stimulation with central sham stimulation and conventional rehab; the literature is mixed regarding motor function and performance of activities of daily living.
- Intermittent theta burst stimulation with peripheral magnetic stimulation and conventional rehab may be beneficial for improving motor function and performance of activities of daily living, but not spasticity, after

stroke when compared to intermittent theta burst stimulation with sham peripheral stimulation and conventional rehab.

- Bihemispheric transcranial direct current stimulation with Repetitive Peripheral Nerve Stimulation and Conventional Therapy may not be beneficial for improving motor function and spasticity after stroke when compared to Sham transcranial direct current stimulation with Repetitive Peripheral Nerve Stimulation and Conventional Therapy.
- High-frequency repetitive transcranial magnetic stimulation with cervical nerve root magnetic stimulation may be beneficial for improving motor function, but not performance of activities of daily living and stroke severity, after stroke when compared to Sham high-frequency repetitive transcranial magnetic stimulation with Sham cervical nerve root magnetic stimulation.
- High-frequency repetitive transcranial magnetic stimulation with cervical nerve root magnetic stimulation may not be beneficial for improving performance of activities of daily living and stroke severity after stroke when compared to high-frequency repetitive transcranial magnetic stimulation with sham cervical nerve root magnetic stimulation; the literature is mixed regarding motor function.
- High-frequency repetitive transcranial magnetic stimulation with cervical nerve root magnetic stimulation may be beneficial for improving performance of activities of daily living, but not stroke severity, after stroke when compared to Sham high-frequency repetitive transcranial magnetic stimulation with cervical nerve root magnetic stimulation; the literature is mixed regarding motor function.
- High-frequency repetitive transcranial magnetic stimulation with sham cervical nerve root magnetic stimulation may not be beneficial for improving motor function, performance of activities of daily living, and stroke severity after stroke when compared to Sham high-frequency repetitive transcranial magnetic stimulation with cervical nerve root magnetic stimulation.
- The literature is mixed regarding the effect of Neuromuscular electrical stimulation with Conventional therapy on improvement of motor function after stroke when compared to Conventional therapy.
- Neuromuscular electrical stimulation with Conventional therapy may not be beneficial for improving motor function after stroke when compared to Peripheral Pulse Electromagnetic Waves (rPMS) with Conventional therapy.
- Repetitive peripheral nerve stimulation with anodal tDCS may not be beneficial for improving motor function, muscle strength, and dexterity after stroke when compared to repetitive peripheral nerve stimulation with sham tDCS.
- Non-electrical somatosensory stimulation may be beneficial for improving muscle strength after stroke when compared to sham; the literature is mixed regarding spasticity, proprioception, and dexterity.
- LASER therapy may not be beneficial for improving performance of activities of daily living after stroke when compared to Interferential current treatment.
- High intensity laser (HILT) with therapeutic exercise program and regular rehab may be beneficial for improving performance of activities of daily living and stroke severity, but not spasticity and range of motion, after stroke when compared to therapeutic exercise program with regular rehab.
- Suprascapular nerve pulsed radiofrequency may be beneficial for improving performance of activities of daily living and range of motion after stroke when compared to Suprascapular Nerve Block with lidocain.
- Pulsed Radiofrequency with rehabilitation therapy may be less beneficial than Intra-articular corticosteroid injection with rehabilitation therapy for improving range of motion after stroke.
- Paired associative stimulation (PAS) with Motor imagery may not be beneficial for improving range of motion after stroke when compared to Sham PAS with motor imagery.
- Suprascapular nerve block may not be beneficial for improving range of motion after stroke when compared to Ultrasound.
- Non invasive transcutaneous electrical nerve stimulation with conventional treatment (NSAID, Exercise and activities of daily living instructions) may be beneficial for improving range of motion and muscle strength after stroke when compared to Ultrasound therapy with conventional treatment (NSAID, Exercise and activities of daily living instructions).
- Active repetitive peripheral nerve sensory stimulation (RPPS) with sham transcranial direct current stimulation may not be beneficial for improving range of motion and muscle strength after stroke when compared to Sham RRPS with sham transcranial direct current stimulation.

- Active repetitive peripheral nerve sensory stimulation (RPPS) with sham transcranial direct current stimulation may not be beneficial for improving range of motion and muscle strength after stroke when compared to Sham RRPS with Anodal transcranial direct current stimulation or Active RRPS and active transcranial direct current stimulation.
- Therapeutic ultrasound may not be beneficial for improving range of motion after stroke when compared to sham.
- High-Frequency repetitive transcranial magnetic stimulation with Peripheral Somatosensory Stimulation (sensory level electrical stimulation and vibratory stimulation) may not be beneficial for improving proprioception after stroke when compared to Sham repetitive transcranial magnetic stimulation with Peripheral Somatosensory Stimulation.
- The literature is mixed regarding the effect of High-Frequency repetitive transcranial magnetic stimulation with Peripheral Somatosensory Stimulation (sensory level electrical stimulation and vibratory stimulation) on improvement of proprioception after stroke when compared to Low-Frequency repetitive transcranial magnetic stimulation with Peripheral Somatosensory Stimulation.
- High-frequency repetitive peripheral magnetic stimulation with conventional treatment may be beneficial for improving muscle strength after stroke when compared to sham stimulation with conventional treatment.
- Repetitive sensory stimulation with Robot-assisted arm training may not be beneficial for improving motor function, muscle strength, proprioception, and dexterity after stroke when compared to Sham stimulation with Robot-assisted arm training.
- Paired associative stimulation (rTMS with rPMS) and physiotherapy may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to rTMS with physiotherapy.
- EMG paired taVNS with TST may not be beneficial for improving motor function after stroke when compared to Active unpaired taVNS with TST.
- Cerebello-Motor paired associated stimulation (PAS) with physiotherapy may not be beneficial for improving motor function and muscle strength after stroke when compared to Sham with physiotherapy.
- Limb Ischemic Post-Conditioning may be beneficial for improving stroke severity after stroke when compared to Sham treatment.
- Vagus Nerve Stimulation with rehab may not be beneficial for improving motor function, muscle strength, and dexterity after stroke when compared to Conventional care.
- Peripheral nerve stimulation may not be beneficial for improving motor function, muscle strength, and range of motion after stroke when compared to usual care.
- Repetitive peripheral nerve sensory stim (RPSS) with Motor Training may be beneficial for improving motor function after stroke when compared to Sham with Motor Training.
- PNES with Task Specific Training may not be beneficial for improving motor function, muscle strength, and dexterity after stroke when compared to Task-Specific Training.
- Transcutaneous auricular vagus nerve stimulation (tVNS) may be beneficial for improving motor function and performance of activities of daily living, but not stroke severity, after stroke when compared to sham.
- Peripheral Nerve Stimulation combined with other interventions may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to sham or task-specific training; the literature is mixed regarding muscle strength.
- Proprioceptive Training (involving passive and active movements with visual feedback) may be beneficial for improving motor function and proprioception, but not performance of activities of daily living and dexterity, after stroke when compared to Nonspecific sensory stimulation.
- RTMS with Sham TENS with Mirror therapy and Nonelectrical somatosensory stimulation may not be beneficial for improving proprioception, performance of activities of daily living, and dexterity after stroke when compared to Sham rTMS with Sham TENS with Mirror therapy and Nonelectrical somatosensory stimulation; the literature is mixed regarding motor function.
- Sham rTMS with TENS with Mirror therapy and Nonelectrical somatosensory stimulation may not be beneficial for improving proprioception, performance of activities of daily living, and dexterity after stroke when compared to Sham rTMS with Sham TENS with Mirror therapy and Nonelectrical somatosensory stimulation; the literature is mixed regarding motor function.

- RTMS with TENS with Mirror therapy and Nonelectrical somatosensory stimulation may be beneficial for improving motor function and performance of activities of daily living, but not proprioception and dexterity, after stroke when compared to Sham rTMS with Sham TENS with Mirror therapy and Nonelectrical somatosensory stimulation.
- Task practice therapy with TheraBracelet stimulation may be beneficial for improving dexterity, but not motor function, after stroke when compared to task practice therapy with sham stimulation.
- Mirror therapy with Mesh glove may be beneficial for improving motor function and dexterity, but not spasticity and performance of activities of daily living, after stroke when compared to Mirror therapy.
- Sensory-enhanced robot-aided motor training (SERMT) may not be beneficial for improving motor function after stroke when compared to Robot-aided motor training (RMT).
- Cable orthosis with Virtual Reality may not be beneficial for improving motor function, muscle strength, spasticity, range of motion, and dexterity after stroke when compared to Virtual Reality.
- Pneumatic orthosis with Virtual Reality may not be beneficial for improving motor function, muscle strength, spasticity, range of motion, and dexterity after stroke when compared to Virtual Reality.
- Generalized somatosensory discrimination training may be beneficial for improving proprioception after stroke when compared to Repeated exposure to sensory stimuli.
- Medial nerve (somatosensory) stimulation may be beneficial for improving muscle strength after stroke when compared to Sham stimulation.

A.28 Invasive Cortical and Nerve Electrode Implant Stimulation (Table 28)

Key Points

- Electrical Epidural Motor Cortex Stimulation (EECS) with Task specific Training may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Task-specific training.
- Invasive cortical and nerve electrode implant stimulation may not be beneficial for improving performance of activities of daily living and dexterity after stroke when compared to sham; the literature is mixed regarding motor function.
- Invasive cortical and nerve electrode implant stimulation may be beneficial for improving motor function and stroke severity after stroke when compared to conventional therapy; the literature is mixed regarding performance of activities of daily living.

A.29 Repetitive Transcranial Magnetic Stimulation (rTMS) (Table 29)

Key Points

- Low-frequency repetitive transcranial magnetic stimulation may be beneficial for improving dexterity, but not motor function, stroke severity, muscle strength, spasticity, range of motion, and performance of activities of daily living, after stroke when compared to sham.
- Low frequency repetitive transcranial magnetic stimulation applied to primary motor cortex with conventional rehab may be beneficial for improving motor function and muscle strength after stroke when compared to Low frequency repetitive transcranial magnetic stimulation applied to premotor area with conventional rehab.
- Repetitive transcranial magnetic stimulation: some approaches may be more beneficial than others for improving stroke severity; different approaches to repetitive transcranial magnetic stimulation may not have a difference in efficacy when compared with one another for improving motor function, muscle strength, spasticity, range of motion, and performance of activities of daily living.
- Repetitive transcranial magnetic stimulation - M1 area with rehab may not be beneficial for improving motor function after stroke when compared to repetitive transcranial magnetic stimulation - SMA with routin rehab.
- Low-frequency repetitive transcranial magnetic stimulation with rehabilitation may be beneficial for improving motor function, performance of activities of daily living, and stroke severity after stroke when compared to High-frequency repetitive transcranial magnetic stimulation with rehabilitation.

- High-frequency repetitive transcranial magnetic stimulation with conventional care may be beneficial for improving motor function and performance of activities of daily living after stroke when compared to low-frequency repetitive transcranial magnetic stimulation with conventional care.
- The literature is mixed regarding the effect of Low Frequency Combined with High Frequency Repetitive Transcranial Magnetic Stimulation on improvement of motor function after stroke when compared to Low Frequency Repetitive Transcranial Magnetic Stimulation.
- High-frequency repetitive transcranial magnetic stimulation may be beneficial for improving motor function and performance of activities of daily living, but not spasticity, range of motion, stroke severity, and muscle strength, after stroke when compared to sham.
- High-Frequency repetitive transcranial magnetic stimulation with Short Inter-Train Intervals may not be beneficial for improving motor function, performance of activities of daily living, and stroke severity after stroke when compared to High-Frequency repetitive transcranial magnetic stimulation with Long Inter-Train Intervals.
- Paired associative stimulation may not be beneficial for improving motor function after stroke when compared to Active peripheral electrical stimulation with Sham cortical stimulation.
- High-frequency repetitive transcranial magnetic stimulation combined with other interventions may be beneficial for improving motor function, but not dexterity, after stroke when compared to high-frequency rtms; the literature is mixed regarding muscle strength.
- Low-frequency repetitive transcranial magnetic stimulation combined with other interventions may be beneficial for improving motor function and muscle strength after stroke when compared to Sham repetitive transcranial magnetic stimulation with sham ltbs; the literature is mixed regarding performance of activities of daily living.
- Repetitive transcranial magnetic stimulation may not be beneficial for improving motor function, dexterity, performance of activities of daily living, and muscle strength after stroke when compared to Dual transcranial direct current stimulation.
- Low frequency repetitive transcranial magnetic stimulation with intermittent theta burst stimulation may be beneficial for improving motor function and muscle strength after stroke when compared to Sham repetitive transcranial magnetic stimulation with intermittent theta burst stimulation or Low frequency repetitive transcranial magnetic stimulation and sham intermittent theta burst stimulation; the literature is mixed regarding performance of activities of daily living.
- Sham repetitive transcranial magnetic stimulation with intermittent theta burst stimulation may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Low frequency repetitive transcranial magnetic stimulation with sham intermittent theta burst stimulation.
- Sham repetitive transcranial magnetic stimulation with intermittent theta burst stimulation may be less beneficial than Low frequency repetitive transcranial magnetic stimulation with sham intermittent theta burst stimulation for improving muscle strength after stroke.
- Low-frequency repetitive transcranial magnetic stimulation combined with other interventions may not be beneficial for improving motor function, dexterity, performance of activities of daily living, spasticity, range of motion, stroke severity, and muscle strength after stroke when compared to sham or task-specific training.
- Low frequency repetitive transcranial magnetic stimulation with Action Observation may not be beneficial for improving motor function and muscle strength after stroke when compared to Low frequency repetitive transcranial magnetic stimulation.
- Low frequency repetitive transcranial magnetic stimulation may not be beneficial for improving motor function, performance of activities of daily living, spasticity, stroke severity, and muscle strength after stroke when compared to Physical therapy.
- Low frequency repetitive transcranial magnetic stimulation with scalp acupuncture may be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Scalp Acupuncture.
- Low-frequency repetitive transcranial magnetic stimulation combined with other interventions may be beneficial for improving motor function and muscle strength after stroke when compared to sham; the literature is mixed regarding performance of activities of daily living.

- Low frequency repetitive transcranial magnetic stimulation with intermittent Theta Burst Stimulation may be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Low frequency repetitive transcranial magnetic stimulation with sham theta burst stimulation.
- The literature is mixed regarding the effect of Active repetitive transcranial magnetic stimulation with fluoxetine on improvement of motor function after stroke when compared to Sham repetitive transcranial magnetic stimulation with fluoxetine.
- 10 Sessions Low Frequency repetitive transcranial magnetic stimulation before 10 Sessions Intermittent Theta Burst Stimulation may be beneficial for improving motor function, but not muscle strength, after stroke when compared to 10 Sessions Low Frequency repetitive transcranial magnetic stimulation before 10 Sessions Intermittent Theta Burst Stimulation.
- Low-frequency repetitive transcranial magnetic stimulation may be beneficial for improving motor function and muscle strength after stroke when compared to conventional therapy.
- 10 sessions repetitive transcranial magnetic stimulation with conventional therapy may be less beneficial than 30 sessions repetitive transcranial magnetic stimulation with conventional therapy for improving motor function after stroke.
- 20 sessions repetitive transcranial magnetic stimulation with conventional therapy may not be beneficial for improving motor function after stroke when compared to 30 sessions repetitive transcranial magnetic stimulation with conventional therapy.
- High frequency repetitive transcranial magnetic stimulation with constraint-induced movement therapy may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Sham repetitive transcranial magnetic stimulation with constraint-induced movement therapy.
- Repetitive transcranial magnetic stimulation combined with other interventions may not be beneficial for improving spasticity after stroke when compared to sham or task-specific training; the literature is mixed regarding motor function.
- Bilateral repetitive transcranial magnetic stimulation (high-frequency repetitive transcranial magnetic stimulation with low-frequency repetitive transcranial magnetic stimulation) and Task-oriented therapy may not be beneficial for improving motor function and spasticity after stroke when compared to Excitatory repetitive transcranial magnetic stimulation (high-frequency repetitive transcranial magnetic stimulation with sham low-frequency repetitive transcranial magnetic stimulation) and Task-oriented therapy.
- Bilateral repetitive transcranial magnetic stimulation (high-frequency repetitive transcranial magnetic stimulation with low-frequency repetitive transcranial magnetic stimulation) and Task-oriented therapy may not be beneficial for improving motor function and spasticity after stroke when compared to Inhibitory repetitive transcranial magnetic stimulation (sham high-frequency repetitive transcranial magnetic stimulation with low-frequency repetitive transcranial magnetic stimulation) and Task-oriented therapy.
- Excitatory repetitive transcranial magnetic stimulation (high-frequency repetitive transcranial magnetic stimulation with sham low-frequency repetitive transcranial magnetic stimulation) and Task-oriented therapy may not be beneficial for improving motor function and spasticity after stroke when compared to Inhibitory repetitive transcranial magnetic stimulation (sham high-frequency repetitive transcranial magnetic stimulation with low-frequency repetitive transcranial magnetic stimulation) and Task-oriented therapy.
- Repetitive transcranial magnetic stimulation may be beneficial for improving motor function and spasticity, but not stroke severity, after stroke when compared to conventional therapy; the literature is mixed regarding dexterity, performance of activities of daily living, and muscle strength.
- Low frequency repetitive transcranial magnetic stimulation with occupational therapy training may be beneficial for improving motor function after stroke when compared to constraint-induced movement therapy.
- Low frequency repetitive transcranial magnetic stimulation with virtual reality may be beneficial for improving motor function, but not performance of activities of daily living, after stroke when compared to Sham repetitive transcranial magnetic stimulation with virtual reality.
- High Frequency repetitive transcranial magnetic stimulation with Rehabilitation Program may be beneficial for improving dexterity, but not motor function, after stroke when compared to Rehabilitation Program; the literature is mixed regarding muscle strength.

- High frequency repetitive transcranial magnetic stimulation with grip training and conventional rehab may not be beneficial for improving motor function, performance of activities of daily living, and muscle strength after stroke when compared to repetitive transcranial magnetic stimulation with conventional rehab or Grip training and conventional rehab.
- Low-frequency repetitive transcranial magnetic stimulation with functional electrical stimulation and conventional rehab may be beneficial for improving motor function after stroke when compared to functional electrical stimulation with conventional rehab.
- Low-frequency repetitive transcranial magnetic stimulation with functional electrical stimulation and conventional rehab may be beneficial for improving motor function after stroke when compared to Low-frequency repetitive transcranial magnetic stimulation with conventional rehab.
- High-frequency repetitive transcranial magnetic stimulation combined with other interventions may be beneficial for improving muscle strength, but not motor function, dexterity, and performance of activities of daily living, after stroke when compared to sham or motor relearning programmes.
- High-frequency repetitive transcranial magnetic stimulation with Conventional Therapy may be beneficial for improving motor function and dexterity after stroke when compared to Conventional therapy; the literature is mixed regarding muscle strength.
- High-frequency repetitive transcranial magnetic stimulation with Conventional Therapy may not be beneficial for improving dexterity and muscle strength after stroke when compared to Contralateral limb Cross education (strength training) with Conventional therapy.
- High-frequency repetitive transcranial magnetic stimulation with Conventional Therapy may be less beneficial than Contralateral limb Cross education (strength training) with Conventional therapy for improving motor function after stroke.
- Contralateral limb Cross education (strength training) with Conventional therapy may not be beneficial for improving motor function, dexterity, and muscle strength after stroke when compared to high-frequency repetitive transcranial magnetic stimulation with cross education and conventional therapy.
- High-frequency repetitive transcranial magnetic stimulation with Conventional Therapy may not be beneficial for improving motor function, dexterity, and muscle strength after stroke when compared to high-frequency repetitive transcranial magnetic stimulation with cross education and conventional therapy.
- High-frequency repetitive transcranial magnetic stimulation combined with other interventions may be beneficial for improving motor function, but not performance of activities of daily living and stroke severity, after stroke when compared to sham.
- High-frequency repetitive transcranial magnetic stimulation with cervical nerve root magnetic stimulation may not be beneficial for improving performance of activities of daily living and stroke severity after stroke when compared to high-frequency repetitive transcranial magnetic stimulation with sham cervical nerve root magnetic stimulation; the literature is mixed regarding motor function.
- High-frequency repetitive transcranial magnetic stimulation with cervical nerve root magnetic stimulation may be beneficial for improving performance of activities of daily living, but not stroke severity, after stroke when compared to Sham high-frequency repetitive transcranial magnetic stimulation with cervical nerve root magnetic stimulation; the literature is mixed regarding motor function.
- High-frequency repetitive transcranial magnetic stimulation with sham cervical nerve root magnetic stimulation may not be beneficial for improving motor function, performance of activities of daily living, and stroke severity after stroke when compared to Sham high-frequency repetitive transcranial magnetic stimulation with cervical nerve root magnetic stimulation.
- Mirror therapy with high frequency repetitive transcranial magnetic stimulation and Traditional physical therapy may be beneficial for improving motor function and dexterity after stroke when compared to Sham with Traditional physical therapy.
- Mirror therapy with high frequency repetitive transcranial magnetic stimulation and Traditional physical therapy may be beneficial for improving motor function and dexterity after stroke when compared to Mirror therapy with Traditional physical therapy.
- Functional Magnetic Stimulation (applied peripherally) may be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Low-Frequency repetitive transcranial magnetic stimulation.

- Electromyography-triggered neuromuscular electrical stimulation with repetitive transcranial magnetic stimulation may not be beneficial for improving motor function, spasticity, and range of motion after stroke when compared to electromyography-triggered neuromuscular electrical stimulation with Sham repetitive transcranial magnetic stimulation.
- Low frequence repetitive transcranial magnetic stimulation with mental practice may be beneficial for improving motor function, dexterity, and performance of activities of daily living after stroke when compared to repetitive transcranial magnetic stimulation with audiotape-led relaxation.
- Neuromuscular electrical stimulation with repetitive transcranial magnetic stimulation may be beneficial for improving dexterity and spasticity, but not motor function, after stroke when compared to Sham neuromuscular electrical stimulation with repetitive transcranial magnetic stimulation.
- Continuous theta burst stimulation with physiotherapy may be beneficial for improving motor function, performance of activities of daily living, and spasticity, but not stroke severity, after stroke when compared to Sham continuous theta burst stimulation with physiotherapy.
- Ipsilesional Paired Associated Stimulation (PAS) may be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Conventional Care.
- Ipsilesional Paired Associated Stimulation (PAS) may be less beneficial than Contralesional PAS or Bilateral PAS for improving motor function and performance of activities of daily living after stroke.
- Custom occupational therapy with repetitive transcranial magnetic stimulation-LF may be beneficial for improving motor function after stroke when compared to Custom Occupational Therapy.
- Soft Robotic Glove with Conventional therapy may be beneficial for improving motor function, but not performance of activities of daily living, after stroke when compared to Conventional therapy.
- Soft Robotic Glove with Conventional therapy may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Low frequency repetitive transcranial magnetic stimulation with Conventional therapy.
- Low-frequency repetitive transcranial magnetic stimulation with peripheral repetitive magnetic stimulation (rPMS) and rehabilitation may be beneficial for improving motor function, performance of activities of daily living, and spasticity after stroke when compared to rehabilitation.
- Low-frequency repetitive transcranial magnetic stimulation with peripheral repetitive magnetic stimulation (rPMS) and rehabilitation may be beneficial for improving motor function, performance of activities of daily living, and spasticity after stroke when compared to low-frequency repetitive transcranial magnetic stimulation with rehabilitation.
- Graded motor imagery with repetitive transcranial magnetic stimulation and conventional rehabilitation may be beneficial for improving motor function after stroke when compared to Graded motor imagery with conventional rehabilitation; the literature is mixed regarding performance of activities of daily living.
- Graded motor imagery with repetitive transcranial magnetic stimulation and conventional rehabilitation may not be beneficial for improving motor function after stroke when compared to repetitive transcranial magnetic stimulation with conventional rehabilitation; the literature is mixed regarding performance of activities of daily living.
- Repetitive transcranial magnetic stimulation with mirror therapy may not be beneficial for improving motor function after stroke when compared to bilateral tDCS with mirror therapy or sham tDCS with mirror therapy.
- 1Hz repetitive transcranial magnetic stimulation may be beneficial for improving dexterity and stroke severity, but not performance of activities of daily living and muscle strength, after stroke when compared to 3Hz repetitive transcranial magnetic stimulation.
- Interleaved combination method (ICM) repetitive transcranial magnetic stimulation with motor training may not be beneficial for improving dexterity after stroke when compared to Preconditioned combination method (PCM) repetitive transcranial magnetic stimulation with motor training.
- Active priming of low-frequency repetitive transcranial magnetic stimulation may not be beneficial for improving dexterity after stroke when compared to sham priming.
- Low frequency Repetitive Transcranial Magnetic Stimulation to unaffected hemisphere with Brunnstrom movement therapy may be beneficial for improving proprioception, but not spasticity and stroke severity, after stroke when compared to Sham Repetitive Transcranial Magnetic Stimulation with Brunnstrom movement therapy.

- Paired associative stimulation (PAS) with Motor imagery may not be beneficial for improving range of motion after stroke when compared to Sham PAS with motor imagery.
- High-Frequency repetitive transcranial magnetic stimulation with Peripheral Somatosensory Stimulation (sensory level electrical stimulation and vibratory stimulation) may not be beneficial for improving proprioception after stroke when compared to Sham repetitive transcranial magnetic stimulation with Peripheral Somatosensory Stimulation.
- The literature is mixed regarding the effect of High-Frequency repetitive transcranial magnetic stimulation with Peripheral Somatosensory Stimulation (sensory level electrical stimulation and vibratory stimulation) on improvement of proprioception after stroke when compared to Low-Frequency repetitive transcranial magnetic stimulation with Peripheral Somatosensory Stimulation.
- High-frequency repetitive transcranial magnetic stimulation may not be beneficial for improving muscle strength after stroke when compared to low-frequency repetitive transcranial magnetic stimulation.
- Low frequency repetitive transcranial magnetic stimulation with pinch motor training (a metronome-paced pinch of their index finger and thumb of the affected hand as fast as possible) may be beneficial for improving muscle strength after stroke when compared to pinch motor training with sham repetitive transcranial magnetic stimulation.
- Low Frequency repetitive transcranial magnetic stimulation may be less beneficial than ANodal transcranial direct current stimulation or Low Frequency repetitive transcranial magnetic stimulation with ANodal transcranial direct current stimulation for improving muscle strength after stroke.
- Bilateral repetitive transcranial magnetic stimulation may not be beneficial for improving muscle strength after stroke when compared to Unaffected side repetitive transcranial magnetic stimulation or Affected side repetitive transcranial magnetic stimulation.
- Scalp acupuncture (SA) may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to SAEM-CS- SA and electromagnetic convergence stimulation (SA and LF-rTMS simultaneously).
- Repetitive transcranial magnetic stimulation (rTMS) may be beneficial for improving motor function and performance of activities of daily living after stroke when compared to SAEM-CS- SA and electromagnetic convergence stimulation (SA and LF-rTMS simultaneously).
- Scalp acupuncture (SA) may not be beneficial for improving motor function after stroke when compared to Repetitive transcranial magnetic stimulation (rTMS).
- High frequency (10Hz) rTMS with task-oriented training may be beneficial for improving motor function after stroke when compared to Sham rTMS with task-oriented training.
- Unilateral High-frequency repetitive transcranial magnetic stimulation (HF-rTMS) may not be beneficial for improving muscle strength after stroke when compared to Bilateral application of HF- and LF-rTMS (BL-rTMS).
- 3Hz rTMS may not be beneficial for improving stroke severity and muscle strength after stroke when compared to 10Hz rTMS.
- Repetitive transcranial magnetic stimulation may be beneficial for improving motor function, stroke severity, and performance of activities of daily living, but not muscle strength, range of motion, and dexterity, after stroke when compared to sham; the literature is mixed regarding spasticity.
- High-frequency rTMS combined with other interventions may be beneficial for improving motor function, but not proprioception and dexterity, after stroke when compared to sham; the literature is mixed regarding performance of activities of daily living.
- Low-frequency rTMS combined with other interventions may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to conventional therapy.
- Low-frequency rTMS combined with other interventions may not be beneficial for improving motor function, performance of activities of daily living, and dexterity after stroke when compared to task-specific training or sham.
- Paired associative stimulation (rTMS with rPMS) and physiotherapy may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to rTMS with physiotherapy.
- Cerebello-Motor paired associated stimulation (PAS) with physiotherapy may not be beneficial for improving motor function and muscle strength after stroke when compared to Sham with physiotherapy.

- Intermittent theta-burst stimulation of the affected motor cortex hand area with conventional therapy may not be beneficial for improving motor function, muscle strength, and spasticity after stroke when compared to Sham stimulation with conventional therapy.
- Cortico-cortical paired associative stimulation (ccPAS) with routine rehabilitation may be beneficial for improving motor function after stroke when compared to Sham ccPAS with routine rehabilitation.
- Scalp acupuncture (SA) may be less beneficial than Repetitive transcranial magnetic stimulation (rTMS) for improving performance of activities of daily living after stroke.
- Unilateral High-frequency repetitive transcranial magnetic stimulation (HF-rTMS) may be less beneficial than Bilateral application of HF- and LF-rTMS (BL-rTMS) for improving stroke severity after stroke.
- Simultaneous cathodal tDCS with 10hz rTMS may be beneficial for improving proprioception after stroke when compared to rTMS 10Hz with Sham tDCS.
- Simultaneous anodal tDCS with 10hz rTMS may not be beneficial for improving proprioception after stroke when compared to rTMS 10Hz with Sham tDCS.
- Preconditioning cathodal tCDS with 10hz rTMS may not be beneficial for improving proprioception after stroke when compared to rTMS 10Hz with Sham tDCS.
- Preconditioning anodal tDCS with 10hz rTMS may not be beneficial for improving proprioception after stroke when compared to rTMS 10Hz with Sham tDCS.

A.30 Theta Burst Stimulation (TBS) (Table 30)

Key Points

- Theta burst stimulation may be beneficial for improving stroke severity, muscle strength, and spasticity, but not motor function, performance of activities of daily living, and dexterity, after stroke when compared to sham.
- Intermittent theta burst stimulation with high definition transcranial direct current stimulation and rehabilitation may not be beneficial for improving motor function, performance of activities of daily living, spasticity, and muscle strength after stroke when compared to sham transcranial direct current stimulation with intermittent theta burst stimulation and rehabilitation.
- Neuronavigated Continuous Theta Burst Stimulation may not be beneficial for improving motor function, dexterity, performance of activities of daily living, and muscle strength after stroke when compared to Cathodal -transcranial direct current stimulation.
- Intermittent theta burst stimulation with upper-limb training may not be beneficial for improving motor function after stroke when compared to Continuous theta burst stimulation with upper-limb training.
- Intermittent theta burst stimulation with dexterity training may not be beneficial for improving motor function and dexterity after stroke when compared to Sham theta burst stimulation with dexterity training.
- Intermittent theta burst stimulation with dexterity training may not be beneficial for improving motor function and dexterity after stroke when compared to Continuous theta burst stimulation with dexterity training.
- Intermittent theta burst stimulation with Physical therapy may be beneficial for improving motor function, performance of activities of daily living, and stroke severity after stroke when compared to Physical Therapy.
- Intermittent theta burst stimulation with Physical therapy may not be beneficial for improving motor function, performance of activities of daily living, and stroke severity after stroke when compared to functional electrical stimulation with Physical therapy.
- Intermittent theta burst stimulation with Virtual reality-based cycling training (bilateral upper limb) may be beneficial for improving spasticity, but not motor function and dexterity, after stroke when compared to sham intermittent theta burst stimulation with VCT; the literature is mixed regarding performance of activities of daily living.
- The literature is mixed regarding the effect of Continuous theta burst stimulation with intermittent theta burst stimulation and robot assisted therapy on improvement of motor function after stroke when compared to sham continuous theta burst stimulation with sham intermittent theta burst stimulation and robot-assisted therapy.

- Continuous theta burst stimulation with intermittent theta burst stimulation and robot assisted therapy may not be beneficial for improving motor function after stroke when compared to sham continuous theta burst stimulation with intermittent theta burst stimulation and robot assisted training.
- Intermittent theta burst stimulation with peripheral magnetic stimulation and conventional rehab may not be beneficial for improving spasticity after stroke when compared to peripheral magnetic stimulation with central sham stimulation and conventional rehab; the literature is mixed regarding motor function and performance of activities of daily living.
- Intermittent theta burst stimulation with peripheral magnetic stimulation and conventional rehab may be beneficial for improving motor function and performance of activities of daily living, but not spasticity, after stroke when compared to intermittent theta burst stimulation with sham peripheral stimulation and conventional rehab.
- Continuous theta burst stimulation with Conventional therapy may be beneficial for improving motor function, performance of activities of daily living, and stroke severity, but not dexterity, after stroke when compared to Sham continuous theta burst stimulation with Conventional therapy.
- The literature is mixed regarding the effect of Low frequency repetitive transcranial magnetic stimulation with intermittent Theta Burst Stimulation on improvement of motor function and performance of activities of daily living after stroke when compared to Sham with sham.
- Low frequency repetitive transcranial magnetic stimulation with intermittent Theta Burst Stimulation may be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Low frequency repetitive transcranial magnetic stimulation with sham theta burst stimulation.
- 10 Sessions Low Frequency repetitive transcranial magnetic stimulation before 10 Sessions Intermittent Theta Burst Stimulation may be beneficial for improving motor function and muscle strength after stroke when compared to Sham repetitive transcranial magnetic stimulation or intermittent theta burst stimulation.
- 10 Sessions Low Frequency repetitive transcranial magnetic stimulation before 10 Sessions Intermittent Theta Burst Stimulation may be beneficial for improving motor function, but not muscle strength, after stroke when compared to 10 Sessions Low Frequency repetitive transcranial magnetic stimulation before 10 Sessions Intermittent Theta Burst Stimulation.
- Low frequency repetitive transcranial magnetic stimulation with intermittent theta burst stimulation may be beneficial for improving motor function and muscle strength after stroke when compared to Sham repetitive transcranial magnetic stimulation with sham ltbs; the literature is mixed regarding performance of activities of daily living.
- Low frequency repetitive transcranial magnetic stimulation with intermittent theta burst stimulation may be beneficial for improving motor function and muscle strength after stroke when compared to Sham repetitive transcranial magnetic stimulation with intermittent theta burst stimulation or Low frequency repetitive transcranial magnetic stimulation and sham intermittent theta burst stimulation; the literature is mixed regarding performance of activities of daily living.
- Sham repetitive transcranial magnetic stimulation with intermittent theta burst stimulation may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Low frequency repetitive transcranial magnetic stimulation with sham intermittent theta burst stimulation.
- Sham repetitive transcranial magnetic stimulation with intermittent theta burst stimulation may be less beneficial than Low frequency repetitive transcranial magnetic stimulation with sham intermittent theta burst stimulation for improving muscle strength after stroke.
- Repetitive peripheral magnetic stimulation (rPMS) with intermittent theta burst stimulation and rehabilitation may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to sham rPMS with intermittent theta burst stimulation and rehabilitation.
- Robot-assisted therapy with intermittent theta burst stimulation and therapy may be beneficial for improving motor function after stroke when compared to Robot-assisted therapy with therapy.
- CTBS with robotic therapy may be beneficial for improving motor function after stroke when compared to Sham stimulation with robotic therapy.

- Theta burst stimulation combined with other interventions may not be beneficial for improving motor function, stroke severity, muscle strength, spasticity, and dexterity after stroke when compared to sham; the literature is mixed regarding performance of activities of daily living.
- Modified Constraint-induced movement therapy (mCIMT) with iTBS may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to mCIMT.
- MCIMT with sham iTBS may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to mCIMT.
- Active HD-tDCS-eTBS (high definition transcranial electrical theta burst superimposing direct current stimulation) with UE rehab may not be beneficial for improving motor function and dexterity after stroke when compared to sham with UE rehab; the literature is mixed regarding spasticity.
- Real anodal tDCS with iTBS output during conventional rehabilitation may be beneficial for improving dexterity after stroke when compared to sham tDCS with iTBS output during conventional rehabilitation; the literature is mixed regarding motor function.

A.31 Transcranial Direct Current Stimulation (tDCS) (Table 31)

Key Points

- Transcranial direct current stimulation may not be beneficial for improving motor function, stroke severity, muscle strength, spasticity, and performance of activities of daily living after stroke when compared to sham; the literature is mixed regarding dexterity.
- Anodal transcranial direct current stimulation with conventional physio may not be beneficial for improving muscle strength after stroke when compared to dual transcranial direct current stimulation with conventional physio.
- Anodal transcranial direct current stimulation with conventional physio may be less beneficial than dual transcranial direct current stimulation with conventional physio for improving motor function after stroke.
- Cathodal transcranial direct current stimulation with conventional physio may not be beneficial for improving motor function and muscle strength after stroke when compared to dual transcranial direct current stimulation with conventional physio.
- Unilateral Hemisphere transcranial direct current stimulation may not be beneficial for improving motor function, spasticity, and muscle strength after stroke when compared to Dual Hemisphere transcranial direct current stimulation.
- Anodal transcranial direct current stimulation with physical therapy and occupational therapy may not be beneficial for improving motor function after stroke when compared to Dual transcranial direct current stimulation with physical therapy and occupational therapy.
- Anodal transcranial direct current stimulation may be beneficial for improving performance of activities of daily living, but not motor function, stroke severity, muscle strength, range of motion, and proprioception, after stroke when compared to sham; the literature is mixed regarding spasticity and dexterity.
- HD-transcranial direct current stimulation with Conventional therapy may not be beneficial for improving motor function, performance of activities of daily living, and spasticity after stroke when compared to a-transcranial direct current stimulation with Conventional therapy.
- Anodal transcranial direct current stimulation at M1 and DLPFC may be beneficial for improving dexterity, but not motor function, after stroke when compared to Anodal transcranial direct current stimulation at M1 only.
- Dual transcranial direct current stimulation - on primary motor cortex and left dorsolateral prefrontal cortex (DLPFC) may be beneficial for improving motor function after stroke when compared to transcranial direct current stimulation on M1 and sham transcranial direct current stimulation on DLPFC.
- Dual transcranial direct current stimulation may be beneficial for improving motor function and stroke severity, but not muscle strength, spasticity, and performance of activities of daily living, after stroke when compared to sham; the literature is mixed regarding dexterity.
- Robot assisted therapy (InMotion WRIST Robot) with Anodal transcranial direct current stimulation may not be beneficial for improving motor function, dexterity, spasticity, and muscle strength after stroke when compared to Robot assisted therapy with sham transcranial direct current stimulation.

- Anodal transcranial direct current stimulation with Robot-Assisted Arm Training may not be beneficial for improving motor function, dexterity, performance of activities of daily living, spasticity, and muscle strength after stroke when compared to Sham stimulation with Robot-Asssited Arm Training.
- Dual transcranial direct current stimulation may not be beneficial for improving motor function, dexterity, and muscle strength after stroke when compared to Electroacupuncture.
- Cathodal transcranial direct current stimulation with virtual reality may be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Sham transcranial direct current stimulation with virtual reality.
- Anodal transcranial direct current stimulation with visuomotor gripforce tracking task may not be beneficial for improving motor function and dexterity after stroke when compared to Sham transcranial direct current stimulation with visuomotor gripforce tracking task.
- Cathodal transcranial direct current stimulation may be beneficial for improving motor function and range of motion, but not stroke severity, muscle strength, performance of activities of daily living, and dexterity, after stroke when compared to sham; the literature is mixed regarding spasticity.
- Anodal transcranial direct current stimulation on affected hemisphere with robot assisted arm training may be beneficial for improving spasticity, but not motor function and performance of activities of daily living, after stroke when compared to Cathodal transcranial direct current stimulation on unaffected hemisphere with robot assisted arm training.
- Bilateral transcranial direct current stimulation with motor imagery brain-computer interface may not be beneficial for improving motor function after stroke when compared to Sham transcranial direct current stimulation with motor imagery brain-computer interface.
- The literature is mixed regarding the effect of Dual transcranial direct current stimulation combined with other interventions on improvement of motor function after stroke when compared to sham or task-specific training.
- Anodal transcranial direct current stimulation with occupational therapy may not be beneficial for improving muscle strength after stroke when compared to Sham with occupational therapy; the literature is mixed regarding motor function.
- Dual transcranial direct current stimulation combined with other interventions may be beneficial for improving muscle strength, but not spasticity and range of motion, after stroke when compared to sham or fes; the literature is mixed regarding motor function.
- Anodal transcranial direct current stimulation with virtual reality-based therapy and conventional physical therapy may be beneficial for improving motor function and proprioception after stroke when compared to conventional physiotherapy.
- Anodal transcranial direct current stimulation with Repetitive Functional Task-Oriented Programme (RFTOP) may be beneficial for improving dexterity, but not motor function, after stroke when compared to Repetitive Functional Task Oriented Programme.
- The literature is mixed regarding the effect of Visuo-Motor Grip Force Tracking Task Training of the paretic hand with Anodal Unilateral transcranial direct current stimulation on improvement of motor function after stroke when compared to Visuo-Motor Grip Force Tracking Task Training of the paretic hand with Placebo transcranial direct current stimulation.
- Visuo-Motor Grip Force Tracking Task Training of the paretic hand with Anodal Unilateral transcranial direct current stimulation may not be beneficial for improving motor function after stroke when compared to Visuo-Motor Grip Force Tracking Task Training of the paretic hand with Bilateral transcranial direct current stimulation.
- Anodal transcranial direct current stimulation with motor imagery and upper-limb functional training may be beneficial for improving motor function after stroke when compared to sham tCDS with motor imagery and upper-limb functional training.
- Anodal transcranial direct current stimulation with Virtual Reality may be beneficial for improving dexterity, but not motor function, after stroke when compared to sham transcranial direct current stimulation with Virtual Reality.
- Bilateral transcranial direct current stimulation with trunk restraint or training and Conventional physical therapy may be beneficial for improving motor function after stroke when compared to Conventional physical therapy.

- Bilateral transcranial direct current stimulation with trunk restraint or training and Conventional physical therapy may be beneficial for improving motor function after stroke when compared to Sham transcranial direct current stimulation with trunk restraint or training and Conventional physical therapy.
- Bilateral transcranial direct current stimulation with neuromuscular electrical stimulation and coventional care may not be beneficial for improving motor function, performance of activities of daily living, and spasticity after stroke when compared to Sham transcranial direct current stimulation and neuromuscular electrical stimulation with conventional care.
- Anodal transcranial direct current stimulation with Upper extremity strength training may not be beneficial for improving motor function, dexterity, performance of activities of daily living, range of motion, and muscle strength after stroke when compared to Sham transcranial direct current stimulation with Upper extremity strength training.
- Dual transcranial direct current stimulation combined with other interventions may be beneficial for improving motor function, but not muscle strength, after stroke when compared to sham or exercise and custom physiotherapy protocols; the literature is mixed regarding spasticity.
- Bihemispheric transcranial direct current stimulation with Custum physiotherapy protocol may not be beneficial for improving motor function and spasticity after stroke when compared to Unihemispheric transcranial direct current stimulation with Custum physiotherapy protocol.
- Bilateral transcranial direct current stimulation with modified constraint-induced movement therapy and conventional rehab may be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Sham transcranial direct current stimulation with modified constraint-induced movement therapy and conventional rehab.
- Anodal transcranial direct current stimulation with conventional may not be beneficial for improving motor function after stroke when compared to Sham transcranial direct current stimulation with conventional rehab.
- Anodal tDCS with CIMT may not be beneficial for improving motor function, muscle strength, performance of activities of daily living, and dexterity after stroke when compared to sham tDCS with CIMT.
- Bihemispheric transcranial direct current stimulation with Repetitive Peripheral Nerve Stimulation and Conventional Therapy may not be beneficial for improving motor function and spasticity after stroke when compared to Sham transcranial direct current stimulation with Repetitive Peripheral Nerve Stimulation and Conventional Therapy.
- Dual transcranial direct current stimulation with Sensorimotor training may be beneficial for improving motor function, dexterity, performance of activities of daily living, and proprioception after stroke when compared to Sham transcranial direct current stimulation with Sensorimotor training.
- High frequency repetitive transcranial magnetic stimulation with cathodal transcranial direct current stimulation may be beneficial for improving motor function after stroke when compared to High frequency repetitive transcranial magnetic stimulation.
- Repetitive transcranial magnetic stimulation may not be beneficial for improving motor function, dexterity, performance of activities of daily living, and muscle strength after stroke when compared to Dual transcranial direct current stimulation.
- Neuronavigated Continuous Theta Burst Stimulation may not be beneficial for improving motor function, dexterity, performance of activities of daily living, and muscle strength after stroke when compared to Sham.
- Neuronavigated Continuous Theta Burst Stimulation may not be beneficial for improving motor function, dexterity, performance of activities of daily living, and muscle strength after stroke when compared to Cathodal -transcranial direct current stimulation.
- Anodal transcranial direct current stimulation with robot assited arm training may not be beneficial for improving motor function after stroke when compared to robot assisted arm training with sham.
- Robot-Assisted Therapy (RAT) with dual transcranial direct current stimulation may not be beneficial for improving motor function, performance of activities of daily living, spasticity, stroke severity, and muscle strength after stroke when compared to Robot-Assisted Therapy (RAT) with sham transcranial direct current stimulation.
- Smart hand joint training device with bilateral transcranial direct current stimulation may be beneficial for improving motor function and stroke severity after stroke when compared to Smart hand joint training device.

- Personalized reach training (active control-restricted range) with anodal transcranial direct current stimulation and Virtual reality games may not be beneficial for improving motor function and range of motion after stroke when compared to Personal reach training (active control-restricted range) with Sham transcranial direct current stimulation and video games.
- Intermittent theta burst stimulation with high definition transcranial direct current stimulation and rehabilitation may be beneficial for improving performance of activities of daily living and muscle strength, but not spasticity, after stroke when compared to Sham intermittent theta burst stimulation and transcranial direct current stimulation with rehabilitation; the literature is mixed regarding motor function.
- Intermittent theta burst stimulation with high definition transcranial direct current stimulation and rehabilitation may not be beneficial for improving motor function, performance of activities of daily living, spasticity, and muscle strength after stroke when compared to sham transcranial direct current stimulation with intermittent theta burst stimulation and rehabilitation.
- Bilateral transcranial direct current stimulation with Robotic training may not be beneficial for improving motor function, performance of activities of daily living, spasticity, and muscle strength after stroke when compared to Sham transcranial direct current stimulation with Robotic training.
- Short lasting bilateral transcranial direct current stimulation online (during motor training) may not be beneficial for improving dexterity and muscle strength after stroke when compared to Long lasting bilateral transcranial direct current stimulation offline (incongruent with motor training) or Short lasting transcranial direct current stimulation offline (incongruent with motor training).
- Dual transcranial direct current stimulation combined with other interventions may be beneficial for improving dexterity, but not muscle strength, after stroke when compared to sham or motor relearning programmes.
- Dual transcranial direct current stimulation with robot-assisted upper limb therapy may not be beneficial for improving dexterity after stroke when compared to Sham dual-transcranial direct current stimulation with robot-assisted upper limb therapy.
- Dual transcranial direct current stimulation with bimanual cooperative task training may not be beneficial for improving performance of activities of daily living after stroke when compared to sham dual tDCS with bimanual cooperative task training.
- Anodal transcranial direct current stimulation with functional electrical stimulation may be beneficial for improving spasticity after stroke when compared to Sham transcranial direct current stimulation with functional electrical stimulation.
- Active repetitive peripheral nerve sensory stimulation (RPPS) with sham transcranial direct current stimulation may not be beneficial for improving range of motion and muscle strength after stroke when compared to Sham RRPS with sham transcranial direct current stimulation.
- Active repetitive peripheral nerve sensory stimulation (RPPS) with sham transcranial direct current stimulation may not be beneficial for improving range of motion and muscle strength after stroke when compared to Sham RRPS with Anodal transcranial direct current stimulation or Active RRPS and active transcranial direct current stimulation.
- Low Frequency repetitive transcranial magnetic stimulation may be less beneficial than ANodal transcranial direct current stimulation or Low Frequency repetitive transcranial magnetic stimulation with ANodal transcranial direct current stimulation for improving muscle strength after stroke.
- Bimanual motor skill learning with robot-assisted training and transcranial direct current stimulation may not be beneficial for improving muscle strength after stroke when compared to bimanual motor skill learning with sham stimulation.
- The literature is mixed regarding the effect of High-definition tDCS with EMG-driven robotic hand (EMG-RH) on motor function and spasticity after stroke when compared to Sham tDCS with EMG-RH.
- Sequential Combination of Anodal tDCS with Mirror Therapy may be beneficial for improving performance of activities of daily living, but not motor function, after stroke when compared to Sham tDCS with Mirror Therapy.
- Bilateral tDCS before mirror therapy may not be beneficial for improving dexterity after stroke when compared to tDCS during mirror therapy.
- Bilateral tDCS before mirror therapy may not be beneficial for improving motor function and dexterity after stroke when compared to Sham tDCS with mirror therapy.

- TDCS during mirror therapy may not be beneficial for improving dexterity after stroke when compared to Sham tDCS with mirror therapy; the literature is mixed regarding motor function.
- Dual-tDCS combined with PNMES with CIMT may be beneficial for improving motor function after stroke when compared to CIMT; the literature is mixed regarding performance of activities of daily living.
- Anodal tDCS with Modified CIMT may not be beneficial for improving muscle strength after stroke when compared to Sham tDCS with CIMT; the literature is mixed regarding motor function.
- Dual tDCS with Mirror therapy may be beneficial for improving muscle strength and dexterity, but not motor function, after stroke when compared to tDCS with Sham mirror.
- Cathodal tDCS with physical therapy may be beneficial for improving motor function after stroke when compared to Physical therapy.
- Cathodal tDCS with VR may be beneficial for improving motor function, but not spasticity, performance of activities of daily living, and dexterity, after stroke when compared to VR:.
- Cathodal tDCS with VR may be beneficial for improving motor function, but not spasticity, performance of activities of daily living, and dexterity, after stroke when compared to Cathodal tDCS.
- Cathodal tDCS may be beneficial for improving motor function, but not spasticity, performance of activities of daily living, and dexterity, after stroke when compared to VR:.
- Dual tDCS with methylphenidate may be beneficial for improving dexterity after stroke when compared to tDCS with placebo.
- Dual tDCS with methylphenidate may be beneficial for improving dexterity after stroke when compared to Sham tDCS with methylphenidate.
- Anodal tDCS combined with other interventions may not be beneficial for improving motor function after stroke when compared to sham; the literature is mixed regarding spasticity and dexterity.
- Dual tDCS combined with other interventions may not be beneficial for improving motor function after stroke when compared to sham or cimt; the literature is mixed regarding performance of activities of daily living.
- Active rTMS with cathodal tDCS may be beneficial for improving motor function after stroke when compared to sham rTMS with sham cathodal tDCS.
- Real bilateral tDCS with resistance training exercise may not be beneficial for improving motor function, muscle strength, spasticity, performance of activities of daily living, and dexterity after stroke when compared to sham tDCS with resistance training exercise.
- Robot-assisted therapy with dual tDCS may not be beneficial for improving motor function, performance of activities of daily living, and dexterity after stroke when compared to Robot-assisted therapy with sham tDCS.
- Virtual reality with aNodal tDCS may not be beneficial for improving motor function, muscle strength, and spasticity after stroke when compared to virtual reality with sham.
- Bilateral tDCS and CIMT may not be beneficial for improving muscle strength and performance of activities of daily living after stroke when compared to Sham tDCS with CIMT; the literature is mixed regarding motor function.
- Different approaches to anodal tDCS combined with peripheral nerve stimulation and robot-assisted training may not have a difference in efficacy when compared with one another for improving motor function.
- Bilateral tDCS before mirror therapy may be less beneficial than tDCS during mirror therapy for improving motor function after stroke.
- Anodal tDCS Ipsilesional PMC with CIMT may be beneficial for improving motor function, muscle strength, spasticity, and dexterity after stroke when compared to Anodal tDCS Ipsilesional M1 with CIMT.
- Anodal tDCS Ipsilesional PMC with CIMT may be beneficial for improving motor function, muscle strength, spasticity, performance of activities of daily living, and dexterity after stroke when compared to Sham Stimulation with cMIT.
- Anodal tDCS Ipsilesional M1 with CIMT may be beneficial for improving performance of activities of daily living after stroke when compared to Sham Stimulation with cMIT.

- Concurrent Combination of tDCS with Mirror Therapy may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Sham tDCS with Mirror Therapy.
- Cathodal tDCS with Modified CIMT may not be beneficial for improving motor function and muscle strength after stroke when compared to Sham tDCS with CIMT.
- Simultaneous cathodal tDCS with 10hz rTMS may be beneficial for improving proprioception after stroke when compared to rTMS 10Hz with Sham tDCS.
- Simultaneous anodal tDCS with 10hz rTMS may not be beneficial for improving proprioception after stroke when compared to rTMS 10Hz with Sham tDCS.
- Preconditioning cathodal tCDS with 10hz rTMS may not be beneficial for improving proprioception after stroke when compared to rTMS 10Hz with Sham tDCS.
- Preconditioning anodal tDCS with 10hz rTMS may not be beneficial for improving proprioception after stroke when compared to rTMS 10Hz with Sham tDCS.

A.32 Other Non-Invasive Brain Stimulation Methods (Table 32)

Key Points

- Transcranial Random Noise stimulation (tRNS) with FES may not be beneficial for improving muscle strength after stroke when compared to Sham-tRNS with active FES; the literature is mixed regarding motor function.
- BCI-based, Low-Frequency, Frequency-Tuned Electromagnetic Network Targeting Field (ENTF) Therapy (BCI-EMF) with conventional therapy may be beneficial for improving stroke severity and dexterity, but not motor function, after stroke when compared to Sham BCI-EMF with conventional therapy.
- TNRS with GRASP may be beneficial for improving motor function, but not stroke severity and performance of activities of daily living, after stroke when compared to Sham tRNS with GRASP.

A.33 Botulinum Toxin (Table 33)

Key Points

- Botulinum toxin (botox): some approaches may be more beneficial than others for improving range of motion; different approaches to botulinum toxin (botox) may not have a difference in efficacy when compared with one another for improving spasticity and performance of activities of daily living.
- Botulinum Toxin A with Task Specific Training may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Task-Specific Training.
- Botulinum Toxin A injection with neuromuscular electrical stimulation may be beneficial for improving motor function after stroke when compared to Placebo with neuromuscular electrical stimulation; the literature is mixed regarding spasticity and range of motion.
- Intramuscular botulinum toxin A with physiotherapy may not be beneficial for improving motor function, spasticity, and range of motion after stroke when compared to Intra-articular triamcinolone acetonide injection with physiotherapy.
- BtxA (Dysport) with modified constraint-induced movement therapy may be beneficial for improving motor function and performance of activities of daily living, but not spasticity, after stroke when compared to BtxA (Dysport) with conventional rehabilitation.
- Botulinum toxin (botox) combined with other interventions may be beneficial for improving motor function, but not spasticity and performance of activities of daily living, after stroke when compared to botulinum toxin (botox).
- Botulinumtoxin therapy in combination with dynamic electric neurostimulation (the explanation is consistent with transcutaneous electrical nerve stimulation) and basic therapy, including massage and therapeutic exercises may be beneficial for improving motor function and spasticity after stroke when compared to Basic Therapy.
- Botulinumtoxin therapy in combination with dynamic electric neurostimulation (the explanation is consistent with transcutaneous electrical nerve stimulation) and basic therapy, including massage and

therapeutic exercises may be beneficial for improving motor function and spasticity after stroke when compared to Botulinum toxin therapy and basic therapy.

- Botulinumtoxin therapy in combination with dynamic electric neurostimulation (the explanation is consistent with transcutaneous electrical nerve stimulation) and basic therapy, including massage and therapeutic exercises may be beneficial for improving motor function and spasticity after stroke when compared to Dynamic electric neurostimulation and basic therapy.
- Onabotulinumtoxin-A may be beneficial for improving motor function and spasticity after stroke when compared to Suprascapular Nerve Block.
- Botulinum toxin type A injection with programme of upper limb therapy may be beneficial for improving spasticity, but not motor function, dexterity, performance of activities of daily living, and muscle strength, after stroke when compared to upper limb therapy programme.
- Botulinum toxin A injection with structured stretching exercises and conventional rehabilitation may be beneficial for improving performance of activities of daily living and spasticity, but not motor function, after stroke when compared to Self-stretching exercises with conventional rehabilitation.
- Robot assisted training with Botox may be beneficial for improving motor function, muscle strength, and spasticity after stroke when compared to Conventional treatment with Botox.
- Extracorpeal shockwave may be beneficial for improving motor function and range of motion, but not spasticity, after stroke when compared to Botox.
- Condensed Robot-assisted training with botulinum toxin A and Functional training may not be beneficial for improving motor function, performance of activities of daily living, and spasticity after stroke when compared to Distributed robot-assisted training with botulinum toxin A and Functional training.
- Repetitive facilitative exercise (RFE) with botulinum toxin A injection, conventional self-training and conventional rehab may be beneficial for improving motor function, dexterity, and range of motion, but not spasticity, after stroke when compared to repetitive facilitative exercise (RFE) with conventional self-training and conventional rehab.
- Botox with movement training may be beneficial for improving muscle strength, but not dexterity, performance of activities of daily living, spasticity, and range of motion, after stroke when compared to Botox plus excercise handout.
- Letibotulinumtoxin (Botulax) may not be beneficial for improving performance of activities of daily living and spasticity after stroke when compared to onabotuliNomtoxin (Botox).
- Intramuscular botulinum toxin A may not be beneficial for improving performance of activities of daily living and muscle strength after stroke when compared to Placebo; the literature is mixed regarding spasticity.
- Botox-A with adhesive taping may be beneficial for improving spasticity after stroke when compared to Botox-A with Manual Stretching (with splint to maintain maximum stretching); the literature is mixed regarding performance of activities of daily living.
- Ultrasound guided BotulinumToxin A Injections may not be beneficial for improving performance of activities of daily living and spasticity after stroke when compared to No treatment.
- Botox 1000u with cyclic neuromuscular electrical stimulation may be beneficial for improving performance of activities of daily living, but not spasticity and proprioception, after stroke when compared to Placebo.
- Non-Targeted High Volume Botulinum Toxin may not be beneficial for improving spasticity after stroke when compared to Endplate-Targeted Low Volume Botulinum Toxin or Non-Targeted Low Volume Botulinum Toxin.
- Botolinum Toxin-A with Extracorporeal shock wave therapy (extracorporeal shockwave therapy) may be beneficial for improving spasticity after stroke when compared to botulinum toxin A with electrical stimulation (ES).
- Transcutaneous electrical nerve stimulation with BTA infiltration may not be beneficial for improving spasticity and range of motion after stroke when compared to transcutaneous electrical nerve stimulation with Placebo 2.5mL saline.
- Suprascapular botulinum toxin A injections may not be beneficial for improving range of motion after stroke when compared to placebo.
- Bot toxin A with physiotherapy may not be beneficial for improving muscle strength, spasticity, and performance of activities of daily living after stroke when compared to baclofenum with physiotherapy.

- Botox with intensive rehabilitation program may not be beneficial for improving spasticity, performance of activities of daily living, and dexterity after stroke when compared to Botox.
- Botulinum toxin (botox) combined with other interventions may not be beneficial for improving motor function, muscle strength, spasticity, proprioception, and dexterity after stroke when compared to botulinum toxin (botox) or conventional therapy.
- Botulinum toxin (botox) may be beneficial for improving spasticity, but not motor function, muscle strength, range of motion, performance of activities of daily living, and dexterity, after stroke when compared to sham.
- Botulinum toxin (botox) may be beneficial for improving spasticity and performance of activities of daily living, but not motor function, after stroke when compared to conventional therapy.
- Robot-assisted training (Bi-Manu-Track BMT robotic arm) with BoNT-A injection and functional practice may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to conventional task-oriented movement training with BoNT-A injection and functional practice.
- Mirror therapy with BoNT-A injection and functional practice may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to conventional task-oriented movement training with BoNT-A injection and functional practice.
- Botulinum toxin A with robotic training may be beneficial for improving spasticity and dexterity, but not motor function and performance of activities of daily living, after stroke when compared to Robotic training.
- FES with botulinum toxin-A and home based task-oriented exercise may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Botulinum toxin-A with home-based exercise program.

A.34 Antispastic Medications (Table 34)

Key Points

- Antispastic medications may be beneficial for improving spasticity, but not motor function, dexterity, performance of activities of daily living, range of motion, and muscle strength, after stroke when compared to sham.
- Cyproheptadine with EMG-controlled VAEDA glove may not be beneficial for improving motor function after stroke when compared to Placebo with EMG-controlled VAEDA glove or Placebo with passive stretching VAEDA with glove.
- Intramuscular botulinum toxin A may not be beneficial for improving performance of activities of daily living and muscle strength after stroke when compared to Placebo; the literature is mixed regarding spasticity.
- Intrathecal Baclofen may be beneficial for improving spasticity, but not performance of activities of daily living, after stroke when compared to Conventional Spasticity Management.
- The literature is mixed regarding the effect of Isradipine on improvement of muscle strength after stroke when compared to Placebo.
- Isradipine may not be beneficial for improving muscle strength after stroke when compared to Tizanidine.
- Bot toxin A with physiotherapy may not be beneficial for improving muscle strength, spasticity, and performance of activities of daily living after stroke when compared to baclofenum with physiotherapy.

A.35 Nerve Block (Table 35)

Key Points

- Ultrasound-guided stellate ganglion block with Conventional Therapy may be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Conventional therapy.
- Ultrasound-guided stellate ganglion block with Conventional Therapy may not be beneficial for improving performance of activities of daily living after stroke when compared to Ultrasound-guided stellate ganglion block with Extracorporeal shock wave therapy and Conventional therapy.

- Ultrasound-guided stellate ganglion block with Conventional Therapy may be less beneficial than Ultrasound-guided stellate ganglion block with Extracorporeal shock wave therapy and Conventional therapy for improving motor function after stroke.
- Extracorporeal shock wave therapy with Conventional therapy may not be beneficial for improving performance of activities of daily living after stroke when compared to Ultrasound-guided stellate ganglion block with Extracorporeal shock wave therapy and Conventional therapy.
- Extracorporeal shock wave therapy with Conventional therapy may be less beneficial than Ultrasound-guided stellate ganglion block with Extracorporeal shock wave therapy and Conventional therapy for improving motor function after stroke.
- Ultrasound-guided stellate ganglion block with Conventional Therapy may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Extracorporeal shock wave therapy with Conventional therapy.
- Onabotulinumtoxin-A may be beneficial for improving motor function and spasticity after stroke when compared to Suprascapular Nerve Block.
- Anesthesia of Intact Hand may be beneficial for improving dexterity after stroke when compared to No Anesthesia.
- Transcutaneous electrical nerve stimulation with conventional rehab may not be beneficial for improving performance of activities of daily living, spasticity, and range of motion after stroke when compared to Suprascapular nerve block with conventional rehab.
- Suprascapular nerve pulsed radiofrequency may be beneficial for improving performance of activities of daily living and range of motion after stroke when compared to Suprascapular Nerve Block with lidocain.
- Suprascapular nerve block (methylprednisone with bupivacaine hydrochloride) may not be beneficial for improving performance of activities of daily living and stroke severity after stroke when compared to Placebo (saline injection).
- Suprascapular nerve block may not be beneficial for improving range of motion after stroke when compared to Ultrasound.
- The literature is mixed regarding the effect of Lidocaine Injection (suprascapular nerve block) on improvement of range of motion after stroke when compared to Placebo injection.
- Lidocaine Injection (suprascapular nerve block) may not be beneficial for improving range of motion after stroke when compared to 5ml Lidocaine AND betamethasone.
- Intra-Articular Steroid Injection (IASI) may not be beneficial for improving range of motion after stroke when compared to Suprascapular Nerve Block (SSNB).
- Different approaches to nerve block may not have a difference in efficacy when compared with one another for improving range of motion.

A.36 Steroids (Table 36)

Key Points

- Steroids may be beneficial for improving range of motion, but not motor function, after stroke when compared to sham; the literature is mixed regarding performance of activities of daily living.
- Steroids may be beneficial for improving motor function and range of motion, but not stroke severity and spasticity, after stroke when compared to conventional therapy; the literature is mixed regarding performance of activities of daily living.
- Dual corticosteroid injection with conventional therapy may be beneficial for improving motor function, but not performance of activities of daily living and range of motion, after stroke when compared to single corticosteroid injection with conventional therapy.
- Ultrasonic-guided betamethasone local injection with Rehabilitation may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Extracorporeal shock wave therapy with Rehabilitation.
- Intramuscular botulinum toxin A with physiotherapy may not be beneficial for improving motor function, spasticity, and range of motion after stroke when compared to Intra-articular triamcinolone acetonide injection with physiotherapy.

- Oral Prednisolone may not be beneficial for improving performance of activities of daily living after stroke when compared to Oral Piroxicam.
- Oral Prednisolone may not be beneficial for improving performance of activities of daily living and stroke severity after stroke when compared to Discontinued Prednisone.
- Triamcinolone acetonide with transcutaneous electrical nerve stimulation and Therapeutic exercise program may be beneficial for improving range of motion, but not performance of activities of daily living, spasticity, and stroke severity, after stroke when compared to transcutaneous electrical nerve stimulation with Therapeutic exercise program.
- Intra-Articular Steroid Injection (IASI) may not be beneficial for improving range of motion after stroke when compared to Suprascapular Nerve Block (SSNB).
- The literature is mixed regarding the effect of Lidocaine Injection (suprascapular nerve block) on improvement of range of motion after stroke when compared to Placebo injection.
- Lidocaine Injection (suprascapular nerve block) may not be beneficial for improving range of motion after stroke when compared to 5ml Lidocaine AND betamethasone.
- Pulsed Radiofrequency with rehabilitation therapy may be less beneficial than Intra-articular corticosteroid injection with rehabilitation therapy for improving range of motion after stroke.
- Hyaluronic acid (2mL) may not be beneficial for improving range of motion after stroke when compared to Triamcinolone acetonide (40mg).

A.37 Cerebrolysin (Table 37)

Key Points

- Cerebrolysin may be beneficial for improving motor function, performance of activities of daily living, and stroke severity, but not dexterity, after stroke when compared to sham.

A.38 Levodopa (Table 38)

Key Points

- Amphetamine with Levodopa and conventional physiotherapy may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Amphetamine-Placebo with Levodopa-Placebo and conventional physiotherapy.
- Levodopa (L-DOPA) with Carbidopa may not be beneficial for improving motor function, muscle strength, and dexterity after stroke when compared to Placebo.

A.39 Statins and Antihypertensives (Table 39)

Key Points

- Secondary prevention (atorvastatin and clopidogrel) with physical rehabilitation may be beneficial for improving motor function and performance of activities of daily living after stroke when compared to physical rehabilitation.
- Phosphodiesterase inhibitor 6mg may not be beneficial for improving dexterity, performance of activities of daily living, stroke severity, and muscle strength after stroke when compared to Sham.
- Olmesartan may be beneficial for improving stroke severity, but not performance of activities of daily living, after stroke when compared to Amlodipine.
- Telmisartan may be beneficial for improving stroke severity after stroke when compared to Mannitol.
- The literature is mixed regarding the effect of Isradipine on improvement of muscle strength after stroke when compared to Placebo.
- Isradipine may not be beneficial for improving muscle strength after stroke when compared to Tizanidine.

A.40 Antidepressants (Table 40)

Key Points

- Antidepressants may be beneficial for improving motor function after stroke when compared to sham; the literature is mixed regarding stroke severity, muscle strength, performance of activities of daily living, and dexterity.
- Active repetitive transcranial magnetic stimulation with fluoxetine may be less beneficial than Sham repetitive transcranial magnetic stimulation with placebo fluoxetine for improving motor function after stroke.
- The literature is mixed regarding the effect of Active repetitive transcranial magnetic stimulation with fluoxetine on improvement of motor function after stroke when compared to Sham repetitive transcranial magnetic stimulation with fluoxetine.

A.41 Central Nervous System Stimulants (Table 41)

Key Points

- Dextroamphetamine with physiotherapy may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Placebo with Physiotherapy.
- Amphetamine with Levodopa and conventional physiotherapy may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Amphetamine-Placebo with Levodopa-Placebo and conventional physiotherapy.
- Central nervous system stimulants may not be beneficial for improving stroke severity, muscle strength, performance of activities of daily living, and dexterity after stroke when compared to sham; the literature is mixed regarding motor function.
- CIMT-6hr with cycloserine may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to CIMT-6hr with placebo.
- Dual tDCS with methylphenidate may be beneficial for improving dexterity after stroke when compared to tDCS with placebo.
- Dual tDCS with methylphenidate may be beneficial for improving dexterity after stroke when compared to Sham tDCS with methylphenidate.

A.42 Neuroprotectants and Regenerative Therapies (Table 42)

Key Points

- Stem cell therapy may not be beneficial for improving motor function, performance of activities of daily living, and stroke severity after stroke when compared to conventional therapy.
- Neuroprotective biologics may not be beneficial for improving motor function, performance of activities of daily living, and stroke severity after stroke when compared to sham.
- Erythropoiegtin with Granulocyte-Colony Stimulating Factor may not be beneficial for improving dexterity, performance of activities of daily living, and muscle strength after stroke when compared to Placebo.
- Hyperabaric oxygen therapy may not be beneficial for improving dexterity, stroke severity, and muscle strength after stroke when compared to Sham Hyperbaric oxygen therapy.
- Platelet-Rich Plasma Injections may not be beneficial for improving performance of activities of daily living, spasticity, and range of motion after stroke when compared to Placebo Injections.

A.43 Other Pharmacological and Medical Interventions (Table 43)

Key Points

- Segmental neuromyotherapy (SNMT) with therapy may be beneficial for improving motor function, but not spasticity, after stroke when compared to therapy.
- Hyaluronic acid may not be beneficial for improving motor function, spasticity, and range of motion after stroke when compared to sham.
- Traditional medicines and massage may be beneficial for improving motor function after stroke when compared to piracetam with usual post-stroke medications.

- Acupuncture (aligned acupuncture at the muscle regions plus cutaneous needle therapy) may be beneficial for improving motor function, spasticity, range of motion, and stroke severity after stroke when compared to Piracetam Injection.
- Donepezil with constraint-induced movement therapy may not be beneficial for improving motor function, dexterity, and performance of activities of daily living after stroke when compared to Placebo with constraint-induced movement therapy.
- Vitamin D Supplementation may not be beneficial for improving performance of activities of daily living, stroke severity, and muscle strength after stroke when compared to Placebo.
- Nabiximol cannabinoid may not be beneficial for improving spasticity after stroke when compared to Placebo nabiximol.
- Individualized homeopathic medicines with physiotherapy may not be beneficial for improving spasticity, stroke severity, and muscle strength after stroke when compared to Placebo with physiotherapy.
- Etanercept may be beneficial for improving range of motion after stroke when compared to Placebo (saline).
- Major ozonated autohemotherapy with stroke usual medical management may be beneficial for improving stroke severity after stroke when compared to stroke usual medical management.
- Telmisartan may be beneficial for improving stroke severity after stroke when compared to Mannitol.
- Conv rehab with Soymilk Ingestion may be beneficial for improving muscle strength after stroke when compared to Conv rehab with Placebo Milk Ingestion.
- Hyaluronic acid (2mL) may not be beneficial for improving range of motion after stroke when compared to Triamcinolone acetonide (40mg).
- Lithium 300mg with Conventional therapy may not be beneficial for improving motor function and stroke severity after stroke when compared to Placebo tablet with Conventional therapy.
- Atomoxetine with Task Oriented Upper Extremity Training may not be beneficial for improving motor function after stroke when compared to Placebo with Task Oriented Upper Extremity Training.

A.44 Acupuncture (Table 44)

Key Points

- Acupuncture: some approaches may be more beneficial than others for improving motor function, muscle strength, spasticity, range of motion, and performance of activities of daily living.
- Contralateral acupuncture may be beneficial for improving stroke severity, but not motor function and performance of activities of daily living, after stroke when compared to conventional acupuncture.
- Acupuncture may not be beneficial for improving stroke severity, muscle strength, spasticity, range of motion, and performance of activities of daily living after stroke when compared to sham; the literature is mixed regarding motor function.
- Acupuncture may not be beneficial for improving motor function, performance of activities of daily living, and stroke severity after stroke when compared to Physiotherapy Bobath.
- Acupuncture may not be beneficial for improving motor function, performance of activities of daily living, and stroke severity after stroke when compared to Acupuncture with Physiotherapy Bobath.
- Physiotherapy Bobath may not be beneficial for improving motor function, performance of activities of daily living, and stroke severity after stroke when compared to Acupuncture with Physiotherapy Bobath.
- Acupuncture (aligned acupuncture at the muscle regions plus cutaneous needle therapy) may be beneficial for improving motor function, spasticity, range of motion, and stroke severity after stroke when compared to Piracetam Injection.
- Acupuncture combined with other interventions may be beneficial for improving motor function, but not spasticity and performance of activities of daily living, after stroke when compared to acupuncture; the literature is mixed regarding range of motion.
- Dry Needling may not be beneficial for improving motor function, performance of activities of daily living, and dexterity after stroke when compared to sham; the literature is mixed regarding spasticity and range of motion.

- Physiotherapy may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Acupuncture.
- Physiotherapy may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Physiotherapy with Acupuncture.
- Acupuncture may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Physiotherapy with Acupuncture.
- Dry Needling with Neurorehabilitation protocol (electrotherapy (functional electrical stimulation and hot pack) and stroke conventional exercise) may be beneficial for improving motor function, dexterity, and muscle strength, but not spasticity, after stroke when compared to Sham-Needling with functional electrical stimulation with hot pack and Conventional exercise training.
- Dry Needling with exercise therapy may not be beneficial for improving motor function and spasticity after stroke when compared to Exercise therapy; the literature is mixed regarding range of motion.
- Low frequency repetitive transcranial magnetic stimulation with scalp acupuncture may be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Scalp Acupuncture.
- Scalp cluster acupuncture with constraint-induced movement therapy may be beneficial for improving motor function after stroke when compared to Body acupuncture with traditional rehabilitation.
- Botox with dry needling and conventional rehab may be beneficial for improving motor function and spasticity after stroke when compared to Botox with conventionalrehab.
- Traditional Chinese medicine with Tuina treatment (massage techniques), Acupuncture kinesiotherapy and Basic stroke treatment may be beneficial for improving performance of activities of daily living and spasticity after stroke when compared to Basic stroke treatment with modern rehabilitation techniques.
- Acupuncture with individualized rehabilitation training may be beneficial for improving performance of activities of daily living after stroke when compared to individualized rehabilitation training alone.
- The literature is mixed regarding the effect of Dry Needling on improvement of spasticity after stroke when compared to conventional therapy.
- Dry needling may not be beneficial for improving spasticity after stroke when compared to Dry needling.
- Dry needling may be less beneficial than Dry needling for improving range of motion after stroke.
- Electroacupunture with acupuncture therapy may be beneficial for improving spasticity after stroke when compared to acupuncture therapy.
- Standard Acupuncture with Shixuan & Xiaohai acupoints with Functional training may be beneficial for improving motor function and muscle strength after stroke when compared to Standard Acupuncture only with Functional training.
- Acupuncture may be beneficial for improving stroke severity and range of motion, but not spasticity, after stroke when compared to conventional therapy; the literature is mixed regarding motor function and performance of activities of daily living.
- Scalp acupuncture (SA) may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Conventional therapy.
- Repetitive transcranial magnetic stimulation (rTMS) may be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Conventional therapy.
- SAEM-CS- SA and electromagnetic convergence stimulation (SA and LF-rTMS simultaneously) may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Conventional therapy.
- Scalp acupuncture (SA) may not be beneficial for improving motor function and performance of activities of daily living after stroke when compared to SAEM-CS- SA and electromagnetic convergence stimulation (SA and LF-rTMS simultaneously).
- Repetitive transcranial magnetic stimulation (rTMS) may be beneficial for improving motor function and performance of activities of daily living after stroke when compared to SAEM-CS- SA and electromagnetic convergence stimulation (SA and LF-rTMS simultaneously).
- Scalp acupuncture (SA) may not be beneficial for improving motor function after stroke when compared to Repetitive transcranial magnetic stimulation (rTMS).

- Electroacupuncture with Standard rehab may not be beneficial for improving range of motion after stroke when compared to Minimal acupuncture with Standard rehab.
- Different approaches to dry Needling may not have a difference in efficacy when compared with one another for improving motor function, stroke severity, and spasticity.
- Scalp acupuncture (SA) may be less beneficial than Repetitive transcranial magnetic stimulation (rTMS) for improving performance of activities of daily living after stroke.
- Acupuncture combined with other interventions may be beneficial for improving performance of activities of daily living after stroke when compared to conventional therapy; the literature is mixed regarding range of motion.

A.45 Electroacupuncture and Transcutaneous Electrical Acupoint Stimulation (Table 45)

Key Points

- Electroacupuncture and transcutaneous electrical acupoint stimulation may not be beneficial for improving motor function, muscle strength, and performance of activities of daily living after stroke when compared to sham; the literature is mixed regarding spasticity.
- Electroacupuncture and transcutaneous electrical acupoint stimulation may be beneficial for improving motor function and stroke severity after stroke when compared to conventional therapy; the literature is mixed regarding performance of activities of daily living and muscle strength.
- Electroacupoint stimulation with conventional rehab may not be beneficial for improving motor function and muscle strength after stroke when compared to Sham stimulation with conventional rehab.
- Electroacupuncture with moxibustion may not be beneficial for improving motor function after stroke when compared to Regular rehabilitation therapy.
- Dual transcranial direct current stimulation may not be beneficial for improving motor function, dexterity, and muscle strength after stroke when compared to Electroacupuncture.
- Electroacupuncture with massage may be beneficial for improving stroke severity after stroke when compared to Conventional therapy; the literature is mixed regarding motor function.
- Transcutaneous electrical acupoint stimulation may be beneficial for improving spasticity, but not performance of activities of daily living, after stroke when compared to Transcutaneous electrical acupoint stimulation.
- Electroacupuncture with cycling may be beneficial for improving performance of activities of daily living, stroke severity, and muscle strength after stroke when compared to Electroacupuncture.
- Electroacupuncture with strength training may be beneficial for improving spasticity after stroke when compared to Strength training.
- Electroacupunture with acupuncture therapy may be beneficial for improving spasticity, but not range of motion, after stroke when compared to acupuncture therapy.
- Electroacupuncture and transcutaneous electrical acupoint stimulation: some approaches may be more beneficial than others for improving motor function, stroke severity, spasticity, and performance of activities of daily living; different approaches to Electroacupuncture and transcutaneous electrical acupoint stimulation may not have a difference in efficacy when compared with one another for improving muscle strength.

A.46 Meridian Acupressure and Massage Therapy (Table 46)

Key Points

- Massage may be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Traditional medicine (Conventional unani drug therapy (Munzij, Mushil, Muaqwwi Aasab)).
- Electroacupuncture with massage may be beneficial for improving stroke severity after stroke when compared to Conventional therapy; the literature is mixed regarding motor function.
- Vibrational heated pressure therapy with Meridian dredging exercise and conventional rehab may be beneficial for improving motor function, performance of activities of daily living, and spasticity after stroke when compared to meridian dredging exercise with conventional treatment.

- Tui Na Chinese massage therapy with conventional rehabilitation may not be beneficial for improving motor function, spasticity, and performance of activities of daily living after stroke when compared to sham with conventional rehabilitation.
- Nurse-led acupressure with usual care may be beneficial for improving motor function and performance of activities of daily living after stroke when compared to usual care alone.
- Meridian acupressure and massage therapy may be beneficial for improving stroke severity, muscle strength, and range of motion, but not spasticity and performance of activities of daily living, after stroke when compared to conventional therapy.
- Traditional Chinese medicine with Tuina treatment, Acupuncture and standard therapy may be beneficial for improving spasticity and performance of activities of daily living after stroke when compared to Kinesiotherapy exercises with standard therapy.

A.47 Traditional Herbal Medicine (Table 47)

Key Points

- Traditional medicines and massage may be beneficial for improving motor function after stroke when compared to piracetam with usual post-stroke medications.
- Traditional herbal medicines may be beneficial for improving motor function, performance of activities of daily living, and spasticity, but not stroke severity, after stroke when compared to conventional therapy.
- Traditional herbal medicines may be beneficial for improving motor function and performance of activities of daily living, but not range of motion, after stroke when compared to sham; the literature is mixed regarding stroke severity.
- Massage may be beneficial for improving motor function and performance of activities of daily living after stroke when compared to Traditional medicine (Conventional unani drug therapy (Munzij, Mushil, Muaqwwi Aasab)).
- Electroacupuncture with moxibustion may not be beneficial for improving motor function after stroke when compared to Regular rehabilitation therapy.
- Traditional Chinese medicine with Tuina treatment (massage techniques), Acupuncture kinesiotherapy and Basic stroke treatment may be beneficial for improving performance of activities of daily living and spasticity after stroke when compared to Basic stroke treatment with modern rehabilitation techniques.
- Electroacupunture with acupuncture therapy may be beneficial for improving spasticity after stroke when compared to acupuncture therapy.

Conclusions Matrix

This table presents 1,642 conclusion statements across 47 intervention categories. Each row presents the intervention, the comparator, and its verdict in each outcome measure domain. Green = favourable, yellow = mixed evidence, red = not beneficial. A blank cell means the domain was not graded for that comparison.

Neurodevelopmental Techniques (44 conclusions)

Intervention	Compared to	Motor Funct.	Stroke Severity	Muscle Strength	Spasticity	ROM	Proprio-ception	ADLs	Dexterity
Brunnstrom hand manipulation treatment with Conventional occupational therapy	Motor relearning programme based hand protocol with Conventional occupational therapy								
Early Sitting, Standing and Walking With Bobath Training (a bobath approach developed by the researchers)	Bobath Training								
Different approaches to motor relearning programmes	one another								
Repetitive facilitative exercise (RFE) with botulinum toxin A injection, conventional self-training and conventional rehab	repetitive facilitative exercise (RFE) with conventional self-training and conventional rehab								
Impairment oriented training Arm BASIS with usual treatment	usual treatment								
Impairment oriented training Arm BASIS with usual treatment	Bobath therapy with usual treatment								
Acupuncture	Physiotherapy Bobath								
Acupuncture	Acupuncture with Physiotherapy Bobath								
Physiotherapy Bobath	Acupuncture with Physiotherapy Bobath								
Electromyography-triggered neuromuscular electrical stimulation	Tracking training (a structured motor learning program) or electromyography-triggered neuromuscular electrical stimulation with tracking training								
Constraint-induced movement therapy	Bobath therapy								
Tracking training of finger and wrist (temporospatial processing)	repetitive simple Movement training								
Integrated behavioural and physical therapy with electromyography biofeedback	Exercise physical therapy (Bobath approach)								
Robotic training (InMotion ARM) with motor learning	Motor learning								
Shaping training with constraint-induced movement therapy transfer package (TP)	Shaping training								
Constraint-induced movement therapy	motor relearning program								
Proprioceptive neuromuscular facilitation with virtual reality (Nintendo Wii)	proprioceptive neuromuscular facilitation or Wii								
Task Specific Training	Proprioceptive Neuromuscular Facilitation								
Task-specific training	training using the Bobath approach								
Movement science based training	Bobath concept								
Visuo-Motor Grip Force Tracking Task Training of the paretic hand with Anodal Unilateral transcranial direct current stimulation	Visuo-Motor Grip Force Tracking Task Training of the paretic hand with Placebo transcranial direct current stimulation								
Visuo-Motor Grip Force Tracking Task Training of the paretic hand with Anodal Unilateral transcranial direct current stimulation	Visuo-Motor Grip Force Tracking Task Training of the paretic hand with Bilateral transcranial direct current stimulation								
Neuromuscular electrical stimulation with conventional exercise	conventional training								
Functional electrical stimulation with Brunnstrom Hand rehab and conventional rehab	Conventional Rehab								
High-frequency repetitive transcranial magnetic stimulation with Motor Learning	Sham repetitive transcranial magnetic stimulation with Motor Learning								
High-frequency repetitive transcranial magnetic stimulation with Motor training and Conventional therapy	Sham repetitive transcranial magnetic stimulation with Motor training and Conventional Therapy								
Neurodevelopmental techniques (Bobath approach)	conventional therapy								
Brunnstrom movement therapy with conventional therapy	mirror therapy with conventional therapy								
Forced use therapy using splint	Bimanual training based on neuro-developmental treatment								
Impairment-oriented training	Conventional therapy								

Intervention	Compared to	Motor Funct.	Stroke Severity	Muscle Strength	Spasticity	ROM	Proprio-ception	ADLs	Dexterity
Task oriented circuit training	Neurodevelopmental techniques								
Low frequency Repetitive Transcranial Magnetic Stimulation to unaffected hemisphere with Brunnstrom movement therapy	Sham Repetitive Transcranial Magnetic Stimulation with Brunnstrom movement therapy								
Proprioceptive neuromuscular facilitation early	Cognitive therapeutic exercise (CTE) early or late								
PNF with NMES	PNF								
Proprioceptive neuromuscular facilitation early	Cognitive therapeutic exercise (CTE) early or proprioceptive neuromuscular facilitation late or CTE late								
Dual transcranial direct current stimulation with motor learning training	Sham dual transcranial direct current stimulation with motor learning training								
Motor relearning with electrical stim	Bobath treatment with electrical stim								
Motor relearning programmes	neurodevelopmental techniques (Bobath approach)								
Constraint-induced movement therapy	Motor learning programme								
Motor learning program	Mirror therapy								
Motor relearning programmes	conventional therapy								
Finger movement tracking training	Waitlist								
Interleaved combination method (ICM) repetitive transcranial magnetic stimulation with motor training	Preconditioned combination method (PCM) repetitive transcranial magnetic stimulation with motor training								
Dual transcranial direct current stimulation with motor skill learning	Sham dual transcranial direct current stimulation with motor skill learning								

Bilateral Arm Training (47 conclusions)

Intervention	Compared to	Motor Funct.	Stroke Severity	Muscle Strength	Spasticity	ROM	Proprio-ception	ADLs	Dexterity
Bilateral arm training	conventional therapy								
Active-passive bilateral therapy (APBT) with Self-directed motor practice	Self-directed motor practice on affected upper limb								
Different approaches to Bilateral arm training combined with other interventions	one another								
Different approaches to bilateral arm training	one another								
Bilateral arm training combined with other interventions	unilateral arm training								
Bilateral arm training combined with other interventions	conventional therapy								
Distributed constraint-induced therapy	bilateral arm training								
Bilateral UE Training with Unilateral task-oriented training	Unilateral task-oriented Training (using a hand orthosis)								
Bilateral arm training; visual fb mirror therapy	bilateral arm training without mirror therapy								
Bilateral arm training with functional electrical stimulation and conventional occupational therapy	Bilateral arm training with sham functional electrical stimulation and conventional occupational therapy								
Constraint Induced Movement Therapy	Bilateral Arm Training								
Robotic arm therapy (NeReBot) with conventional therapy	Conventional therapy with proximal paretic arm exercise								
Shoulder sling exercise (Sling Suspension System on Shoulder Subluxation)	bilateral arm training								
Modified constraint-induced movement therapy	Bilateral training								
Forced use therapy using splint	Bimanual training based on neuro-developmental treatment								
Constraint-induced movement therapy	Conservative treatment (bimanual-upper-extremity training by conservative neurodevelopmental technique)								
Virtual reality bilateral arm training with conventional therapy	Bilateral arm training with conventional therapy								
Hospital-based task-oriented mirror therapy	Bilateral arm training								
Constraint-induced movement therapy with bilateral arm training	Bimanual task-related training								

Intervention	Compared to	Motor Funct.	Stroke Severity	Muscle Strength	Spasticity	ROM	Proprio-ception	ADLs	Dexterity
Unilateral robot assisted therapy with modified constraint-induced movement therapy	Robot assist therapy								
Unilateral robot assisted therapy with modified constraint-induced movement therapy	Bilateral robot assisted therapy with bilateral arm training								
Electromyography-triggered neuromuscular electrical stimulation with BAT	transcutaneous electrical nerve stimulation with BAT								
Robot-Assisted Therapy with Bilateral Practice with Task-Specific Training	Conventional Care with Task-Specific Training								
Unilateral robot assisted therapy with constraint-induced movement therapy (unilateral arm)	Robot assisted therapy alone (both modes)								
Unilateral robot assisted therapy with constraint-induced movement therapy (unilateral arm)	Bilateral robot assisted therapy with BAT (Bimanual tracking)								
Associated Mirror Therapy (Mirror Therapy with Bimanual Training)	Bimanual Training without mirroring with Conventional Care								
Robotic Priming with mirror therapy (RMT)	Robotic Priming with Bilateral Upper Limb Training (RBULT)								
Virtual reality-based bilateral arm training with conventional rehab	bilateral arm training								
Occupation-Based Bilateral Upper Limb Training with Cognitive Behavioral Therapy	Occupation-Based Bilateral Upper Limb Training with Conventional occupational therapy								
Mirror therapy with Bilateral arm training and Conventional therapy	Bilateral Arm training with Conventional therapy								
Unilateral mirror therapy with Unimanual training	Mirror therapy								
Unilateral mirror therapy with Unimanual training	Unilateral mirror therapy with Bimanual training								
Unilateral mirror therapy with Bimanual training	Bilateral mirror therapy with Bimanual training								
Bilateral arm training with rhythmic auditory cueing	task-oriented bilateral arm training								
Bilateral motor priming with task-specific training	health care education with task-specific training								
Unilateral robot-assisted arm training	Bilateral robot-assisted arm training								
Modified constraint-induced movement therapy	Dose-matched conventional treatment								
Bimanual, lever-driven wheelchair (LARA) for stationary arm exercise and overground ambulation with Videogame	Conventional Arm Exercises								
Mirror therapy-based Bilateral Training	Bilateral Training								
Balance Training with Affected Hand at Low Back	Balance Training								
Balance Training with Elevated Affected Shoulder	Balance Training								
Bilateral arm training with rhythmic auditory cueing	Conventional therapy								
Short-term bilateral arm training with electromyography triggered neuromuscular electrical stimulation	long-term bilateral arm training with electromyography triggered neuromuscular electrical stimulation								
Occupation-based bilateral upper extremity training	Task-based bilateral upper extremity training								
Coupled bilateral training with load with electromyography-triggered neuromuscular electrical stimulation	Coupled bilateral training with no load with electromyography-triggered neuromuscular electrical stimulation								
Electromyography-Triggered neuromuscular electrical stimulation with Bilateral Arm Training	Sham Stimulation with Bilateral Arm Training								
Electromyography-Triggered neuromuscular electrical stimulation with Bilateral Arm Training	electromyography-Triggered neuromuscular electrical stimulation with Bilateral Arm Training								

Exercise and Strength Training (143 conclusions)

Intervention	Compared to	Motor Funct.	Stroke Severity	Muscle Strength	Spasticity	ROM	Proprio-ception	ADLs	Dexterity
Functional strength training	Movement performance therapy								
Dynamic resistance training (POWER)	Functional Task Practice (FTP)								
Strength training	conventional therapy								

Intervention	Compared to	Motor Funct.	Stroke Severity	Muscle Strength	Spasticity	ROM	Proprio-ception	ADLs	Dexterity
Functional strength training with conventional physical therapy	Conventional physiotherapy X2								
Exercise and custom physiotherapy protocols	conventional therapy								
Different approaches to exercise and custom physiotherapy protocols	one another								
Arm treatment for 3hr/d	Arm treatment for 2hr/d or Arm treatment for 1hr/d								
Arm treatment for 3hr/d	Arm treatment for 2hr/d								
Functional strength training UL	the other study arms								
Graded Arm Supplementary Program	Conventional Therapy								
Different approaches to strength training	one another								
Graded repetitive arm supplementary program protocol	Education book- self-administered homework exercise program								
Strength training combined with other interventions	stretching and positioning programs								
Exercise and custom physiotherapy protocols	no treatment								
Body-weight supported treadmill training	Education (reviewing home exercises)								
Strength training combined with other interventions	conventional therapy								
Exercise and custom physiotherapy protocols combined with other interventions	conventional therapy								
Arm Ergometer with conventional treatment	Cryotherapy with Proprioceptive Neuromusucal Facilitation and Neurodevelopmental Techniques								
Exercise and custom physiotherapy protocols combined with other interventions	exercise and custom physiotherapy protocols								
Leg rehab training	Immobilization therapy with inflatable pressure splint (arm and leg with splints)								
Graded repetitive arm supplementary program	Virtual reality								
Boxing training	No intervention or therapy								
Boxing training	Scapular stabilization training								
Forced-rate exercise with Repetitive task practice	Repetitive task practice								
Cycling exercise with feedback and Conventional therapy	Conventional therapy								
Task-related Training (Grasping or Retrieving Objects)	Progressive Resistive Exercises								
Smart Glove Upper Extremity Training (RAPAEL) with rehab	Upper Extremity Self-Training at home with rehab								
Active-passive bilateral therapy (APBT) with Self-directed motor practice	Self-directed motor practice on affected upper limb								
Mental Practice with activities of daily living training session	Sham Relaxation Exercise with activities of daily living training session								
Whole-body vibration with Task Oriented Training and Conventional physical therapy	Upper- and lower-Cycle group with Task Specific Training and Conventional physical therapy								
Massage	Traditional medicine (Conventional unani drug therapy (Munzij, Mushil, Muaqwwi Aasab))								
Group Circuit	high intensity physio or usual physiotherapy								
Task-related Training with Trunk Restraint	Resistive Exercises with Trunk Restraint								
Dextroamphetamine with physiotherapy	Placebo with Physiotherapy								
Mirror therapy with usual care	Lower-limb exercise with usual care								
Telemonitored hand robotic-assisted therapy (Hand mentor pro) with home exercise program	Home exercise program only								
Modified constraint-induced movement therapy	Conventional rehabilitation								
Robot arm end effectors (ReoGO) with therapy	self-guided therapy with therapy								
Telerehabilitation	In clinic Rehabilitation								
Robot-Assisted Therapy	Usual care								
Robot-Assisted Therapy	Dose-matched Intensive Comparison Therapy								

Intervention	Compared to	Motor Funct.	Stroke Severity	Muscle Strength	Spasticity	ROM	Proprio-ception	ADLs	Dexterity
Eccentric strength training	Task-oriented strength training								
Intermittent theta burst stimulation with dexterity training	Sham theta burst stimulation with dexterity training								
Intermittent theta burst stimulation with dexterity training	Continuous theta burst stimulation with dexterity training								
Functional task practice (FTP) with Power training	Functional task practice (FTP)								
Task specific training with strength training or resistance	Task oriented training without resistance								
Upper extremity thermal stimulation	lower extremity thermal stimulation								
Pointing movement practice with feedback	Pointing movement practice without feedback								
OnabotulinumtoxinA with upper limb rehabilitation	OnabotulinumtoxinA								
Progressive abduction loading therapy with horizontal-plance viscous resistance device	Progressive abduction loading therapy								
Virtual Reality Boxing (Xbox Kinect)	Boxing Practice with Therapist								
Intermittent theta burst stimulation with Physical therapy	Physical Therapy								
Intermittent theta burst stimulation with Physical therapy	functional electrical stimulation with Physical therapy								
Unilateral and bilateral task oriented exercises	Walking tasks								
Physiotherapy	Acupuncture								
Physiotherapy	Physiotherapy with Acupuncture								
Acupuncture	Physiotherapy with Acupuncture								
Wii arm exercises	Home-based arm exercises								
Neuroanimation therapy using ARMEO exoskeleton	Modified Occupational therapy (stretching, task specific training)								
Robotic-assisted training with conventional therapy	Conventional therapy with arm specific physiotherapy								
Botulinum toxin injection with self-rehabilitation	BTI								
Dual-Task Training with Conventional occupational therapy	Single Task Training (combining sensory stimulation, UE muscle strength, cognitive and perceptual training, and fine hand movement) with Conventional occupational therapy								
Virtual reality therapy with ARMEO with combination of different exercises	Conventional physiotherapy								
High frequency repetitive transcranial magnetic stimulation with grip training and conventional rehab	repetitive transcranial magnetic stimulation with conventional rehab or Grip training and conventional rehab								
Three-Dimensional Upper Limb Robotic Exoskeleton Training	Manual Rehabilitation								
Robot-assisted training (RAT) with conventional rehab	Enhanced upper extremity therapy (EUET) with conventional rehab								
Cueing or remind to move with exercise or custom physiotherapy protocols	Sham with exercise or custom physiotherapy protocols								
Anodal transcranial direct current stimulation with Upper extremity strength training	Sham transcranial direct current stimulation with Upper extremity strength training								
Jintronix Virtual reality	graded repetitive arm supplementary program rehab								
Dual transcranial direct current stimulation with home exercise program	Sham transcranial direct current stimulation with home exercise program								
Bihemispheric transcranial direct current stimulation with Custum physiotherapy protocol	Sham transcranial direct current stimulation with Custom physiotherapy protocol								
Bihemispheric transcranial direct current stimulation with Custum physiotherapy protocol	Unihemispheric transcranial direct current stimulation with Custum physiotherapy protocol								
High-frequency repetitive transcranial magnetic stimulation with Conventional Therapy	Conventional therapy								
High-frequency repetitive transcranial magnetic stimulation with Conventional Therapy	Contralateral limb Cross education (strength training) with Conventional therapy								
Contralateral limb Cross education (strength training) with Conventional therapy	high-frequency repetitive transcranial magnetic stimulation with cross education and conventional therapy								

Intervention	Compared to	Motor Funct.	Stroke Severity	Muscle Strength	Spasticity	ROM	Proprio-ception	ADLs	Dexterity
High-frequency repetitive transcranial magnetic stimulation with Conventional Therapy	high-frequency repetitive transcranial magnetic stimulation with cross education and conventional therapy								
Robotic training with Rebless	UE training with Motomed ergometer								
Modified Constraint-Induced Movement Therapy with Exercise or custom physiotherapy (Telerehabilitation)	Home exercise program								
Enriched Music-Supported Therapy (eMST)	Graded Repetitive Arm Supplementary Program								
Task-oriented training with conventional therapy	Progressive resistance exercise with conventional therapy								
Smart reminder wristwatch telerehabilitation with Conventional therapy	Conventional therapy								
Cognitive motor rehabilitation with specific UE exercises	Specific UE exercises								
Dry Needling with exercise therapy	Exercise therapy								
Graded Motor Imagery (included implicit and explicit motor imagery plus mirror therapy) with conventional rehabilitation	Upper limb exercise with conventional rehabilitation								
'BOOST' Intensive Arm-Hand Training Protocol	Lower-Limb Strengthening And Reconditioning								
Real bilateral tDCS with resistance training exercise	sham tDCS with resistance training exercise								
UE function training	lower extremity function training								
Aerobic exercise	Stretching exercise								
Community-based upper extremity exercise program	Lower extremity exercise program								
Alternating hot-cold water immersion (AHCWI) with Standard rehabilitation	Upper limb cycling exercises with Standard rehabilitation								
Cognitive Orientation to Daily Occupaitonal Performance	Conventional occupational therapy								
Ergotact system (Videogames)	Home-based self-rehabilitation program								
Sensory Relearning with Task-Specific Training and home exercise	Task-Specific Training with strength training								
Task-Oriented Training	Table-Top Activity Training								
Virtual Reality Training (Nintendo Wii) with general physical therapy	OT with general physical therapy								
TNRS with GRASP	Sham tRNS with GRASP								
Functional Training	Strength Training								
Focal muscle vibration with progressive modular rebalancing	Conventional physiotherapy								
Forced aerobic exercise with Repetitive task practice(RTP)	Voluntary exercise with RTP								
Forced aerobic exercise with Repetitive task practice(RTP)	RTP								
Voluntary exercise with RTP	RTP								
Video game self training	Graded repetitive arm supplementary program								
Repetitive Task Practice	Occupation-Based Intervention								
VR based rehab	Group based rehab								
Music glove	Conventional care								
Isometric hand therapy	Conventional care								
Music glove	Isometric hand therapy								
Repetitive peripheral nerve sensory stim (RPSS) with Motor Training	Sham with Motor Training								
Standard Acupuncture with Shixuan & Xiaohai acupoints with Functional training	Standard Acupuncture only with Functional training								
CIMT	Therapeutic Climbing								
CIMT	Conventional neurological therapy								
Therapeutic Climbing	Conventional neurological therapy								

Intervention	Compared to	Motor Funct.	Stroke Severity	Muscle Strength	Spasticity	ROM	Proprio-ception	ADLs	Dexterity
Robotic therapy (MIT-Manus) with conventional therapy	Occupational therapy								
Strength training	Standard care								
EMG triggered NMS (EMG-Stim) with Wrist Strengthening Exercises	Wrist Exercises								
High intensity FES assisted exercise therapy	Low FES assisted exercise therapy								
Tilt table affected knee belt with Conventional Therapy	Tilt table alone (both knee belts) with Conventional Therapy								
Tilt table with task oriented training with Conventional Therapy	Tilt table alone (both knee belts) with Conventional Therapy								
Cognitive Orientation to Daily Occupaitonal Performance	Progressive exercise program (strenght, functional, balance, and endurance training)								
Robot-assisted training	Usual care								
Enhanced upper limb therapy	Usual care								
Robot-assisted training	Enhanced upper limb therapy								
Upper extremity aerobic exercise with conventional physiotherapy	Conventional physiotherapy								
Arm cycling with conventional physiotherapy	conventional physiotherapy								
Electroacupuncture with cycling	Electroacupuncture								
High intensity interval training (HIIT)	Moderate intensity constant-load exercise (MICE)								
Augmented Community Telerehabilitation	Conventional Therapy								
Botox with movement training	Botox plus excercise handout								
Lower-Limb Task-Specific Circuit Training	Upper-Limb Task-Specific Training								
Dorsal hand splint with home-based exercise program	Home-based exercise program								
Electroacupuncture with strength training	Strength training								
Traditional Chinese medicine with Tuina treatment (massage techniques), Acupuncture kinesiotherapy and Basic stroke treatment	Basic stroke treatment with modern rehabilitation techniques								
Botox with intensive rehabilitation program	Botox								
Superficial needling acupuncture plus club swing exercise with conventional therapy	Conventional therapy								
Proprioceptive neuromuscular facilitation exercises with neuromobilization of the affected upper extremity	proprioceptive neuromuscular facilitation exercises without neuromobilization or conventional care								
Stretching with Joint-stabilizing exercises	exercise								
Stretching with Joint-stabilizing exercises	Stretching								
Radial extracorporeal shock wave therapy (radial extracorporeal shockwave therapy) with Designed physical therapy program for shoulder	Sham radial extracorporeal shockwave therapy with Designed physical therapy program for shoulder								
Kinesio taping with graded repetitive arm supplementary program (home program)	graded repetitive arm supplementary program (Home program)								
Mirror and strength training therapy	Strength training								
VR (YOUgrabber)	Gym training								
High-Intensity Interval Training	Rest control								
Home-Based (Virtual) Rehabilitation with Treatment As Usual	Graded Repetitive Arm Supplementary Program with Treatment As Usual								

Task-Specific Training (147 conclusions)

Intervention	Compared to	Motor Funct.	Stroke Severity	Muscle Strength	Spasticity	ROM	Proprio-ception	ADLs	Dexterity
Task-related Training (Grasping or Retrieving Objects)	Progressive Resistive Exercises								

Intervention	Compared to	Motor Funct.	Stroke Severity	Muscle Strength	Spasticity	ROM	Proprio-ception	ADLs	Dexterity
Task-specific training combined with other interventions	task-specific training								
Task-specific training	conventional therapy								
Structured, task-oriented upper extremity training (Accelerated Skill Acquisition Program)	Dose-equivalent usual occupational therapy								
Impairment oriented training Arm BASIS with usual treatment	usual treatment								
Impairment oriented training Arm BASIS with usual treatment	Bobath therapy with usual treatment								
Group Circuit	high intensity physio or usual physiotherapy								
Different approaches to task-specific training combined with other interventions	one another								
Different approaches to task-specific training	one another								
Task-specific training combined with other interventions	conventional therapy								
Constraint induced movement therapy (constraint-induced movement therapy) with Conventional rehabilitation	Upper limb task-oriented training with Conventional rehabilitation								
Arm ability training with knowledge of results (feedback on their performance presented as charts to them)	arm ability training without knowledge of results								
Task-specific training combined with other interventions	task-specific training or sham								
Reaching task training in a 3D virtual environment	Reaching task training in physical environment (PE)								
Task-specific training	no treatment								
Task-Specific Circuit Training	Stretching with Memory exercises and Education								
Task-specific training combined with other interventions	sham or task-specific training								
Task Specific Training	Proprioceptive Neuromuscular Facilitation								
Unilateral and bilateral task oriented exercises	Walking tasks								
Task-specific training	training using the Bobath approach								
Personalized reach training (active control-restricted range) with anodal transcranial direct current stimulation and Virtual reality games	Personal reach training (active control-restricted range) with Sham transcranial direct current stimulation and video games								
Autonomy support (training with more-affected arm and could actively adjust task difficulty) with Verbal feedback	Training with more-affected arm with no opportunity to adjust difficulty with General verbal feedback								
Task-oriented training with conventional therapy	Progressive resistance exercise with conventional therapy								
Dynamic resistance training (POWER)	Functional Task Practice (FTP)								
Mirror therapy with Mesh glove (afferent stimulation, primarily neuromuscular electrical stimulation)	task oriented exercise								
Mirror therapy with Mesh glove (afferent stimulation, primarily neuromuscular electrical stimulation)	Mirror therapy								
Botulinum Toxin A with Task Specific Training	Task-Specific Training								
Whole-body vibration with Task Oriented Training and Conventional physical therapy	Upper- and lower-Cycle group with Task Specific Training and Conventional physical therapy								
Task-oriented training with non-immersive virtual reality with conventional rehabilitation	task-oriented training with simple recreational activities with conventional rehabilitation								
Impairment-oriented training	Conventional therapy								
Task-oriented Robotic arm training (Haptic Master)	Task oriented arm training								
120min electrical stimulation with repetitive task specific practice	60min electrical stimulation therapy with repetitive task specific practice or 30min electrical stimulation therapy and repetitive task specific practice								
Repetitive motor task under vibratory feedback	Repetitive motor task								
Functional electrical stimulation with Task-specific training	Task-specific training								
Received modifed constraint-induced movement therapy with task-specific training 3hr	Traditional therapy								

Intervention	Compared to	Motor Funct.	Stroke Severity	Muscle Strength	Spasticity	ROM	Proprio-ception	ADLs	Dexterity
Received modifed constraint-induced movement therapy with task-specific training 3hr	constraint-induced movement therapy-received 300 repetitions of task specific training or constraint-induced movement therapy with 600 repetitions task specific training								
Repetitive transcranial magnetic stimulation with Task Based occupational Therapy	Sham repetitive transcranial magnetic stimulation with Task Based Occupational Therapy								
High-dose electrical somatosensory stimulation with task oriented training	Sham (Low dose) with task oriented training								
Nintendo Wii virtual reality training with Usual Care (conventional occupational therapy)	dose matched task oriented therapy (as Conventional therapy) with Usual Care (conventional occupational therapy) or Usual Care (conventional occupational therapy)								
Low frequency repetitive transcranial magnetic stimulation with reach-to-grasp (RTG) training	Sham stimulation with reach-to-grasp (RTG) training								
Virtual reality keypad or glove (PneuGlove)	Task Specific Training Occupational Therapy								
Contralaterally controlled functional electrical stimulation with Task specific training	Cyclic neuromuscular electrical stimulation with Task specific training								
Functional task practice with repetitive transcranial magnetic stimulation	Functional task practice with Sham repetitive transcranial magnetic stimulation								
Mirror therapy with task-oriented functional practice	task-oriented functional practice								
Somatosensory (peripheral nerve) stimulation with task specific training	Sham stimulation with task specific training								
Repetitive task exercise with sensory amplitude electrical stimulation (SES)	repetitive task exercise with Sham stimulation								
Sensorimotor Training with conventional therapy	Motor Training (Task-specific Training ands table top games) with conventional therapy								
Myoelectric Continuous Control of Functional Electrical Stimulation with Task Oriented Therapy	Task Oriented Therapy								
Electrical Epidural Motor Cortex Stimulation (EECS) with Task specific Training	Task-specific training								
Anodal transcranial direct current stimulation with visuomotor gripforce tracking task	Sham transcranial direct current stimulation with visuomotor gripforce tracking task								
Electrically assisted movement therapy (functional electrical stimulation with task specific)	care								
Electromyography-Triggered Neuromuscular Stimulation with Task-Oriented Training	electromyography-Triggered Neuromuscular Stimulation								
High Frequency repetitive transcranial magnetic stimulation with Motor Task Training	Sham repetitive transcranial magnetic stimulation with Motor Task Training								
Home-based mirror therapy and task specific training	Clinic-based mirror therapy and task specific training								
Bilateral UE Training with Unilateral task-oriented training	Unilateral task-oriented Training (using a hand orthosis)								
Constraint-induced movement therapy with bilateral arm training	Bimanual task-related training								
Joystim virtual reality with real instrumentation training	Conventional therapy								
Myomo electromyography powered orthosis with repetitive task-specific practice (RTP)	Repetitive task-specific practice								
Robot-Assisted Therapy with Bilateral Practice with Task-Specific Training	Conventional Care with Task-Specific Training								
Robot therapy with task training (Inmotion)	Robot therapy								
Transcutaneous Electrical Nerve Stimulation and Task-Related Training	Sham Transcutaneous Electrical Nerve Stimulation and Task-Related Training								
Robot-assisted Group Therapy with Individual Arm Therapy	Individual arm therapy								
Leg rehab training	Immobilization therapy with inflatable pressure splint (arm and leg with splints)								
Low frequency repetitive transcranial magnetic stimulation with Motor Training	Sham repetitive transcranial magnetic stimulation with Motor Training								
Task Specific training with Trunk restraint training	Task Specific Training without Trunk restraint								
Repetitive peripheral sensory stimulation with functional electrical stimulation and task specific training	Sham RPSS with functional electrical stimulation and TST								
Rejoyce system with occupational therapy	task based exercises with occupational therapy								

Intervention	Compared to	Motor Funct.	Stroke Severity	Muscle Strength	Spasticity	ROM	Proprio-ception	ADLs	Dexterity
Forearm rotation orthosis with occupational therapy Task-Oriented (OTTO)	occupational therapy Task-Oriented (OTTO)								
Anodal transcranial direct current stimulation with Repetitive Functional Task-Oriented Programme (RFTOP)	Repetitive Functional Task Oriented Programme								
Transcutaneous electrical nerve stimulation with Task oriented occupational therapy and conventional therapy	Sham transcutaneous electrical nerve stimulation with Task oriented occupational therapy and conventional therapy								
Sensorimotor therapy with conventional therapy	motor therapy with conventional rehab								
Bi-transcutaneous electrical nerve stimulation with Task Oriented Training (TOT)	No Treatment								
Electromyography-driven Robot-assisted Hand Training	Task-Oriented intervention								
Tenodesis-induced-group-exoskeleton robot (TIGER) training with Regular task-specific motor training	Conventional occupational therapy with Regular task-specific motor training								
Anodal transcranial direct current stimulation with motor imagery and upper-limb functional training	sham tCDS with motor imagery and upper-limb functional training								
Low-frequency repetitive transcranial magnetic stimulation with motor task practice	sham repetitive transcranial magnetic stimulation with motor task practice								
Action observation with task-specific training	Sham observation with task-specific training								
Virtual reality with task based training	Task-specific Training								
CNMES with task oriented training and conventional rehab	electromyography-triggered neuromuscular electrical stimulation with task oriented training and conventional rehab								
Exoskeleton training Armule with TST	Conventional Rehab								
Repetitive transcranial magnetic stimulation with TST	Sham repetitive transcranial magnetic stimulation with TST								
Bilateral transcranial direct current stimulation with TST	Sham transcranial direct current stimulation with TST								
Orthosis assistance TIGER with conventional rehab	Task specific training at home with conventional								
Bilateral robotic priming training with mirror training (R-mirr)	Bilateral robotic priming training with movement oriented training								
Bilateral upper limb robot-assisted training with Conventional Therapy	Task-specific Therapy with Conventional Therapy								
Portable brain-computer interface-based hand robot system with Conventional therapy and neuromuscular electrical stimulation	Task-specific training with Conventional therapy and neuromuscular electrical stimulation								
Gamified training with ArmAble with Conventional therapy	UE task-based training with Conventional therapy								
Virtual reality-based robot therapy with smart glove with task-oriented therapy	Task-oriented therapy								
Forced-rate exercise with Repetitive task practice	Repetitive task practice								
Robotic hand therapy (with objects) with Task-Oriented training and Conventional therapy	Robotic hand therapy (without objects) with Conventional therapy								
Transcutaneous electrical nerve stimulation with wrist extensor taping and Tast-related training	transcutaneous electrical nerve stimulation with task-related training								
Bilateral repetitive transcranial magnetic stimulation (high-frequency repetitive transcranial magnetic stimulation with low-frequency repetitive transcranial magnetic stimulation) and Task-oriented therapy	Sham high-frequency repetitive transcranial magnetic stimulation with Sham low-frequency repetitive transcranial magnetic stimulation and Task-oriented therapy								
Bilateral repetitive transcranial magnetic stimulation (high-frequency repetitive transcranial magnetic stimulation with low-frequency repetitive transcranial magnetic stimulation) and Task-oriented therapy	Excitatory repetitive transcranial magnetic stimulation (high-frequency repetitive transcranial magnetic stimulation with sham low-frequency repetitive transcranial magnetic stimulation) and Task-oriented therapy								
Bilateral repetitive transcranial magnetic stimulation (high-frequency repetitive transcranial magnetic stimulation with low-frequency repetitive transcranial magnetic stimulation) and Task-oriented therapy	Inhibitory repetitive transcranial magnetic stimulation (sham high-frequency repetitive transcranial magnetic stimulation with low-frequency repetitive transcranial magnetic stimulation) and Task-oriented therapy								
Excitatory repetitive transcranial magnetic stimulation (high-frequency repetitive transcranial magnetic stimulation with sham low-frequency repetitive transcranial magnetic stimulation) and Task-oriented therapy	Inhibitory repetitive transcranial magnetic stimulation (sham high-frequency repetitive transcranial magnetic stimulation with low-frequency repetitive transcranial magnetic stimulation) and Task-oriented therapy								

Intervention	Compared to	Motor Funct.	Stroke Severity	Muscle Strength	Spasticity	ROM	Proprio-ception	ADLs	Dexterity
Dextrain Manipulandum exercises (dexterity specific exercises with real-time feedback) with Conventional therapy	Conventional therapy								
Task-Oriented Training	Table-Top Activity Training								
Task-specific training combined with other interventions	exercise and custom physiotherapy protocols								
Task-specific training combined with other interventions	neurodevelopmental techniques (bobath approach)								
Forced aerobic exercise with Repetitive task practice(RTP)	Voluntary exercise with RTP								
Auditory imagery with task specific training	Cumulative imagery with task specific training								
Visual imagery with task specific training	Cumulative imagery with task specific training								
Saebo flex Orthotic splint with intensive training	Orthotic splint								
Reach-To-Grasp with robot feedback with Conventional therapy	Conventional therapy								
Reach-To-Grasp with computer feedback with Conventional therapy	Conventional therapy								
Reach-To-Grasp with robot feedback with Conventional therapy	Reach-To-Grasp with computer feedback with Conventional therapy								
Transcutaneous auricular vagus nerve stimulation with task-oriented training	Task-oriented training								
EMG paired taVNS with TST	Active unpaired taVNS with TST								
Sensory Relearning with Task-Specific Training and home exercise	Task-Specific Training with strength training								
Robotic Therapy (Armeo Spring & Amadeo) with Task Oriented Training with Active Learning Program for Stroke (ALPS)	Robotic Therapy with Active Learning Program for Stroke (ALPS)								
Kinesiotaping with stretching & task specific trainings and conventional rehab	stretching & task specific trainings with conventional rehab and Conventional Therapy								
Bilateral robotic priming (Bi-Manu-Track) with task oriented exercises	Task oriented exercises								
Atomoxetine with Task Oriented Upper Extremity Training	Placebo with Task Oriented Upper Extremity Training								
Action observation with task-specific training	Task-specific training								
1 Hz rTMS with task oriented exercise	Sham rTMS with task oriented exercise								
Taping with Task specific training	Task specific training								
High frequency (10Hz) rTMS with task-oriented training	Sham rTMS with task-oriented training								
Robotic orthosis with Task-Specific training and Videogames (Unilateral)	Usual Physical Therapy								
Robotic orthosis with Task-Specific Training and Videogames (Bilateral)	Usual Physical Therapy								
Myomo brace (EMG triggered micro robot device) with repetitive task practice	Repetitive task practice								
FES with Task specific training	Sham with Task specific training								
Dynamic Wrist hand orthosis (wearing while doing reach and grasp practice) with home exercise	Manual-assisted reach and grasp training therapy with home exercise								
PNES with Task Specific Training	Task-Specific Training								
FES with botulinum toxin-A and home based task-oriented exercise	Botulinum toxin-A with home-based exercise program								
FES with Standard task-specific training	Standard task-specific training								
Cable orthosis with Virtual Reality	Virtual Reality								
Pneumatic orthosis with Virtual Reality	Virtual Reality								
Task-specific training with Peripheral Nerve Stimulation	Task-specific training with Sham Stimulation								
NMES with repetitive facilitative exercise	Conventional Therapy								
Repetitive facilitative exercise	Conventional Therapy								
Whole-Body Vibration (5-15 Hz)	Conventional Physical Therapy								
Whole-Body Vibration with Task-Related Training	Conventional Physical Therapy								

Intervention	Compared to	Motor Funct.	Stroke Severity	Muscle Strength	Spasticity	ROM	Proprio-ception	ADLs	Dexterity
ARMEO exoskeleton with conventional care	Tabletop assisted exercises with conventional therapy								
Active-assistive reaching exercise using a robotic device (Arm Guide)	Task-matched amount of reaching without assistance								
Low frequency repetitive transcranial magnetic stimulation with pinch motor training (a metronome-paced pinch of their index finger and thumb of the affected hand as fast as possible)	pinch motor training with sham repetitive transcranial magnetic stimulation								
Three-Dimensional Printed Dynamic Hand Device with Task-Specific Training	Task-Specific Training								
Progressive unsupported reaching tasks	Supported reaching tasks								
Electromyography biofeedback with task practice	Sham biofeedback with task practice								
Functional integrative rehabilitation approache	sensorimotor integrative rehabilitation approache								
Electrical stim with repetitive task practice	Sham electrical with repetitive task practice								
Dual transcranial direct current stimulation with bimanual cooperative task training	sham dual tDCS with bimanual cooperative task training								
Task specific training with action observation	No treatment								
Occupation-based bilateral upper extremity training	Task-based bilateral upper extremity training								
Task specific training with action observation	Task specific training								
Motor Imagery with Audio Feedback and Task Specific Training	Task-specific Training								
Motor Imagery with Audio Feedback and Task Specific Training	Motor imagery with TST								
Bilateral dexterity training with usual rehabilitation	Unilateral dexterity training with usual rehabilitation								

Sensorimotor Training (14 conclusions)

Intervention	Compared to	Motor Funct.	Stroke Severity	Muscle Strength	Spasticity	ROM	Proprio-ception	ADLs	Dexterity
Sensorimotor training	conventional therapy								
Sensorimotor training combined with other interventions	task-specific training								
5 sessions	Visual Deprivation Training or 3 sessions								
Visual Deprivation Training	3 sessions								
Functional strength training	Movement performance therapy								
Intensive Sensorimotor Arm Training Mediated by robot	Intensive Sensorimotor Arm Training Mediated by Therapist								
Proprioception Training with Conventional Therapy	Conventional Therapy								
Dual transcranial direct current stimulation with Sensorimotor training	Sham transcranial direct current stimulation with Sensorimotor training								
Sensory Relearning with Task-Specific Training and home exercise	Task-Specific Training with strength training								
Proprioceptive Training (involving passive and active movements with visual feedback)	Nonspecific sensory stimulation								
Stochastic resonance stimulation (subthreshold electrical with vibration stimulations) and Conventional occupational therapy	Sham stimulation with Conventional occupational therapy								
Perturbation-Based Pinch Task-Specific Training with Sensorimotor Stimulation training	Upper Extremity Task-Specific Training with Sensorimotor Stimulation Training								
Sensorimotor training with conventional therapy	conventional therapy alone								
Functional integrative rehabilitation approache	sensorimotor integrative rehabilitation approache								

Constraint-Induced Movement Therapy (CIMT) (60 conclusions)

Intervention	Compared to	Motor Funct.	Stroke Severity	Muscle Strength	Spasticity	ROM	Proprio-ception	ADLs	Dexterity
Different approaches to constraint-induced movement therapy	one another								
Received modifed constraint-induced movement therapy with task-specific training 3hr	constraint-induced movement therapy-received 300 repetitions of task specific training or constraint-induced movement therapy with 600 repetitions task specific training								
Constraint-induced movement therapy combined with other interventions	bilateral arm training								
Constraint-induced movement therapy	conventional therapy								
Left-Modified Constraint Induced Movement Therapy with Conventional therapy	Right-Modified Constraint Induced Movement Therapy with Conventional therapy								
Modified constraint-induced movement therapy with daily physical therapy	self-regulated constraint-induced movement therapy with daily physical therapy								
Constraint-induced movement therapy combined with other interventions	constraint-induced movement therapy								
Constraint-induced movement therapy combined with other interventions	constraint-induced movement therapy or sham								
Constraint-induced movement therapy	conventional therapy or no treatment								
Modified constraint-induced movement therapy	Bilateral training								
Constraint-induced movement therapy combined with other interventions	conventional therapy								
Robotic self training with constraint-induced movement therapy	Robotic self training with conventional care								
Distributed Constraint-Induced Movement Therapy with Trunk Restraint	Distributed Constraint-Induced Movement Therapy								
Constraint-induced movement therapy combined with other interventions	motor relearning programmes								
Constraint-induced movement therapy	no treatment or conventional therapy								
Expanded constraint-induced movement therapy	usual care or placebo treatment								
Constraint-induced movement therapy	Bobath therapy								
Donepezil with constraint-induced movement therapy	Placebo with constraint-induced movement therapy								
Mental practice with modified constraint-induced movement therapy	modified constraint-induced movement therapy								
Scalp cluster acupuncture with constraint-induced movement therapy	Body acupuncture with traditional rehabilitation								
Constraint-induced movement therapy with bilateral arm training	Bimanual task-related training								
Constraint-induced movement therapy with Conventional therapy and Hand mitt	Conventional therapy with Hand mitt								
Modified constraint-induced movement therapy with conventional physical therapy	HABIT (hand arm bimanual intensive training) with conventional physical therapy								
BtxA (Dysport) with modified constraint-induced movement therapy	BtxA (Dysport) with conventional rehabilitation								
Botox with modified constraint-induced movement therapy	Botox with Conventional therapy (high dose)								
High frequency repetitive transcranial magnetic stimulation with constraint-induced movement therapy	Sham repetitive transcranial magnetic stimulation with constraint-induced movement therapy								
Unilateral robot assisted therapy with modified constraint-induced movement therapy	Robot assist therapy								
Unilateral robot assisted therapy with modified constraint-induced movement therapy	Bilateral robot assisted therapy with bilateral arm training								
Robot-Assisted Therapy with Modified Constraint-Induced Therapy	Robot-Assisted Therapy								
Nintendo Wii-based movement therapy	Modified constraint-induced movement therapy								
Unilateral robot assisted therapy with constraint-induced movement therapy (unilateral arm)	Robot assisted therapy alone (both modes)								
Unilateral robot assisted therapy with constraint-induced movement therapy (unilateral arm)	Bilateral robot assisted therapy with BAT (Bimanual tracking)								

Intervention	Compared to	Motor Funct.	Stroke Severity	Muscle Strength	Spasticity	ROM	Proprio-ception	ADLs	Dexterity
Shaping training with constraint-induced movement therapy transfer package (TP)	Shaping training								
Robot therapy with distributed constraint induced therapy	Conventional Therapy								
Robot therapy with distributed constraint induced therapy	robot therapy alone								
Distributed Constraint-Induced Therapy	conventional care								
Distributed constraint-induced therapy	bilateral arm training								
Distributed constraint-induced therapy	control treatment								
Low frequency repetitive transcranial magnetic stimulation with occupational therapy training	constraint-induced movement therapy								
Tele-Health constraint-induced movement therapy	In-Lab constraint-induced movement therapy								
Robot-assisted Therapy with conventional rehab	Constraint induced movement therapy with conventional rehab								
Bilateral transcranial direct current stimulation with modified constraint-induced movement therapy and conventional rehab	Sham transcranial direct current stimulation with modified constraint-induced movement therapy and conventional rehab								
Anodal transcranial direct current stimulation with constraint-induced movement therapy	Sham transcranial direct current stimulation with constraint-induced movement therapy								
Constraint-induced movement therapy in-person	Constraint-induced movement therapy via telerehabilitation								
Mirror Therapy	modified constraint-induced movement therapy								
Constraint induced movement therapy (constraint-induced movement therapy) with Conventional rehabilitation	Conventional rehabilitation								
Constraint induced movement therapy (constraint-induced movement therapy) with Conventional rehabilitation	Upper limb task-oriented training with Conventional rehabilitation								
CIMT	Therapeutic Climbing								
Kinesiotape with mCIMT	Sham Kinesiotape with mCIMT								
Dual tDCS with mCIMT and conventional rehabilitation	Sham Dual tDCS with mCIMT and conventional rehabilitation								
Dual-tDCS combined with PNMES with CIMT	CIMT								
Anodal tDCS with Modified CIMT	Sham tDCS with CIMT								
Trunk training with mCIMT	mCIMT								
CIMT-6hr with cycloserine	CIMT-6hr with placebo								
Modified Constraint-Induced Movement Therapy with Exercise/custom physiotherapy (Telerehabilitation)	Home exercise program								
Cathodal tDCS with Modified CIMT	Sham tDCS with CIMT								
Kinesiotape	Sham Kinesiotape with mCIMT								
Constraint-induced movement therapy combined with other interventions	constraint-induced movement therapy alone								
Constraint-induced movement therapy	Motor learning programme								
Modified constraint-induced movement therapy with trunk restraint	modified constraint-induced movement therapy								

Trunk Restraint (18 conclusions)

Intervention	Compared to	Motor Funct.	Stroke Severity	Muscle Strength	Spasticity	ROM	Proprio-ception	ADLs	Dexterity
Balance Training with Affected Hand at Low Back	Balance Training								
Task Specific training with Trunk restraint training	Task Specific Training without Trunk restraint								
Trunk support with visual feedback SMART upper limb training system	Trunk restraint with visual feedback SMART upper limb training system								
Task-related Training with Trunk Restraint	Resistive Exercises with Trunk Restraint								

Intervention	Compared to	Motor Funct.	Stroke Severity	Muscle Strength	Spasticity	ROM	Proprio-ception	ADLs	Dexterity
Modified constraint-induced movement therapy with trunk restraint	modified constraint-induced movement therapy								
Task specific training with trunk restraint	Task specific training								
Distributed Constraint-Induced Movement Therapy with Trunk Restraint	Conventional Therapy								
Distributed Constraint-Induced Movement Therapy with Trunk Restraint	Distributed Constraint-Induced Movement Therapy								
Robot-assisted therapy (Armeo Spring system) with trunk restraint and general physical therapy	Robot-assisted therapy (RT) with sham trunk restraint and general physical therapy								
Bilateral transcranial direct current stimulation with trunk restraint or training and Conventional physical therapy	Conventional physical therapy								
Bilateral transcranial direct current stimulation with trunk restraint or training and Conventional physical therapy	Sham transcranial direct current stimulation with trunk restraint or training and Conventional physical therapy								
Robotic rehab with trunk rehab	Conventional rehab with trunk rehab								
Trunk training with mCIMT	mCIMT								
MCIMT with trunk restraint	mCIMT alone								
Distributed constraint-induced therapy (dCIT) with trunk restraint	Conventional Therapy								
DCIT	Conventional Therapy								
Trunk Restraint Training with auditory feedback	Trunk Restraint Training with tactile feedback								
Modified Constraint Induced Movement Therapy (mCIMT) with Trunk Restraint	modified constraint Induced Movement Therapy (mCIMT)								

Stretching Programs (34 conclusions)

Intervention	Compared to	Motor Funct.	Stroke Severity	Muscle Strength	Spasticity	ROM	Proprio-ception	ADLs	Dexterity
Passive stretching and joint mobilization	conventional therapy								
Stretching and positioning programs	conventional therapy								
Static arm positioning with neuromuscular electrical stimulation	Sham positioning and sham neuromuscular electrical stimulation								
Chiropractic spinal adjustments with physical therapy	Sham Chiro with physical therapy								
Upper limb training with position changes, bedside exercise and resistance bands with Conventional rehabilitation	Basic Upper limb training with Conventional rehabilitation								
Acupuncture with neuromuscular joint facilitation	Acupuncture								
Isokinetic strengthening	Passive joint mobilization								
Muscle strength trainining and task specific exercise	Traditional passive stretch and Range of Motion exercises								
Mirror therapy	Passive mobilization								
Task-Specific Circuit Training	Stretching with Memory exercises and Education								
Games-based training using an exoskeleton with usual rehab	basic stretching and active exercises with usual rehab								
Boxing training	No intervention or therapy								
Boxing training	Scapular stabilization training								
Botulinum toxin A injection with structured stretching exercises and conventional rehabilitation	Self-stretching exercises with conventional rehabilitation								
Upper limb control of less-affected side with real-time feedback	Upper limb control of affected side with real-time feedback								
Sling-suspension-based active shoulder joint exercises with General rehab (physcial therapy and functional electrical stimulation)	Motorized upper extremity exercise (passive exercises) with General rehab (physcial therapy and functional electrical stimulation)								
Different approaches to passive stretching and joint mobilization	one another								
Gloreha Aria (Robotic exoskeleton) with Virtual reality and Conventional therapy	Self mobilization with Conventional therapy								

Intervention	Compared to	Motor Funct.	Stroke Severity	Muscle Strength	Spasticity	ROM	Proprio-ception	ADLs	Dexterity
Aerobic exercise	Stretching exercise								
NMES	Passive extension exercises								
High intensity laser (HILT) with therapeutic exercise program and regular rehab	therapeutic exercise program with regular rehab								
Blocked neuromuscular electrical stimulation training (neuromuscular electrical stimulation with Hand range of motion training)	Hand range of motion exercises (Passive movements, voluntary UE extensions or abduction)								
Botox-A with adhesive taping	Botox-A with Manual Stretching (with splint to maintain maximum stretching)								
Muscle vibration	Stretch control or Rest control								
Radial Shock Wave Therapy with Infrared therapy and Static Stretching	Infrared therapy with Static Stretching								
Static positional stretching	conventional care								
Positioning in Neutral	Conventional Positioning								
Nurse supervised or assisted range of motion exercise programs	usual care								
Muscle stretching regime with standard arm care	standard arm care								
Sustained positioning with a multidisciplinary rehabilitation program	a multidisciplinary rehabilitation program alone								
Proprioceptive neuromuscular facilitation exercises with neuromobilization of the affected upper extremity	proprioceptive neuromuscular facilitation exercises without neuromobilization or conventional care								
Stretching with Joint-stabilizing exercises	exercise								
Stretching with Joint-stabilizing exercises	Stretching								
Blocked neuromuscular electrical stimulation training (neuromuscular electrical stimulation with Hand range of motion training)	Random neuromuscular electrical stimulation training (neuromuscular electrical stimulation with Hand range of motion training)								

Orthotics and Taping (39 conclusions)

Intervention	Compared to	Motor Funct.	Stroke Severity	Muscle Strength	Spasticity	ROM	Proprio-ception	ADLs	Dexterity
Orthotics	conventional therapy								
Orthotics	no treatment								
Actimove Sling	Shoulderlift Sling								
Kinesio taping	sham								
Impairment-oriented training	Conventional therapy								
Shoulder sling exercise (Sling Suspension System on Shoulder Subluxation)	bilateral arm training								
Different approaches to Orthotics	one another								
Mod wheelchair arm support with services	traditional wheelchair arm support with services								
Kinesio taping	conventional therapy								
Orthotics combined with other interventions	task-specific training								
Sling-suspension-based active shoulder joint exercises with General rehab (physcial therapy and functional electrical stimulation)	Motorized upper extremity exercise (passive exercises) with General rehab (physcial therapy and functional electrical stimulation)								
Intramuscular neuromuscular electrical stimulation	Sling								
Kinesio tape with acupuncture	Acupuncture								
Robot-mediated therapy (GENTLE/s)	Sling suspension phase								
Task specific exercises with wrist or finger extension splint	Traditional passive stretch and range of motion exercises								

Intervention	Compared to	Motor Funct.	Stroke Severity	Muscle Strength	Spasticity	ROM	Proprio-ception	ADLs	Dexterity
Constraint-induced movement therapy with Conventional therapy and Hand mitt	Conventional therapy with Hand mitt								
Transcutaneous electrical nerve stimulation with wrist extensor taping and Tast-related training	transcutaneous electrical nerve stimulation with task-related training								
Kinesiotape with mCIMT	Sham Kinesiotape with mCIMT								
Kinesiotaping with stretching & task specific trainings and conventional rehab	stretching & task specific trainings with conventional rehab and Conventional Therapy								
Orthotics combined with other interventions	conventional therapy								
Taping with Task specific training	Task specific training								
Dynamic Wrist hand orthosis (wearing while doing reach and grasp practice) with home exercise	Manual-assisted reach and grasp training therapy with home exercise								
Integrated volitional electrical stimulator (IVES) with wrist splint	wrist splint								
Cable orthosis with Virtual Reality	Virtual Reality								
Pneumatic orthosis with Virtual Reality	Virtual Reality								
Task oriented training with Lycra glove	Task oriented training								
Botulinum toxin A injection with Lycra splint orthotic and upper-limb rehabilitation	Botulinum toxin-A injection with rehab								
Saebo flex Orthotic splint with intensive training	Orthotic splint								
Kinesiotape	Sham Kinesiotape with mCIMT								
Electrical Stimulation to Wrist and Finger Extensors with Splint	Splint								
Cryotherapy on spastic wrist flexors with Kinesiotherapy	neuromuscular electrical stimulation on wrist extensors								
Thermoplastic resting splint (5wk)	Thermoplastic resting splint (6wk)								
Longitudinal strapping	Circumferential strapping								
Therapeutic strapping	Placebo or care								
Orthotics combined with other interventions	exercise and custom physiotherapy protocols								
Botox-A with adhesive taping	Botox-A with Manual Stretching (with splint to maintain maximum stretching)								
Spint 22hr/d	Splint 6hr/d								
Splint 12hr/d	Splint 6hr/d								
Jeonbuk Tri-pull taping (Shoulder kinesiology taping) with Conventional therapy	Sham taping with Conventional therapy								

Mirror Therapy (62 conclusions)

Intervention	Compared to	Motor Funct.	Stroke Severity	Muscle Strength	Spasticity	ROM	Proprio-ception	ADLs	Dexterity
Mirror Therapy	conventional therapy								
Video augmented mirror therapy with conventional therapy	traditional mirror therapy with conventional therapy								
Mirror Therapy	sham								
Individual mirror therapy	Group mirror therapy								
Mirror Therapy combined with other interventions	sham								
Leap motion virtual reality with mirror therapy	Mirror therapy								
Mirror therapy with high frequency repetitive transcranial magnetic stimulation and Traditional physical therapy	Mirror therapy with Traditional physical therapy								
Mirror Therapy combined with other interventions	task-specific training								
Mirror therapy with Mesh glove (afferent stimulation, primarily neuromuscular electrical stimulation)	Mirror therapy								
Different approaches to mirror Therapy combined with other interventions	one another								

Intervention	Compared to	Motor Funct.	Stroke Severity	Muscle Strength	Spasticity	ROM	Proprio-ception	ADLs	Dexterity
Home-based mirror therapy and task specific training	Clinic-based mirror therapy and task specific training								
Functional Electrical Stimulation	Mirror Therapy								
Functional Electrical Stimulation	Functional Electrical Stimulation with Mirror Therapy								
Mirror Therapy	Functional Electrical Stimulation with Mirror Therapy								
Mirror therapy with Mesh glove afferent stimulation	Mirror therapy								
Mirror therapy with usual care	Lower-limb exercise with usual care								
Different approaches to Mirror Therapy	one another								
Mirror therapy	Passive mobilization								
Mirror Therapy combined with other interventions	bilateral arm training								
Mirror Therapy combined with other interventions	sham or robotics								
Virtual reality-based mirror therapy (virtual reality-mirror therapy) with conventional occupational therapy	conventional occupational therapy								
Virtual reality-based mirror therapy (virtual reality-mirror therapy) with conventional occupational therapy	mirror therapy with conventional occupational therapy								
Mirror therapy with TOT	Conventional therapy (TOT)								
Mirror therapy with TOT	Cognitive therapeutic exercise with TOT								
Unilateral mirror therapy with Unimanual training	Mirror therapy								
Unilateral mirror therapy with Unimanual training	Unilateral mirror therapy with Bimanual training								
Unilateral mirror therapy with Bimanual training	Bilateral mirror therapy with Bimanual training								
Mirror Therapy combined with other interventions	constraint-induced movement therapy								
Functional Electrical Stimulation with Mirror Therapy	Functional Electrical Stimulation with Sham Mirror Therapy								
Bilateral electromyography-triggered multi-channel electrostimulation with mirror therapy	bilateral electromyography-triggered multi-channel electrostimulation								
Immediate Mirror therapy with electromyography-triggered neuromuscular electrical stimulation and Physical and Occupational therapy	delayed Mirror therapy with electromyography-triggered neuromuscular electrical stimulation and Physical and Occupational therapy								
Bilateral arm training; visual fb mirror therapy	bilateral arm training without mirror therapy								
Robotic Priming with mirror therapy (RMT)	Robotic Priming with Bilateral Upper Limb Training (RBULT)								
RMT	mirror therapy								
Functional electrical stimulation-Biofeedback mirror therapy with conventional	Mirror therapy with conventional rehab								
Bilateral robotic priming training with mirror training (R-mirr)	Bilateral robotic priming training with movement oriented training								
Virtual reality-based mirror therapy with conventional physical therapy	Conventional physical therapy								
Virtual reality-based mirror therapy with conventional physical therapy	Traditional mirror therapy with conventional physical therapy								
Contralaterally controlled functional electrical stimulation with CT	Conventional therapy								
Mirror therapy with conventional therapy	conventional therapy alone								
Brunnstrom movement therapy with conventional therapy	mirror therapy with conventional therapy								
Mental practice combined with other interventions	mirror therapy								
Mirror therapy	No treatment/not mentioned								
Virtual Reality Mirror Therapy	Standard Mirror Therapy								
Movement based mirror therapy with conventional therapy	Task based mirror therapy with conventional therapy								
Mirror Therapy combined with other interventions	conventional therapy								
Mirror therapy	Vibration therapy								

Intervention	Compared to	Motor Funct.	Stroke Severity	Muscle Strength	Spasticity	ROM	Proprio-ception	ADLs	Dexterity
Mirror therapy	EMG-triggered neuromuscular stimulation								
Functional electrical stimulation with biofeedback with mirror therapy	FES with mirror therapy								
Mirror Therapy combined with other interventions	mirror therapy								
Robot-assisted training (Bi-Manu-Track BMT robotic arm) with BoNT-A injection and functional practice	conventional task-oriented movement training with BoNT-A injection and functional practice								
Mirror therapy with BoNT-A injection and functional practice	conventional task-oriented movement training with BoNT-A injection and functional practice								
Sequential Combination of Anodal tDCS with Mirror Therapy	Sham tDCS with Mirror Therapy								
Bilateral tDCS before mirror therapy	tDCS during mirror therapy								
Bilateral tDCS before mirror therapy	Sham tDCS with mirror therapy								
tDCS during mirror therapy	Sham tDCS with mirror therapy								
Dual tDCS with Mirror therapy	tDCS with Sham mirror								
Concurrent Combination of tDCS with Mirror Therapy	Sham tDCS with Mirror Therapy								
Mirror Therapy with Conventional Therapy	Conventional Therapy								
High-frequency repetitive transcranial magnetic stimulation with Task-oriented mirror therapy	High-frequency repetitive transcranial magnetic stimulation								
Motor learning program	Mirror therapy								
Mirror and strength training therapy	Strength training								

Mental Practice (50 conclusions)

Intervention	Compared to	Motor Funct.	Stroke Severity	Muscle Strength	Spasticity	ROM	Proprio-ception	ADLs	Dexterity
Mental practice combined with other interventions	fes								
Mental Practice with activities of daily living training session	Sham Relaxation Exercise with activities of daily living training session								
Mental Practice with electromyography neuromuscular electrical stimulation and Conventional Rehab	Conventional Rehab								
Mental practice	sham								
Mental Imagery internal	Mental imagery external								
Mental practice	conventional therapy								
Mental practice combined with other interventions	mental practice								
Graded motor imagery with repetitive transcranial magnetic stimulation and conventional rehabilitation	repetitive transcranial magnetic stimulation with conventional rehabilitation								
Low frequence repetitive transcranial magnetic stimulation with mental practice	repetitive transcranial magnetic stimulation with audiotape-led relaxation								
Motor Imagery & mental practice	Attention-placebo control or Normal care								
Electromyography neuromuscular electrical stimulation with mental imagery training	electromyography neuromuscular electrical stimulation								
Motor Imagery with Action Observation and occupational therapy	Action Observation with occupational therapy								
Motor imagery with conventional therapy	Health education on stroke with conventional therapy								
Graded Motor Imagery (included implicit and explicit motor imagery plus mirror therapy) with conventional rehabilitation	Upper limb exercise with conventional rehabilitation								
Mental practice with Modified Constraint Induced Movement Therapy	Modified Constraint Induced Movement Therapy								
Motor Imagery-based Brain-computer Interface with functional electrical stimulation	functional electrical stimulation								
Virtual reality game (Wii) with mental practice	virtual reality game (Wii)								
Mental practice with modified constraint-induced movement (modified constraint-induced movement therapy) therapy	modified constraint-induced movement therapy therapy								

Intervention	Compared to	Motor Funct.	Stroke Severity	Muscle Strength	Spasticity	ROM	Proprio-ception	ADLs	Dexterity
Bilateral transcranial direct current stimulation with motor imagery brain-computer interface	Sham transcranial direct current stimulation with motor imagery brain-computer interface								
EEG-based motor imargery brain-computer interface with Haptic Knob robotic arm rehabilitation	arm therapy								
EEG-based Motor Imagery Brain-Computer Interface with Robotic Feedback (MIT-MANUS)	Traditional Robotic Therapy								
Brain computer interface motor imagery with MITManus robotic training	MIT-Manus robotic training								
Mental practice with modified constraint-induced movement therapy	modified constraint-induced movement therapy								
External focus with robotic arm	Internal focus with robot								
Virtual Reality (Wii)	Conventional therapy								
Virtual Reality (Wii)	Motor Imagery Training								
Motor Imagery based brain-computer interface with conventional rehab	Motor Imagery with conventional rehab								
Anodal transcranial direct current stimulation with motor imagery and upper-limb functional training	sham tCDS with motor imagery and upper-limb functional training								
Task oriented training with mental practice	Task oriented training								
Brain-computer interface motor imagery training with conventional rehab	Conventional rehab								
Motor imagery brain-computer interface with conventional rehab	functional electrical stimulation with conventional rehab								
Brain-computer interface controlled hand exoskeleton with Mental practice and Occupational therapy	Occupational therapy								
Action observation with Motor imagery and Conventional therapy	Conventional therapy with passive video exposure (without guided action observation or motor imagery)								
Brain-computer interface-motor imagery system with Conventional therapy	Conventional therapy								
Mental imagery training	functional training								
Mental practice of hand movement with Bobath therapy	Bobath therapy alone								
Mental practice combined with other interventions	mirror therapy								
Low-frequency rTMS with motor imagery and electrical stimulation	low-frequency rTMS with motor imagery and sham electrical stimulation								
EEG brain-computer interface with hand robotic orthosis	motor imagery tasks								
motor imagery with neurofeedback	motor imagery with sham feedback								
Imagery training with conventional occupational therapy	conventional occupational therapy alone								
Music therapy combined with motor imagery	music therapy alone								
Auditory imagery with task specific training	Task specific training								
Visual imagery with task specific training	Task specific training								
Cumulative imagery with task specific training	Task specific training								
Auditory imagery with task specific training	Cumulative imagery with task specific training								
Visual imagery with task specific training	Cumulative imagery with task specific training								
Paired associative stimulation (PAS) with Motor imagery	Sham PAS with motor imagery								
Mental practice combined with other interventions	task-specific training								
Motor Imagery with Audio Feedback and Task Specific Training	Motor imagery with TST								

Action Observation (16 conclusions)

Intervention	Compared to	Motor Funct.	Stroke Severity	Muscle Strength	Spasticity	ROM	Proprio-ception	ADLs	Dexterity
Action observation	sham								

Intervention	Compared to	Motor Funct.	Stroke Severity	Muscle Strength	Spasticity	ROM	Proprio-ception	ADLs	Dexterity
Action observation	conventional therapy								
Action Observation with EEG-Mediated Functional Electrical Stimulation Brain-Computer Interface	Functional Electrical Stimulation								
Functional electrical stimulation with Action observation training and brain computer interface	Conventional therapy								
Action observation with task-specific training	Sham observation with task-specific training								
First-Person Action Observation Training with conventional occupational therapy	Third-person Action Observation Training with conventional occupational therapy								
Action observation with Motor imagery and Conventional therapy	Conventional therapy with passive video exposure (without guided action observation or motor imagery)								
Low frequency repetitive transcranial magnetic stimulation with Action Observation	Low frequency repetitive transcranial magnetic stimulation								
Action observation with EEG-guided robot-hand training	robot-hand training without action observation and EEG guidance								
Motor Imagery with Action Observation and occupational therapy	Action Observation with occupational therapy								
Action observation therapy with routine rehabilitation	routine rehabilitation alone								
Same arm movement therapy	constraint-induced movement therapy								
Action observation therapy with conventional treatment	task-oriented training with conventional treatment								
Action observation with task-specific training	Task-specific training								
Task specific training with action observation	No treatment								
Task specific training with action observation	Action observation								

Cognitive and Dual-Task Training (14 conclusions)

Intervention	Compared to	Motor Funct.	Stroke Severity	Muscle Strength	Spasticity	ROM	Proprio-ception	ADLs	Dexterity
Dual-Task Training with Conventional occupational therapy	Single Task Training (combining sensory stimulation, UE muscle strength, cognitive and perceptual training, and fine hand movement) with Conventional occupational therapy								
Occupation-Based Bilateral Upper Limb Training with Cognitive Behavioral Therapy	Occupation-Based Bilateral Upper Limb Training with Conventional occupational therapy								
Cognitive motor rehabilitation with specific UE exercises	Specific UE exercises								
Robot-Assisted Neurocognitive Therapy using a haptic device with Conventional Neurocognitive Therapy	Conventional Neurocognitive Therapy								
Cognitive orientation to daily occupational performance (CO-OP)	taskspecific upper extremity training (TUET)								
Mirror therapy with TOT	Conventional therapy (TOT)								
Mirror therapy with TOT	Cognitive therapeutic exercise with TOT								
Cognitive Orientation to Daily Occupaitonal Performance	Conventional occupational therapy								
Cognitive training	conventional therapy								
Robotic Therapy (Armeo Spring & Amadeo) with Task Oriented Training with Active Learning Program for Stroke (ALPS)	Robotic Therapy with Active Learning Program for Stroke (ALPS)								
Cognitive Orientation to Daily Occupaitonal Performance	Progressive exercise program (strenght, functional, balance, and endurance training)								
Proprioceptive neuromuscular facilitation early	Cognitive therapeutic exercise (CTE) early or late								
Proprioceptive neuromuscular facilitation early	Cognitive therapeutic exercise (CTE) early or proprioceptive neuromuscular facilitation late or CTE late								
Cognitive Exercise Therapy	Conventional Occupational Therapy								

Music Therapy and Rhythmic Auditory Stimulation (16 conclusions)

Intervention	Compared to	Motor Funct.	Stroke Severity	Muscle Strength	Spasticity	ROM	Proprio-ception	ADLs	Dexterity
Rhythmic Auditory Stimulation	Conventional Rehabilitation								
Music therapy	conventional therapy								
Rhythmic auditory cueing	Conventional therapy								
Rhythmic auditory cueing	Visual cueing								
Home based music therapy	waitlist								
Bilateral Leg Training with Rhythmic Auditory Cueing	Bilateral Arm Training with Rhythmic Auditory Cueing								
Enriched Music-Supported Therapy (eMST)	Graded Repetitive Arm Supplementary Program								
Modified constraint-induced movement therapy	Dose-matched conventional treatment								
Bilateral arm training with rythmic auditory cueing	Dose matched theraupetic unilateral therapeutic exercises								
Bilateral arm training with rhythmic auditory cueing	Conventional therapy								
Music therapy combined with motor imagery	music therapy alone								
Robot-assisted rehabilitation with music therapy	robot-assisted rehabilitation or conventional care alone								
Music upper limb therapy-integrated (MULT-I)	a home exercise program								
Audible musical instrument training	mute musical instrument training								
Virtual reality keypad or glove (PneuGlove)	Task Specific Training Occupational Therapy								
Music movement therapy	routine treatment								

Telerehabilitation and Education (10 conclusions)

Intervention	Compared to	Motor Funct.	Stroke Severity	Muscle Strength	Spasticity	ROM	Proprio-ception	ADLs	Dexterity
Exercise and custom physiotherapy protocols	conventional therapy								
Telerehabilitation	In clinic Rehabilitation								
Tracking training of finger and wrist (temporospatial processing)	repetitive simple Movement training								
Bimanual robotic training with error augmentation	Bimanual robotic training								
Remote virtual reality treatment	Traditional physical therapy								
Different approaches to constraint-induced movement therapy	one another								
Glove orthosis graded repetitive arm supplementary program with Virtual reality with home based rehab with occupational therapy	Conventional Rehab								
Modified Constraint-Induced Movement Therapy with Exercise or custom physiotherapy (Telerehabilitation)	Home exercise program								
Coaching based teleoccupational guidance (CTG) via WeChat (coaching sessions with OT)	conventional rehab (routine teleocupiational guidance via WeChat)								
Class-based in person body awareness & movement education	Home-based in person body awareness & movement education								

Robotics (123 conclusions)

Intervention	Compared to	Motor Funct.	Stroke Severity	Muscle Strength	Spasticity	ROM	Proprio-ception	ADLs	Dexterity
Robotics	conventional therapy								
Bi-Manu-Track(Bilateral robot training)	INMotion 3.0 (unilateral robot training)								
Unilateral robot-assisted arm training	Bilateral robot-assisted arm training								

Intervention	Compared to	Motor Funct.	Stroke Severity	Muscle Strength	Spasticity	ROM	Proprio-ception	ADLs	Dexterity
High intensity robotic therapy (BiManu-Track)	Low intensity robotic therapy								
Unilateral Robotic Training (MIME)	Bilateral Robotic Training (MIME) or Combined Unilateral and Bilateral Robotic Training (MIME)								
Exoskeleton robotics	conventional therapy								
Unilateral robot-assisted training with conventional therapy	Bilateral robot-assisted training with conventional therapy								
Non-robotic electromechanical devices combined with other interventions	conventional therapy								
IronHand Assistive Glove	No IronHand Glove								
IronHand Assistive Glove	IronHand Therapeutic Glove								
Different approaches to robotics	one another								
Fast training	Slow training								
Robot-aided Progressive Resistance Training	Robot-aided Active-assisted Training								
Robotics combined with other interventions	exercise and custom physiotherapy protocols								
Robotic arm therapy (NeReBot) with conventional therapy	Conventional therapy with proximal paretic arm exercise								
Robotics combined with other interventions	task-specific training								
Robot-Assisted Neurocognitive Therapy using a haptic device with Conventional Neurocognitive Therapy	Conventional Neurocognitive Therapy								
Robotics	sham								
Exoskeleton robotics combined with other interventions	task-specific training								
Mechanical arm trainer	Electrical muscle stimulation of paretic wrist extensors								
Telemonitored hand robotic-assisted therapy (Hand mentor pro) with home exercise program	Home exercise program only								
Robotic orthosis	conventional therapy								
Intensive Sensorimotor Arm Training Mediated by robot	Intensive Sensorimotor Arm Training Mediated by Therapist								
Robotic orthosis combined with other interventions	conventional therapy								
Soft Robotic Glove with Conventional therapy	Low frequency repetitive transcranial magnetic stimulation with Conventional therapy								
Robotic Assisted Therapy (Bi-Manu-track robot)	electromyography-initiated electrical stimulation								
Exoskeleton robotics combined with other interventions	exercise and custom physiotherapy protocols								
Exoskeleton robotics combined with other interventions	conventional therapy								
Robotics combined with other interventions	conventional therapy								
Robot therapy with distributed constraint induced therapy	robot therapy alone								
Robot-Assisted Therapy	Dose-matched Intensive Comparison Therapy								
Different approaches to robotics combined with other interventions	one another								
Robot therapy with Electroymography-triggered neuromuscular electrical stimulation (ENMES)	Robot therapy or ENMES								
Neuromuscular electrical stimulation robotic to distal fingers	neuromuscular electrical stimulation robotic to proximal wrist-elbow joints								
External focus with robotic arm	Internal focus with robot								
Robot hand and arm separate training with virtual reality	Robot hand and arm together training with virtual reality								
AMES robot with torque biofeedback and muscle vibration	AMES robot with electromyography biofeedback and muscle vibration								
Robotics combined with other interventions	sham or robotics								
X-Glove Orthosis Prolonged Stretching	Resting								
Robot-mediated therapy (GENTLE/s)	Sling suspension phase								
Robotics combined with other interventions	robotics								

Intervention	Compared to	Motor Funct.	Stroke Severity	Muscle Strength	Spasticity	ROM	Proprio-ception	ADLs	Dexterity
Unilateral robot assisted therapy with modified constraint-induced movement therapy	Bilateral robot assisted therapy with bilateral arm training								
Unilateral robot assisted therapy with constraint-induced movement therapy (unilateral arm)	Bilateral robot assisted therapy with BAT (Bimanual tracking)								
Neuromuscular electrical stimulation electromyography robotic hand	electromyography robotic hand								
Robot assisted training with Botox	Conventional treatment with Botox								
Progressive abduction loading therapy with horizontal-plance viscous resistance device	Progressive abduction loading therapy								
Robotic orthosis combined with other interventions	task-specific training								
Distal (wrist or hand Functional Electrical Stimulation)	functional electrical stimulation with Robot assisted Whole arm								
Distal (wrist or hand Functional Electrical Stimulation)	Proximal (Shoulder or elbow) (Functional Electrical Stimulation with inMotion robot)								
End-effector robot with occupational therapy	Exoskeleton robot with occupational therapy								
Robotics combined with other interventions	robotics or sham								
Robotic training (InMotion ARM) with motor learning	Motor learning								
Robotics combined with other interventions	robotics or augmented feedback training								
Robot-Assisted Therapy with Bilateral Practice with Task-Specific Training	Conventional Care with Task-Specific Training								
Condensed Robot-assisted training with botulinum toxin A and Functional training	Distributed robot-assisted training with botulinum toxin A and Functional training								
Robotic glove therapy	conventional therapy								
Rejoyce system with occupational therapy	task based exercises with occupational therapy								
Games-based training using an exoskeleton with usual rehab	basic stretching and active exercises with usual rehab								
Robotic Priming with mirror therapy (RMT)	Robotic Priming with Bilateral Upper Limb Training (RBULT)								
Robot-assisted Therapy with conventional rehab	Constraint induced movement therapy with conventional rehab								
Patient-centered Robot-assisted occupational therapy with conventional rehab	Robot-centered Robot-assisted therapy with conventional rehab or conventional rehab								
Assisted Motion, Biofeedback, and Antagonist Muscle Vibration delivered by a Robotic Device with UL rehabilitation	Placebo intervention with UL rehabilitation								
Exoskeleton robotics combined with other interventions	exoskeleton robotics or sham								
RMT	mirror therapy								
Smart hand joint training device with bilateral transcranial direct current stimulation	Smart hand joint training device								
Bilateral robotic priming training with mirror training (R-mirr)	Bilateral robotic priming training with movement oriented training								
Robotic rehab with trunk rehab	Conventional rehab with trunk rehab								
Exoskeleton robotics combined with other interventions	exoskeleton robotics								
Robotic training with Rebless	UE training with Motomed ergometer								
Virtual reality-based robot therapy with smart glove with task-oriented therapy	Task-oriented therapy								
Robotic training with force fields for error augmentation with Video game therapy and Conventional therapy	Robotic training without force fields for error augmentation with Video game therapy and Conventional therapy								
Robot assisted therapy (InMotion WRIST Robot) with Anodal transcranial direct current stimulation	Robot assisted therapy with sham transcranial direct current stimulation								
Anodal transcranial direct current stimulation with Robot-Assisted Arm Training	Sham stimulation with Robot-Asssited Arm Training								
Robot therapy with task specific training	Robot therapy with impairment oriented training								
Electromyography-driven Robot	Passive motion robot device on wrist								
Anodal transcranial direct current stimulation on affected hemisphere with robot assisted arm training	Cathodal transcranial direct current stimulation on unaffected hemisphere with robot assisted arm training								

Intervention	Compared to	Motor Funct.	Stroke Severity	Muscle Strength	Spasticity	ROM	Proprio-ception	ADLs	Dexterity
EEG-based motor imargery brain-computer interface with Haptic Knob robotic arm rehabilitation	arm therapy								
EEG-based Motor Imagery Brain-Computer Interface with Robotic Feedback (MIT-MANUS)	Traditional Robotic Therapy								
Brain computer interface motor imagery with MITManus robotic training	MIT-Manus robotic training								
Bimanual robotic training with error augmentation	Bimanual robotic training								
Therapist-based Bilateral Arm Training	Control treatment								
Brain-computer interfaces-Exoskeleton-Based Training	Sham exoskeleton Training								
Transcutaneous Auricular Vagus Nerve Stimulation with Robotic Training	Sham transcutaneous auricular vagus nerve stimulation with Robotic Training								
Brain-computer interface Therapy with Robotic Hand Orthosis	Conventional Care								
Mirror Visual Feedback with Robot-Assisted Training	Sham-Mirror Visual Feedback with Robot-Assisted Training								
Trunk support with visual feedback SMART upper limb training system	Trunk restraint with visual feedback SMART upper limb training system								
Brain-computer interface - Robotic with Conventional Rehab	Conventional Rehab								
Robotic self training with constraint-induced movement therapy	Conventional self training with conventional care								
Robotic self training with constraint-induced movement therapy	Robotic self training with conventional care								
Continuous theta burst stimulation with intermittent theta burst stimulation and robot assisted therapy	sham continuous theta burst stimulation with sham intermittent theta burst stimulation and robot-assisted therapy								
Continuous theta burst stimulation with intermittent theta burst stimulation and robot assisted therapy	sham continuous theta burst stimulation with intermittent theta burst stimulation and robot assisted training								
Glove orthosis graded repetitive arm supplementary program with Virtual reality with home based rehab with occupational therapy	Conventional Rehab								
Mirror therapy with robot assisted training HOH(Hand of Hope)	Sham mirror therapy with robot assisted training HOH								
Portable brain-computer interface-based hand robot system with Conventional therapy and neuromuscular electrical stimulation	Task-specific training with Conventional therapy and neuromuscular electrical stimulation								
Brain-computer interface controlled hand exoskeleton with Mental practice and Occupational therapy	Occupational therapy								
Immersive virtual reality (CUREO) with Conventional therapy	Electromechanically assisted training (ARMEOSpring) with Conventional therapy								
Cyproheptadine with EMG-controlled VAEDA glove	Placebo with EMG-controlled VAEDA glove or Placebo with passive stretching VAEDA with glove								
Task-oriented training with force feedback hand rehab robot with Conventional upper limb rehabilitation	Task-oriented training assisted by a therapist with Conventional upper limb rehabilitation								
Non-robotic electromechanical devices	conventional therapy								
Bilateral Arm Light Exoskeleton Rehab Station (ALEx RS) with Conventional Therapy	Unilateral Arm Light Exoskeleton Rehab Station (ALEx RS) with Conventional Therapy								
Exoskeleton robotics combined with other interventions	stretching and positioning programs								
Robotics combined with other interventions	botulinum toxin (botox)								
Robotics combined with other interventions	robotics or video game training								
Different approaches to exoskeleton robotics	one another								
Robotic Therapy (Armeo Spring & Amadeo) with Task Oriented Training with Active Learning Program for Stroke (ALPS)	Robotic Therapy with Active Learning Program for Stroke (ALPS)								
Robotic training (Armeo) with Muscle vibration	Robotic training (Armeo) with Sham muscle vibration								
Single joint arm exoskeleton	Multijoint arm exoskeleton								
Repetitive sensory stimulation with Robot-assisted arm training	Sham stimulation with Robot-assisted arm training								
High-definition tDCS with EMG-driven robotic hand (EMG-RH)	Sham tDCS with EMG-RH								

Intervention	Compared to	Motor Funct.	Stroke Severity	Muscle Strength	Spasticity	ROM	Proprio-ception	ADLs	Dexterity
EMG-Controlled FES during task oriented training with Robotic training	Conventional rehab (TST)								
EMG driven NMES Robot arm	Conventional Therapy								
CTBS with robotic therapy	Sham stimulation with robotic therapy								
Robot-assisted training	Usual care								
Enhanced upper limb therapy	Usual care								
Robot-assisted training	Enhanced upper limb therapy								
Bimanual motor skill learning with robot-assisted training and transcranial direct current stimulation	bimanual motor skill learning with sham stimulation								
SMART arm with electrical stim	No Treatment								
robot training with forced field	robot training without force field								
Robotics therapy (consisted a glove detecting hand movements)	Conventional therapy								
SMART Arm with outcome-triggered (OT) electrical stimulation	SMART arm alone								
Virtual Relaity Game (Vision Based Tracking)	Virtual Reality (Haptic Feedback)								
Virtual Reality (Haptic Feedback)	Virtual Reality (Exoskelton)								
Virtual Relaity Game (Vision Based Tracking)	Virtual Reality (Exoskelton)								

Virtual Reality (77 conclusions)

Intervention	Compared to	Motor Funct.	Stroke Severity	Muscle Strength	Spasticity	ROM	Proprio-ception	ADLs	Dexterity
Smart Glove Upper Extremity Training (RAPAEL) with rehab	Upper Extremity Self-Training at home with rehab								
Virtual reality training	conventional therapy								
Video game training	conventional therapy								
Virtual reality training combined with other interventions	conventional therapy								
Virtual reality-based mirror therapy with conventional physical therapy	Traditional mirror therapy with conventional physical therapy								
Virtual Reality (Wii)	Motor Imagery Training								
Task-oriented training with non-immersive virtual reality with conventional rehabilitation	task-oriented training with simple recreational activities with conventional rehabilitation								
Different approaches to virtual reality training	one another								
Multiuser virtual reality Therapy	Single user virtual reality Therapy								
Smart gaming gloves	conventional therapy								
Nintendo Wii virtual reality training with Usual Care (conventional occupational therapy)	dose matched task oriented therapy (as Conventional therapy) with Usual Care (conventional occupational therapy) or Usual Care (conventional occupational therapy)								
Virtual reality keypad or glove (PneuGlove)	Task Specific Training Occupational Therapy								
Virtual reality training combined with other interventions	virtual reality training								
Virtual reality training combined with other interventions	bilateral arm training								
Virtual reality training	sham								
Non-immersive virtual reality smart glove training (RAPAEL)	Recreational video games with Conventional rehabilitation								
Virtual Reality Boxing (Xbox Kinect)	Boxing Practice with Therapist								
Nintendo Wii-based movement therapy	Modified constraint-induced movement therapy								
Proprioceptive neuromuscular facilitation with virtual reality (Nintendo Wii)	proprioceptive neuromuscular facilitation or Wii								

Intervention	Compared to	Motor Funct.	Stroke Severity	Muscle Strength	Spasticity	ROM	Proprio-ception	ADLs	Dexterity
Video game training combined with other interventions	graded repetitive arm supplementary program								
Neuroanimation therapy using ARMEO exoskeleton	Modified Occupational therapy (stretching, task specific training)								
Video game training combined with other interventions	task-specific training								
Virtual reality games with Audio feedback and conventional therapy	Conventional Rehab								
Immersive virtual reality (CUREO) with Conventional therapy	Electromechanically assisted training (ARMEOSpring) with Conventional therapy								
Virtual reality games (Leap Motion Controller) - enhanced motivation, gradually increasing difficulty	Virtual reality games (Leap Motion Controller) - algorithm control, difficulty was modified using adaptive algorithms based on maintaining 80% success rate								
Weight supported Arm training (ArmeoBoom device is a sling suspension system)	Conventional therapy								
Cathodal transcranial direct current stimulation with virtual reality	Sham transcranial direct current stimulation with virtual reality								
Motion tracking device with virtual reality game	Conventional therapy								
Motion tracking device with virtual reality game	Motion tracking device with braincomputer interface attention monitoring electroencephalogram device and virtual reality game								
Remote virtual reality treatment	Traditional physical therapy								
Leap motion virtual reality with mirror therapy	Sham								
Leap motion virtual reality with mirror therapy	Mirror therapy								
Robot hand and arm separate training with virtual reality	Robot hand and arm together training with virtual reality								
Low frequency repetitive transcranial magnetic stimulation with virtual reality	Sham repetitive transcranial magnetic stimulation with virtual reality								
Intermittent theta burst stimulation with Virtual reality-based cycling training (bilateral upper limb)	sham intermittent theta burst stimulation with VCT								
Virtual reality with arm exoskeleton	conventional physiotherapy								
Anodal transcranial direct current stimulation with virtual reality-based therapy and conventional physical therapy	conventional physiotherapy								
Anodal transcranial direct current stimulation with Virtual Reality	sham transcranial direct current stimulation with Virtual Reality								
Glove orthosis graded repetitive arm supplementary program with Virtual reality with home based rehab with occupational therapy	Conventional Rehab								
Personalized reach training (active control-restricted range) with anodal transcranial direct current stimulation and Virtual reality games	Personal reach training (active control-restricted range) with Sham transcranial direct current stimulation and video games								
Graded repetitive arm supplementary program	Virtual reality								
Contralaterally controlled functional electrical stimulation with Hand therapy video games	contralaterally controlled functional electrical stimulation								
Vitrual Arm Boot Camp (home exercise program with feedback from TENZR and conventional therpay)	Waitlist (conventional care)								
Robotic training with force fields for error augmentation with Video game therapy and Conventional therapy	Robotic training without force fields for error augmentation with Video game therapy and Conventional therapy								
Virtual reality training	no treatment								
Immersive virtual reality (VR)-based upper limb exercise system with Conventional therapy	Commercial video games with Conventional therapy								
Video game training combined with other interventions	exercise and custom physiotherapy protocols								
Virtual Reality Training (Nintendo Wii) with general physical therapy	OT with general physical therapy								
Video game training combined with other interventions	conventional therapy								
Different approaches to video game training	one another								
Video game training	sham								
Virtual Reality with Functional Electrical Stimulation	Functional Electrical Stimulation								

Intervention	Compared to	Motor Funct.	Stroke Severity	Muscle Strength	Spasticity	ROM	Proprio-ception	ADLs	Dexterity
Video game self training	Graded repetitive arm supplementary program								
VR based rehab	Group based rehab								
Virtual reality Wii gaming	Conventional therapy								
Music glove	Conventional care								
Isometric hand therapy	Conventional care								
Music glove	Isometric hand therapy								
Virtual reality with aNodal tDCS	virtual reality with sham								
VR gaming Gloves with Standard rehabilitation	Intensive Occupational therapy (the same movement in the VR gaming group without any game)								
Gloreha Aria (Robotic exoskeleton) with Virtual reality and Conventional therapy	Self mobilization with Conventional therapy								
Low dose exoskeleton robot HEXORR II (12 sessions) with videogames	High dose exoskeleton robot HEXORR II (24 sessions) with video games								
Hand orthosis with computerised gaming exercises	Conventional home exercise								
Cathodal tDCS with VR	VR:								
Cathodal tDCS with VR	Cathodal tDCS								
Cathodal tDCS	VR:								
Robotic orthosis with Task-Specific training and Videogames (Unilateral)	Usual Physical Therapy								
Robotic orthosis with Task-Specific Training and Videogames (Bilateral)	Usual Physical Therapy								
Playstation EyeToy games with conventional therapy	Sham therapy with conventional therapy								
Game-based virtual reality rehabilitation using a smart glove	conventional physiotherapy								
Nintendo Wii Sports	Neutral warmth								
Virtual reality training (ArmeoSenso with monetary feedback rewards) and conventional care	virtual reality training (without rewards) with conventional care								
Constraint-induced movement therapy using augmented reality "Nintendo Wii"	Conventional physiotherapy								
Smart gaming gloves combined with other interventions	exercise and custom physiotherapy protocols								
Virtual Relaity Game (Vision Based Tracking)	Virtual Reality (Haptic Feedback)								
Virtual Reality (Haptic Feedback)	Virtual Reality (Exoskelton)								
Virtual Relaity Game (Vision Based Tracking)	Virtual Reality (Exoskelton)								

Brain Computer Interfaces (19 conclusions)

Intervention	Compared to	Motor Funct.	Stroke Severity	Muscle Strength	Spasticity	ROM	Proprio-ception	ADLs	Dexterity
Brain-computer interface combined with other interventions	fes								
Brain-computer interface combined with other interventions	sham								
Brain-computer interface combined with other interventions	conventional therapy								
Brain-computer interface combined with other interventions	robotics								
Functional electrical stimulation with brain-computer interface	neuromuscular electrical stimulation								
Motor Imagery based brain-computer interface with conventional rehab	Motor Imagery with conventional rehab								
Motor imagery brain-computer interface with conventional rehab	functional electrical stimulation with conventional rehab								
Portable brain-computer interface-based hand robot system with Conventional therapy and neuromuscular electrical stimulation	Task-specific training with Conventional therapy and neuromuscular electrical stimulation								

Intervention	Compared to	Motor Funct.	Stroke Severity	Muscle Strength	Spasticity	ROM	Proprio-ception	ADLs	Dexterity
Brain-computer interface with functional electrical stimulation	Sham brain-computer interface with functional electrical stimulation								
Motor Imagery-based Brain-computer Interface with functional electrical stimulation	functional electrical stimulation								
Motor imagery with Brain-computer interface with stroke treatment	Motor imagery with stroke treatment								
Motion tracking device with virtual reality game	Conventional therapy								
Motion tracking device with virtual reality game	Motion tracking device with braincomputer interface attention monitoring electroencephalogram device and virtual reality game								
Bilateral transcranial direct current stimulation with motor imagery brain-computer interface	Sham transcranial direct current stimulation with motor imagery brain-computer interface								
Action Observation with EEG-Mediated Functional Electrical Stimulation Brain-Computer Interface	Functional Electrical Stimulation								
Functional electrical stimulation with Action observation training and brain computer interface	Conventional therapy								
Isometric myoelectric computer interface	Non-restrained (freely moved) myoelectric computer Interface								
Action observation with EEG-guided robot-hand training	robot-hand training without action observation and EEG guidance								
Brain-computer interface training	no treatment								

EMG Biofeedback (20 conclusions)

Intervention	Compared to	Motor Funct.	Stroke Severity	Muscle Strength	Spasticity	ROM	Proprio-ception	ADLs	Dexterity
Electromyography biofeedback	conventional therapy								
Electromyography-driven Robot	Passive motion robot device on wrist								
Electromyography biofeedback	sham								
Integrated behavioural and physical therapy with electromyography biofeedback	Exercise physical therapy (Bobath approach)								
Isometric myoelectric computer interface	Non-restrained (freely moved) myoelectric computer Interface								
Ocupational Therapy	Ocupational Therapy with electromyography-biofeedback; Neurofeedback or Ocupational Therapy and Neurofeedback Therapy								
FMRI neurofeedback	Sham fMRI neurofeedback								
Electromyography bridge therapy with conventional therapy	neuromuscular electrical stimulation with conventional rehab								
Functional electrical stimulation-Biofeedback mirror therapy with conventional	Mirror therapy with conventional rehab								
Electromyography neuromuscular electrical stimulation robot	electromyography robot								
Neuromuscular electrical stimulation electromyography robotic hand	electromyography robotic hand								
Electromyography-driven Robot-assisted Hand Training	Task-Oriented intervention								
Electromyography- driven Exoskeleton Hand Robot with Rehabilitation Program	Rehabilitation Program								
AI-based electromyography hand robotic	Passive robot hand robotic(no electromyography)								
EMG biofeedback (unilateral)	EMG biofeedback (bilateral)								
High-definition tDCS with EMG-driven robotic hand (EMG-RH)	Sham tDCS with EMG-RH								
AMES robot with torque biofeedback and muscle vibration	AMES robot with EMG biofeedback and muscle vibration								
Surface electromyography biofeedback	sham biofeedback								
Electromyography biofeedback	Sham Biofeedback or care								
Electromyography biofeedback with task practice	Sham biofeedback with task practice								

Feedback-Based Training (32 conclusions)

Intervention	Compared to	Motor Funct.	Stroke Severity	Muscle Strength	Spasticity	ROM	Proprio-ception	ADLs	Dexterity
Repetitive motor task under vibratory feedback	Repetitive motor task								
Motion tracking device with virtual reality game	Conventional therapy								
Motion tracking device with virtual reality game	Motion tracking device with braincomputer interface attention monitoring electroencephalogram device and virtual reality game								
Wearable movement monitoring device (providing visual and audio feedback)	rehabilitation treatment								
Pointing movement practice with feedback	Pointing movement practice without feedback								
Upper limb control of less-affected side with real-time feedback	Upper limb control of affected side with real-time feedback								
Reinforced feedback in Virtual Reality environment with traditional neuromotor rehabilitation	traditional neuromotor rehabilitation								
Arm ability training with knowledge of results (feedback on their performance presented as charts to them)	Rehab								
Arm ability training with knowledge of results (feedback on their performance presented as charts to them)	arm ability training without knowledge of results								
Rhythmic auditory cueing	Conventional therapy								
Rhythmic auditory cueing	Visual cueing								
Bilateral Isometric Handgrip Force Training with Visual Feedback	Therapy								
Pointing exercise with feedback at end	Conventional care								
Robot Assisted Arm Training with high inertia (RAT-WAM)	Robot Assisted Arm Training with low-inertia Proficio (RAT-P)								
Robot therapy with assistance as needed	Robot therapy with guidance forces all times								
AMES robot with torque biofeedback and muscle vibration	AMES robot with electromyography biofeedback and muscle vibration								
Virtual reality training (ArmeoSenso with monetary feedback rewards) and conventional care	virtual reality training (without rewards) with conventional care								
Teacher-supervised Virtual reality with conventional rehab	Non-supervised virtual reality with conventional rehab								
Virtual reality games with Audio feedback and conventional therapy	Conventional Rehab								
Autonomy support (training with more-affected arm and could actively adjust task difficulty) with Verbal feedback	Training with more-affected arm with no opportunity to adjust difficulty with General verbal feedback								
Cycling exercise with feedback and Conventional therapy	Conventional therapy								
Visual feedback therapy	conventional therapy								
Augmented feedback training combined with other interventions	conventional therapy								
Reach-To-Grasp with robot feedback with Conventional therapy	Reach-To-Grasp with computer feedback with Conventional therapy								
Trunk Restraint Training with auditory feedback	Trunk Restraint Training with tactile feedback								
MCIMT with auditory feedback	mCIMT alone								
Spatial target reaching training based on visual biofeedback with Routine therapy	Routine Therapy								
SMART Arm with outcome-triggered (OT) electrical stimulation	SMART arm alone								
Virtual Relaity Game (Vision Based Tracking)	Virtual Reality (Haptic Feedback)								
Virtual Reality (Haptic Feedback)	Virtual Reality (Exoskelton)								
Virtual Relaity Game (Vision Based Tracking)	Virtual Reality (Exoskelton)								
Visual feedback correction with conventional therapy	Placebo video treatment with conventional therapy								

Wearable Cueing and Reminder Devices (7 conclusions)

Intervention	Compared to	Motor Funct.	Stroke Severity	Muscle Strength	Spasticity	ROM	Proprio-ception	ADLs	Dexterity
Remind to Move group (using cueing wristwatch device)	usual care								
Remind to Move group (using cueing wristwatch device)	Sham device								
Cueing or remind to move with exercise or custom physiotherapy protocols	Sham with exercise or custom physiotherapy protocols								
Neuro-X (Robotic exoskeleton) with Visual and Audio feedback	Neuro-X (Robotic exoskeleton)								
Home-based custom exercise program with Visual feedback and Vibrotactile Reminders	Home-based custom exercise program								
Motor Imagery with Audio Feedback and Task Specific Training	Task-specific Training								
Motor Imagery with Audio Feedback and Task Specific Training	Motor imagery with TST								

Neuromuscular Electrical Stimulation (NMES) (126 conclusions)

Intervention	Compared to	Motor Funct.	Stroke Severity	Muscle Strength	Spasticity	ROM	Proprio-ception	ADLs	Dexterity
120min electrical stimulation with repetitive task specific practice	60min electrical stimulation therapy with repetitive task specific practice or 30min electrical stimulation therapy and repetitive task specific practice								
Different approaches to functional electrical stimulation combined with other interventions	one another								
Bilateral arm training with functional electrical stimulation and conventional occupational therapy	Bilateral arm training with sham functional electrical stimulation and conventional occupational therapy								
Neuromuscular electrical stimulation combined with other interventions	sham								
Functional electrical stimulation	conventional therapy								
Functional electrical stimulation combined with other interventions	fes								
Neuromuscular electrical stimulation	sham								
Neuromuscular electrical stimulation	conventional therapy								
High neuromuscular electrical stimulation	Low neuromuscular electrical stimulation								
Functional electrical stimulation combined with other interventions	neuromuscular electrical stimulation								
Arm with Hand Contralaterally Controlled Functional Electrical Stimulation	Hand contralaterally controlled functional electrical stimulation or Arm with Hand Cyclic Neuromuscular Electrical Stimulation								
Neuromuscular Electrical Stimulation with Conventional Rehabilitation	Noxious Thermal Stimulation with Conventional Rehabilitation or Thermal Stimulation, Neuromuscular Electrical stimulation and Conventional Rehabilitation								
Neuromuscular electrical stimulation with repetitive transcranial magnetic stimulation	Sham neuromuscular electrical stimulation with repetitive transcranial magnetic stimulation								
Cyclic Neuromuscular Electrical Stimulation	Electromyographically-triggered Neuromuscular Electrical Stimulatiom or Sensory Stimulation								
Electromyography-triggered neuromuscular electrical stimulation with repetitive transcranial magnetic stimulation	electromyography-triggered neuromuscular electrical stimulation with Sham repetitive transcranial magnetic stimulation								
Functional electrical stimulation combined with other interventions	task-specific training								
Neuromuscular electrical stimulation combined with other interventions	orthotics								
Contralaterally controlled functional electrical stimulation with Task specific training	Cyclic neuromuscular electrical stimulation with Task specific training								
Different approaches to neuromuscular electrical stimulation	one another								
Electromyography-triggered neuromuscular electrical stimulation	cyclic neuromuscular electrical stimulation								
Motor electrical stimulation involving cyclic (neuromuscular electrical stimulation) and electromyography	Percutaneous Sensory electrical stimulation								

Intervention	Compared to	Motor Funct.	Stroke Severity	Muscle Strength	Spasticity	ROM	Proprio-ception	ADLs	Dexterity
Functional Electrical Stimulation with Mirror Therapy	Functional Electrical Stimulation with Sham Mirror Therapy								
Electromyography-triggered neuromuscular electrical stimulation combined with other interventions	emg-triggered nmes								
Electromyogrpahical bridge	Cyclic neuromuscular electrical stimulation								
Neuromuscular electrical stimulation combined with other interventions	conventional therapy								
Neuromuscular electrical stimulation with Conventional therapy	Peripheral Pulse Electromagnetic Waves (rPMS) with Conventional therapy								
Neuromuscular electrical stimulation with conventional rehabilitation	transcutaneous electrical nerve stimulation with conventional rehabilitation								
Functional electrical stimulation combined with other interventions	conventional therapy								
Electromyography-triggered neuromuscular electrical stimulation	conventional therapy								
Different approaches to electromyography-triggered neuromuscular electrical stimulation combined with other interventions	one another								
Electromuscular Stimulation	Transcutaneous Electrical Nerve Stimulation								
CNMES with task oriented training and conventional rehab	electromyography-triggered neuromuscular electrical stimulation with task oriented training and conventional rehab								
Functional electrical stimulation	No treatment								
Position triggered ES with conventional rehabilitation	Passive ES with conventional rehabilitation								
Arm hand function training (electromyography triggered biofeedback with movement imagery) and usual therapy	Electrical stimulation (without the electromyography-triggered feedback function) with usual therapy								
Mental Practice with electromyography neuromuscular electrical stimulation and Conventional Rehab	Conventional Rehab								
Mirror therapy with Mesh glove (afferent stimulation, primarily neuromuscular electrical stimulation)	task oriented exercise								
Mirror therapy with Mesh glove (afferent stimulation, primarily neuromuscular electrical stimulation)	Mirror therapy								
Functional electrical stimulation with Task-specific training	Task-specific training								
Functional Electrical Stimulation	Mirror Therapy								
Functional Electrical Stimulation	Functional Electrical Stimulation with Mirror Therapy								
Mirror Therapy	Functional Electrical Stimulation with Mirror Therapy								
Mechanical arm trainer	Electrical muscle stimulation of paretic wrist extensors								
Botulinum Toxin A injection with neuromuscular electrical stimulation	Placebo with neuromuscular electrical stimulation								
Brain-computer interface with functional electrical stimulation	Functional Electrical Stimulation								
Low frequency repetitive transcranial magnetic stimulation	Physical therapy								
Robot-assisted arm therapy with hand functional electrical stimulation (RAT and functional electrical stimulation)	Conventional Therapy								
Robotic Assisted Therapy (Bi-Manu-track robot)	electromyography-initiated electrical stimulation								
Robot Exoskeleton with electromyography-Triggered functional electrical stimulation (RETRAINER)	Conventional Therapy								
Modified constraint-induced movement therapy	Usual care								
Mental Imagery Training with electromyography-Triggered Electrical Stimulation	Generalized Functional Electric Stimulation								
Electromyography neuromuscular electrical stimulation robot	electromyography robot								
Action Observation with EEG-Mediated Functional Electrical Stimulation Brain-Computer Interface	Functional Electrical Stimulation								
Neuromuscular electrical stimulation electromyography robotic hand	electromyography robotic hand								
Neuromuscular electrical stimulation robotic to distal fingers	neuromuscular electrical stimulation robotic to proximal wrist-elbow joints								

Intervention	Compared to	Motor Funct.	Stroke Severity	Muscle Strength	Spasticity	ROM	Proprio-ception	ADLs	Dexterity
Dual transcranial direct current stimulation with functional electrical stimulation	Sham transcranial direct current stimulation with functional electrical stimulation								
Bilateral active transcranial direct current stimulation with functional electrical stimulation	sham transcranial direct current stimulation with functional electrical stimulation								
Functional electrical stimulation with Action observation training and brain computer interface	Conventional therapy								
Distal (wrist or hand Functional Electrical Stimulation)	functional electrical stimulation with Robot assisted Whole arm								
Distal (wrist or hand Functional Electrical Stimulation)	Proximal (Shoulder or elbow) (Functional Electrical Stimulation with inMotion robot)								
Neuromuscular electrical stimulation with robot therapy	Robot therapy with Sham								
Robotic training (InMotion ARM) with motor learning	Motor learning								
Electrical stim with repetitive task practice	Sham electrical with repetitive task practice								
Static arm positioning with neuromuscular electrical stimulation	Sham positioning and sham neuromuscular electrical stimulation								
Intermittent theta burst stimulation with Physical therapy	Physical Therapy								
Intermittent theta burst stimulation with Physical therapy	functional electrical stimulation with Physical therapy								
Electromyography neuromuscular electrical stimulation with mental imagery training	electromyography neuromuscular electrical stimulation								
Functional electrical stimulation with brain-computer interface	neuromuscular electrical stimulation								
Repetitive peripheral sensory stimulation with functional electrical stimulation and task specific training	Sham RPSS with functional electrical stimulation and TST								
Purposeful activity with electrical stimulation therapy (functional electrical stimulation) and occupational therapy	occupational therapy								
Bilateral transcranial direct current stimulation with neuromuscular electrical stimulation and coventional care	Sham transcranial direct current stimulation and neuromuscular electrical stimulation with conventional care								
Low-frequency repetitive transcranial magnetic stimulation with functional electrical stimulation and conventional rehab	functional electrical stimulation with conventional rehab								
Low-frequency repetitive transcranial magnetic stimulation with functional electrical stimulation and conventional rehab	Low-frequency repetitive transcranial magnetic stimulation with conventional rehab								
Electromyography bridge therapy with conventional therapy	neuromuscular electrical stimulation with conventional rehab								
Brain-computer interface-functional electrical stimulation with Conventional rehab	functional electrical stimulation with Conventional Rehab								
Functional electrical stimulation-Biofeedback mirror therapy with conventional	Mirror therapy with conventional rehab								
Motor imagery brain-computer interface with conventional rehab	functional electrical stimulation with conventional rehab								
Portable brain-computer interface-based hand robot system with Conventional therapy and neuromuscular electrical stimulation	Task-specific training with Conventional therapy and neuromuscular electrical stimulation								
Brain-computer interface with functional electrical stimulation	Sham brain-computer interface with functional electrical stimulation								
Robot therapy with Electroymography-triggered neuromuscular electrical stimulation (ENMES)	Robot therapy or ENMES								
Functional electrical stimulation	routine therapy								
Functional electrical therapy applied in the acute phase	functional electrical therapy applied in the chronic phase								
Cyclic neuromuscular electrical stimulation with mirror therapy	neuromuscular electrical stimulation or mirror therapy alone								
FES with Conventional rehab	Sham FES with Conventional rehab								
EMG-Controlled FES during task oriented training with Robotic training	Conventional rehab (TST)								
Different approaches to FES	one another								
EMG driven NMES Robot arm	Conventional Therapy								
Long NMES (12Hr)	Short NMES (30min)								
FES with Task specific training	Sham with Task specific training								

Intervention	Compared to	Motor Funct.	Stroke Severity	Muscle Strength	Spasticity	ROM	Proprio-ception	ADLs	Dexterity
FES with botulinum toxin-A and home based task-oriented exercise	Botulinum toxin-A with home-based exercise program								
Neuromuscular electrical stimulation combined with other interventions	stretching and positioning programs								
EMG triggered NMS (EMG-Stim) with Wrist Strengthening Exercises	Wrist Exercises								
Transcranial Random Noise stimulation (tRNS) with FES	Sham-tRNS with active FES								
Task Specific EMG triggered ES therapy with Conventional PT	Conventional PT								
Virtual Reality with Functional Electrical Stimulation	Functional Electrical Stimulation								
Dual-tDCS combined with PNMES with CIMT	CIMT								
Mirror therapy	EMG-triggered neuromuscular stimulation								
Functional electrical stimulation with biofeedback with mirror therapy	Conventional rehabilitation								
Functional electrical stimulation with biofeedback with mirror therapy	FES with mirror therapy								
Mental training linked with EMG triggered stimulation	FES								
Integrated volitional electrical stimulator (IVES) with wrist splint	wrist splint								
Dry Needling with FES and conventional exercise	Sham-Needling with FES and Conventional exercise								
EMG-triggered neuromuscular stimulation	Conventional care								
PNF with NMES	PNF								
Functional Electrical Stimulation with 1:1 On/Off Ratio	Functional Electrical Stimulation with 1:3 On/Off Ratio or Functional Electrical Stimulation with 1:5 On/Off Ratio								
Blocked neuromuscular electrical stimulation training (neuromuscular electrical stimulation with Hand range of motion training)	Hand range of motion exercises (Passive movements, voluntary UE extensions or abduction)								
SMART arm with outcome triggered electrical stim and usual therapy	Usual therapy								
Cryotherapy on spastic wrist flexors with Kinesiotherapy	neuromuscular electrical stimulation on wrist extensors								
Motor relearning with electrical stim	Bobath treatment with electrical stim								
Short-term bilateral arm training with electromyography triggered neuromuscular electrical stimulation	long-term bilateral arm training with electromyography triggered neuromuscular electrical stimulation								
EMG-triggered neuromuscular electrical stimulation	conventional therapy								
High Frequency NMES (40Hz)	Low Frequency NMES (20Hz)								
Anodal transcranial direct current stimulation with functional electrical stimulation	Sham transcranial direct current stimulation with functional electrical stimulation								
Electromyography-trigerred functional electrical stimulation	Conventional therapy								
Botolinum Toxin-A with Extracorporeal shock wave therapy (extracorporeal shockwave therapy)	botulinum toxin A with electrical stimulation (ES)								
SMART arm with electrical stim	No Treatment								
Neuromuscular electrical stimulation	passive stretching								
Different approaches to functional electrical stimulation	one another								
Electrical Stimulation to Wrist and Finger Extensors with Splint	Splint								
Botox 1000u with cyclic neuromuscular electrical stimulation	Placebo								
Bilateral electromyography-triggered multi-channel electrostimulation with mirror therapy	bilateral electromyography-triggered multi-channel electrostimulation								
Blocked neuromuscular electrical stimulation training (neuromuscular electrical stimulation with Hand range of motion training)	Random neuromuscular electrical stimulation training (neuromuscular electrical stimulation with Hand range of motion training)								
Electromyography-Triggered neuromuscular electrical stimulation with Bilateral Arm Training	Sham Stimulation with Bilateral Arm Training								
Electromyography-Triggered neuromuscular electrical stimulation with Bilateral Arm Training	electromyography-Triggered neuromuscular electrical stimulation with Bilateral Arm Training								

Intervention	Compared to	Motor Funct.	Stroke Severity	Muscle Strength	Spasticity	ROM	Proprio-ception	ADLs	Dexterity
Coupled bilateral training with load with electromyography-triggered neuromuscular electrical stimulation	unilateral arm training								
Coupled bilateral training with load with electromyography-triggered neuromuscular electrical stimulation	Coupled bilateral training with no load with electromyography-triggered neuromuscular electrical stimulation								

Transcutaneous Electrical Nerve Stimulation (TENS) (22 conclusions)

Intervention	Compared to	Motor Funct.	Stroke Severity	Muscle Strength	Spasticity	ROM	Proprio-ception	ADLs	Dexterity
Transcutaneous electrical stimulation (transcutaneous electrical nerve stimulation)	sham								
Low-transcutaneous electrical nerve stimulation with physiotherapy	Physiotherapy								
Transcutaneous electrical stimulation (transcutaneous electrical nerve stimulation) combined with other interventions	sham or task-specific training								
Movement science based training	Bobath concept								
Bi-transcutaneous electrical nerve stimulation with Task Oriented Training (TOT)	No Treatment								
Transcutaneous electrical nerve stimulation with wrist extensor taping and Tast-related training	transcutaneous electrical nerve stimulation with task-related training								
Task related training with transcutaneous electrical nerve stimulation	Task related training with Sham transcutaneous electrical nerve stimulation								
Neuromuscular electrical stimulation with conventional rehabilitation	Conventional rehabilitation								
Neuromuscular electrical stimulation with conventional rehabilitation	transcutaneous electrical nerve stimulation with conventional rehabilitation								
Botulinumtoxin therapy in combination with dynamic electric neurostimulation (the explanation is consistent with transcutaneous electrical nerve stimulation) and basic therapy, including massage and therapeutic exercises	Basic Therapy								
Botulinumtoxin therapy in combination with dynamic electric neurostimulation (the explanation is consistent with transcutaneous electrical nerve stimulation) and basic therapy, including massage and therapeutic exercises	Botulinum toxin therapy and basic therapy								
Botulinumtoxin therapy in combination with dynamic electric neurostimulation (the explanation is consistent with transcutaneous electrical nerve stimulation) and basic therapy, including massage and therapeutic exercises	Dynamic electric neurostimulation and basic therapy								
Electromuscular Stimulation	Transcutaneous Electrical Nerve Stimulation								
Electromyography-triggered neuromuscular electrical stimulation with BAT	transcutaneous electrical nerve stimulation with BAT								
Task specific training with transcutaneous electrical nerve stimulation acupoint	Task-specific training with Sham electrical stimulation								
Transcutaneous auricular vagus nerve stimulation with task-oriented training	Task-oriented training								
Triamcinolone acetonide with transcutaneous electrical nerve stimulation and Therapeutic exercise program	transcutaneous electrical nerve stimulation with Therapeutic exercise program								
Non invasive transcutaneous electrical nerve stimulation with conventional treatment (NSAID, Exercise and activities of daily living instructions)	Ultrasound therapy with conventional treatment (NSAID, Exercise and activities of daily living instructions)								
Transcutaneous electrical nerve stimulation (TENS)	sham TENS								
Transcutaneous electrical nerve stimulation with BTA infiltration	transcutaneous electrical nerve stimulation with Placebo 2.5mL saline								
Transcutaneous electrical nerve stimulation with conventional rehab	Suprascapular nerve block with conventional rehab								
LASER therapy	Interferential current treatment								

Thermal Stimulation (11 conclusions)

Intervention	Compared to	Motor Funct.	Stroke Severity	Muscle Strength	Spasticity	ROM	Proprio-ception	ADLs	Dexterity
Different approaches to thermal stimulation	one another								
Upper extremity thermal stimulation	lower extremity thermal stimulation								
Vibrational heated pressure therapy with Meridian dredging exercise and conventional rehab	meridian dredging exercise with conventional treatment								
Neuromuscular Electrical Stimulation with Conventional Rehabilitation	Noxious Thermal Stimulation with Conventional Rehabilitation or Thermal Stimulation, Neuromuscular Electrical stimulation and Conventional Rehabilitation								
Alternating hot-cold water immersion (AHCWI) with Standard rehabilitation	Upper limb cycling exercises with Standard rehabilitation								
Heat/Cool Therapy with Accupuncture and routine rehabilitation	Accupuncture with routine rehabilitation								
Paraffin wax thermal stimulation	Placebo paraffin thermal stimulation (room temperature sand picks)								
Thermal stimulation	conventional therapy								
Cryotherapy on spastic wrist flexors with Kinesiotherapy	neuromuscular electrical stimulation on wrist extensors								
Radial Shock Wave Therapy with Infrared therapy and Static Stretching	Infrared therapy with Static Stretching								
Nintendo Wii Sports	Neutral warmth								

Muscle Vibration (15 conclusions)

Intervention	Compared to	Motor Funct.	Stroke Severity	Muscle Strength	Spasticity	ROM	Proprio-ception	ADLs	Dexterity
Muscle vibration	conventional therapy								
Whole-body vibration with Task Oriented Training and Conventional physical therapy	Upper- and lower-Cycle group with Task Specific Training and Conventional physical therapy								
Muscle vibration	sham								
AMES robot with torque biofeedback and muscle vibration	AMES robot with electromyography biofeedback and muscle vibration								
Vibrational heated pressure therapy with Meridian dredging exercise and conventional rehab	meridian dredging exercise with conventional treatment								
Focal muscle vibration with progressive modular rebalancing	Conventional physiotherapy								
Mirror therapy	Conventional therapy								
Vibration therapy	Conventional therapy								
Mirror therapy	Vibration therapy								
Robotic training (Armeo) with Muscle vibration	Robotic training (Armeo) with Sham muscle vibration								
Whole-Body Vibration (5-15 Hz)	Conventional Physical Therapy								
Whole-Body Vibration with Task-Related Training	Conventional Physical Therapy								
Muscle vibration	rest								
Muscle vibration	Stretch control or Rest control								
Segmental muscle vibration with standard therapy	Standard Therapy								

Extracorporeal Shockwave Therapy (15 conclusions)

Intervention	Compared to	Motor Funct.	Stroke Severity	Muscle Strength	Spasticity	ROM	Proprio-ception	ADLs	Dexterity
Extracorporeal shockwave therapy	sham								
Radial Shock Wave Therapy 3 session	Radial Shock Wave Therapy 1 session								

Intervention	Compared to	Motor Funct.	Stroke Severity	Muscle Strength	Spasticity	ROM	Proprio-ception	ADLs	Dexterity
Extracorporeal shockwave therapy	conventional therapy								
Radial extracorporeal shockwave (rEWST) agonist muscle with conventional therapy	extracorporeal shockwave (rEWST) antagonist muscle with conventional therapy								
Extracorpeal shockwave	Botox								
Ultrasound-guided stellate ganglion block with Conventional Therapy	Conventional therapy								
Ultrasound-guided stellate ganglion block with Conventional Therapy	Ultrasound-guided stellate ganglion block with Extracorporeal shock wave therapy and Conventional therapy								
Extracorporeal shock wave therapy with Conventional therapy	Ultrasound-guided stellate ganglion block with Extracorporeal shock wave therapy and Conventional therapy								
Ultrasound-guided stellate ganglion block with Conventional Therapy	Extracorporeal shock wave therapy with Conventional therapy								
Ultrasonic-guided betamethasone local injection with Rehabilitation	Extracorporeal shock wave therapy with Rehabilitation								
Botulinum toxin injection with Extracorporeal shock wave therapy (extracorporeal shockwave therapy)	Botulinum toxin injection								
Botolinum Toxin-A with Extracorporeal shock wave therapy (extracorporeal shockwave therapy)	botulinum toxin A with electrical stimulation (ES)								
Extracorpeal shockwave on muscle belly	Extracorpeal shockwave on myotendinous junction								
Radial Shock Wave Therapy with Infrared therapy and Static Stretching	Infrared therapy with Static Stretching								
Radial extracorporeal shock wave therapy (radial extracorporeal shockwave therapy) with Designed physical therapy program for shoulder	Sham radial extracorporeal shockwave therapy with Designed physical therapy program for shoulder								

Additional Afferent and Peripheral Stimulation Methods (79 conclusions)

Intervention	Compared to	Motor Funct.	Stroke Severity	Muscle Strength	Spasticity	ROM	Proprio-ception	ADLs	Dexterity
Functional Magnetic Stimulation (applied peripherally)	Low-Frequency repetitive transcranial magnetic stimulation								
Repetitive Sensory Stimulation	Sham Repetitive Sensory Stimulation								
High-dose electrical somatosensory stimulation with task oriented training	Sham (Low dose) with task oriented training								
Peripheral Nerve Stimulation	sham								
Somatosensory (peripheral nerve) stimulation with task specific training	Sham stimulation with task specific training								
Repetitive task exercise with sensory amplitude electrical stimulation (SES)	repetitive task exercise with Sham stimulation								
Intermittent pneumatic compression	conventional therapy								
Paretic hand peripheral nerve (somatosensory) stimulation	No stimulation								
Vibratory Somatosensory Stimulation	No Stimulation								
Vibratory Somatosensory Stimulation	Light Touch Somatosensory Stimulation (Brush) or Rough Touch Somatosensory Stimulation (Sand Paper)								
Intermittent pneumatic compression with conventional physiotherapy	Sham short wave therapy with conventional physiotherapy								
Non-electrical somatosensory stimulation	conventional therapy								
Peripheral magnetic stimulation	sham								
Repetitive peripheral sensory stimulation with functional electrical stimulation and task specific training	Sham RPSS with functional electrical stimulation and TST								
Ipsilesional Paired Associated Stimulation (PAS)	Conventional Care								
Ipsilesional Paired Associated Stimulation (PAS)	Contralesional PAS or Bilateral PAS								
Transcutaneous Auricular Vagus Nerve Stimulation with Robotic Training	Sham transcutaneous auricular vagus nerve stimulation with Robotic Training								

Intervention	Compared to	Motor Funct.	Stroke Severity	Muscle Strength	Spasticity	ROM	Proprio-ception	ADLs	Dexterity
Peripheral magnetic stimulation	conventional therapy								
Transcutaneous auricular vagus nerve stimulation with conventional rehab	Sham TA-VNS with conventional rehab								
Low-frequency repetitive transcranial magnetic stimulation with peripheral repetitive magnetic stimulation (rPMS) and rehabilitation	rehabilitation								
Low-frequency repetitive transcranial magnetic stimulation with peripheral repetitive magnetic stimulation (rPMS) and rehabilitation	low-frequency repetitive transcranial magnetic stimulation with rehabilitation								
High intensity laser therapy (HILT) with therapeutic exercises	Conventional exercise program								
Repetitive peripheral magnetic stimulation (rPMS) with intermittent theta burst stimulation and rehabilitation	sham rPMS with intermittent theta burst stimulation and rehabilitation								
Cyclic Neuromuscular Electrical Stimulation	Electromyographically-triggered Neuromuscular Electrical Stimulatiom or Sensory Stimulation								
Paired associative stimulation	Active peripheral electrical stimulation with Sham cortical stimulation								
Mirror therapy with Mesh glove afferent stimulation	Mirror therapy or Mirror Therapy with Sham								
Mirror therapy with Mesh glove afferent stimulation	Mirror therapy								
Motor electrical stimulation involving cyclic (neuromuscular electrical stimulation) and electromyography	Percutaneous Sensory electrical stimulation								
Robot assisted therapy with Transcutaneous stim of vagus nerve tVNS	Robot assisted therapy with sham tVNS								
Peripheral nerve stimulation with modified constraint-induced movement therapy	Sham peripheral nerve stimulation with modified constraint-induced movement therapy								
Peripheral nerve stimulation with task oriented training	Sham stimulation with task oriented training								
Somatosensory Stimulation (peripheral nerve stimulation) with Intensive Task-Oriented Training	Sham Stimulation with Intensive Task-Oriented Training								
Assisted Motion, Biofeedback, and Antagonist Muscle Vibration delivered by a Robotic Device with UL rehabilitation	Placebo intervention with UL rehabilitation								
Intermittent theta burst stimulation with peripheral magnetic stimulation and conventional rehab	peripheral magnetic stimulation with central sham stimulation and conventional rehab								
Intermittent theta burst stimulation with peripheral magnetic stimulation and conventional rehab	intermittent theta burst stimulation with sham peripheral stimulation and conventional rehab								
Bihemispheric transcranial direct current stimulation with Repetitive Peripheral Nerve Stimulation and Conventional Therapy	Sham transcranial direct current stimulation with Repetitive Peripheral Nerve Stimulation and Conventional Therapy								
High-frequency repetitive transcranial magnetic stimulation with cervical nerve root magnetic stimulation	Sham high-frequency repetitive transcranial magnetic stimulation with Sham cervical nerve root magnetic stimulation								
High-frequency repetitive transcranial magnetic stimulation with cervical nerve root magnetic stimulation	high-frequency repetitive transcranial magnetic stimulation with sham cervical nerve root magnetic stimulation								
High-frequency repetitive transcranial magnetic stimulation with cervical nerve root magnetic stimulation	Sham high-frequency repetitive transcranial magnetic stimulation with cervical nerve root magnetic stimulation								
High-frequency repetitive transcranial magnetic stimulation with sham cervical nerve root magnetic stimulation	Sham high-frequency repetitive transcranial magnetic stimulation with cervical nerve root magnetic stimulation								
Neuromuscular electrical stimulation with Conventional therapy	Conventional therapy								
Neuromuscular electrical stimulation with Conventional therapy	Peripheral Pulse Electromagnetic Waves (rPMS) with Conventional therapy								
Repetitive peripheral nerve stimulation with anodal tDCS	repetitive peripheral nerve stimulation with sham tDCS								
Repetitive sensory stimulation with Robot-assisted arm training	Sham stimulation with Robot-assisted arm training								
Paired associative stimulation (rTMS with rPMS) and physiotherapy	rTMS with physiotherapy								
EMG paired taVNS with TST	Active unpaired taVNS with TST								
Cerebello-Motor paired associated stimulation (PAS) with physiotherapy	Sham with physiotherapy								
Transcutaneous auricular vagus nerve stimulation (tVNS)	sham								
Vagus Nerve Stimulation with rehab	Conventional care								

Intervention	Compared to	Motor Funct.	Stroke Severity	Muscle Strength	Spasticity	ROM	Proprio-ception	ADLs	Dexterity
Peripheral nerve stimulation	usual care								
Repetitive peripheral nerve sensory stim (RPSS) with Motor Training	Sham with Motor Training								
PNES with Task Specific Training	Task-Specific Training								
Peripheral Nerve Stimulation combined with other interventions	sham or task-specific training								
Proprioceptive Training (involving passive and active movements with visual feedback)	Nonspecific sensory stimulation								
rTMS with Sham TENS with Mirror therapy and Nonelectrical somatosensory stimulation	Sham rTMS with Sham TENS with Mirror therapy and Nonelectrical somatosensory stimulation								
Sham rTMS with TENS with Mirror therapy and Nonelectrical somatosensory stimulation	Sham rTMS with Sham TENS with Mirror therapy and Nonelectrical somatosensory stimulation								
RTMS with TENS with Mirror therapy and Nonelectrical somatosensory stimulation	Sham rTMS with Sham TENS with Mirror therapy and Nonelectrical somatosensory stimulation								
Task practice therapy with TheraBracelet stimulation	task practice therapy with sham stimulation								
Mirror therapy with Mesh glove	Mirror therapy								
Sensory-enhanced robot-aided motor training (SERMT)	Robot-aided motor training (RMT)								
Cable orthosis with Virtual Reality	Virtual Reality								
Pneumatic orthosis with Virtual Reality	Virtual Reality								
High intensity laser (HILT) with therapeutic exercise program and regular rehab	therapeutic exercise program with regular rehab								
Limb Ischemic Post-Conditioning	Sham treatment								
Non-electrical somatosensory stimulation	sham								
Non invasive transcutaneous electrical nerve stimulation with conventional treatment (NSAID, Exercise and activities of daily living instructions)	Ultrasound therapy with conventional treatment (NSAID, Exercise and activities of daily living instructions)								
Active repetitive peripheral nerve sensory stimulation (RPPS) with sham transcranial direct current stimulation	Sham RRPS with sham transcranial direct current stimulation								
Active repetitive peripheral nerve sensory stimulation (RPPS) with sham transcranial direct current stimulation	Sham RRPS with Anodal transcranial direct current stimulation or Active RRPS and active transcranial direct current stimulation								
High-frequency repetitive peripheral magnetic stimulation with conventional treatment	sham stimulation with conventional treatment								
Medial nerve (somatosensory) stimulation	Sham stimulation								
Suprascapular nerve pulsed radiofrequency	Suprascapular Nerve Block with lidocain								
Pulsed Radiofrequency with rehabilitation therapy	Intra-articular corticosteroid injection with rehabilitation therapy								
Paired associative stimulation (PAS) with Motor imagery	Sham PAS with motor imagery								
Suprascapular nerve block	Ultrasound								
Therapeutic ultrasound	sham								
High-Frequency repetitive transcranial magnetic stimulation with Peripheral Somatosensory Stimulation (sensory level electrical stimulation and vibratory stimulation)	Sham repetitive transcranial magnetic stimulation with Peripheral Somatosensory Stimulation								
High-Frequency repetitive transcranial magnetic stimulation with Peripheral Somatosensory Stimulation (sensory level electrical stimulation and vibratory stimulation)	Low-Frequency repetitive transcranial magnetic stimulation with Peripheral Somatosensory Stimulation								
Generalized somatosensory discrimination training	Repeated exposure to sensory stimuli								
LASER therapy	Interferential current treatment								

Invasive Cortical and Nerve Electrode Implant Stimulation (3 conclusions)

Intervention	Compared to	Motor Funct.	Stroke Severity	Muscle Strength	Spasticity	ROM	Proprio-ception	ADLs	Dexterity
Electrical Epidural Motor Cortex Stimulation (EECS) with Task specific Training	Task-specific training								
Invasive cortical and nerve electrode implant stimulation	sham								
Invasive cortical and nerve electrode implant stimulation	conventional therapy								

Repetitive Transcranial Magnetic Stimulation (rTMS) (93 conclusions)

Intervention	Compared to	Motor Funct.	Stroke Severity	Muscle Strength	Spasticity	ROM	Proprio-ception	ADLs	Dexterity
Low-frequency repetitive transcranial magnetic stimulation	sham								
Low frequency repetitive transcranial magnetic stimulation applied to primary motor cortex with conventional rehab	Low frequency repetitive transcranial magnetic stimulation applied to premotor area with conventional rehab								
Repetitive transcranial magnetic stimulation	sham								
Repetitive transcranial magnetic stimulation - M1 area with rehab	repetitive transcranial magnetic stimulation - SMA with routin rehab								
Low-frequency repetitive transcranial magnetic stimulation with rehabilitation	High-frequency repetitive transcranial magnetic stimulation with rehabilitation								
High-frequency repetitive transcranial magnetic stimulation with conventional care	low-frequency repetitive transcranial magnetic stimulation with conventional care								
Low Frequency Combined with High Frequency Repetitive Transcranial Magnetic Stimulation	Low Frequency Repetitive Transcranial Magnetic Stimulation								
High-frequency repetitive transcranial magnetic stimulation	sham								
High-Frequency repetitive transcranial magnetic stimulation with Short Inter-Train Intervals	High-Frequency repetitive transcranial magnetic stimulation with Long Inter-Train Intervals								
Paired associative stimulation	Active peripheral electrical stimulation with Sham cortical stimulation								
High-frequency repetitive transcranial magnetic stimulation combined with other interventions	high-frequency rtms								
Low-frequency repetitive transcranial magnetic stimulation combined with other interventions	Sham repetitive transcranial magnetic stimulation with sham ltbs								
Repetitive transcranial magnetic stimulation	Dual transcranial direct current stimulation								
Low frequency repetitive transcranial magnetic stimulation with intermittent theta burst stimulation	Sham repetitive transcranial magnetic stimulation with intermittent theta burst stimulation or Low frequency repetitive transcranial magnetic stimulation and sham intermittent theta burst stimulation								
Sham repetitive transcranial magnetic stimulation with intermittent theta burst stimulation	Low frequency repetitive transcranial magnetic stimulation with sham intermittent theta burst stimulation								
Low-frequency repetitive transcranial magnetic stimulation combined with other interventions	sham or task-specific training								
Low frequency repetitive transcranial magnetic stimulation with Action Observation	Low frequency repetitive transcranial magnetic stimulation								
Low frequency repetitive transcranial magnetic stimulation	Physical therapy								
Low frequency repetitive transcranial magnetic stimulation with scalp acupuncture	Scalp Acupuncture								
Low-frequency repetitive transcranial magnetic stimulation combined with other interventions	sham								
Low frequency repetitive transcranial magnetic stimulation with intermittent Theta Burst Stimulation	Low frequency repetitive transcranial magnetic stimulation with sham theta burst stimulation								
Active repetitive transcranial magnetic stimulation with fluoxetine	Sham repetitive transcranial magnetic stimulation with fluoxetine								
10 Sessions Low Frequency repetitive transcranial magnetic stimulation before 10 Sessions Intermittent Theta Burst Stimulation	10 Sessions Low Frequency repetitive transcranial magnetic stimulation before 10 Sessions Intermittent Theta Burst Stimulation								
Low-frequency repetitive transcranial magnetic stimulation	conventional therapy								

Intervention	Compared to	Motor Funct.	Stroke Severity	Muscle Strength	Spasticity	ROM	Proprio-ception	ADLs	Dexterity
10 sessions repetitive transcranial magnetic stimulation with conventional therapy	30 sessions repetitive transcranial magnetic stimulation with conventional therapy								
20 sessions repetitive transcranial magnetic stimulation with conventional therapy	30 sessions repetitive transcranial magnetic stimulation with conventional therapy								
High frequency repetitive transcranial magnetic stimulation with constraint-induced movement therapy	Sham repetitive transcranial magnetic stimulation with constraint-induced movement therapy								
Repetitive transcranial magnetic stimulation combined with other interventions	sham or task-specific training								
Bilateral repetitive transcranial magnetic stimulation (high-frequency repetitive transcranial magnetic stimulation with low-frequency repetitive transcranial magnetic stimulation) and Task-oriented therapy	Excitatory repetitive transcranial magnetic stimulation (high-frequency repetitive transcranial magnetic stimulation with sham low-frequency repetitive transcranial magnetic stimulation) and Task-oriented therapy								
Bilateral repetitive transcranial magnetic stimulation (high-frequency repetitive transcranial magnetic stimulation with low-frequency repetitive transcranial magnetic stimulation) and Task-oriented therapy	Inhibitory repetitive transcranial magnetic stimulation (sham high-frequency repetitive transcranial magnetic stimulation with low-frequency repetitive transcranial magnetic stimulation) and Task-oriented therapy								
Excitatory repetitive transcranial magnetic stimulation (high-frequency repetitive transcranial magnetic stimulation with sham low-frequency repetitive transcranial magnetic stimulation) and Task-oriented therapy	Inhibitory repetitive transcranial magnetic stimulation (sham high-frequency repetitive transcranial magnetic stimulation with low-frequency repetitive transcranial magnetic stimulation) and Task-oriented therapy								
Different approaches to repetitive transcranial magnetic stimulation	one another								
Repetitive transcranial magnetic stimulation	conventional therapy								
Low frequency repetitive transcranial magnetic stimulation with occupational therapy training	constraint-induced movement therapy								
Low frequency repetitive transcranial magnetic stimulation with virtual reality	Sham repetitive transcranial magnetic stimulation with virtual reality								
High Frequency repetitive transcranial magnetic stimulation with Rehabilitation Program	Rehabilitation Program								
High frequency repetitive transcranial magnetic stimulation with grip training and conventional rehab	repetitive transcranial magnetic stimulation with conventional rehab or Grip training and conventional rehab								
Low-frequency repetitive transcranial magnetic stimulation with functional electrical stimulation and conventional rehab	functional electrical stimulation with conventional rehab								
Low-frequency repetitive transcranial magnetic stimulation with functional electrical stimulation and conventional rehab	Low-frequency repetitive transcranial magnetic stimulation with conventional rehab								
High-frequency repetitive transcranial magnetic stimulation combined with other interventions	sham or motor relearning programmes								
High-frequency repetitive transcranial magnetic stimulation with Conventional Therapy	Conventional therapy								
High-frequency repetitive transcranial magnetic stimulation with Conventional Therapy	Contralateral limb Cross education (strength training) with Conventional therapy								
Contralateral limb Cross education (strength training) with Conventional therapy	high-frequency repetitive transcranial magnetic stimulation with cross education and conventional therapy								
High-frequency repetitive transcranial magnetic stimulation with Conventional Therapy	high-frequency repetitive transcranial magnetic stimulation with cross education and conventional therapy								
High-frequency repetitive transcranial magnetic stimulation combined with other interventions	sham								
High-frequency repetitive transcranial magnetic stimulation with cervical nerve root magnetic stimulation	high-frequency repetitive transcranial magnetic stimulation with sham cervical nerve root magnetic stimulation								
High-frequency repetitive transcranial magnetic stimulation with cervical nerve root magnetic stimulation	Sham high-frequency repetitive transcranial magnetic stimulation with cervical nerve root magnetic stimulation								
High-frequency repetitive transcranial magnetic stimulation with sham cervical nerve root magnetic stimulation	Sham high-frequency repetitive transcranial magnetic stimulation with cervical nerve root magnetic stimulation								
Mirror therapy with high frequency repetitive transcranial magnetic stimulation and Traditional physical therapy	Sham with Traditional physical therapy								
Mirror therapy with high frequency repetitive transcranial magnetic stimulation and Traditional physical therapy	Mirror therapy with Traditional physical therapy								
Functional Magnetic Stimulation (applied peripherally)	Low-Frequency repetitive transcranial magnetic stimulation								

Intervention	Compared to	Motor Funct.	Stroke Severity	Muscle Strength	Spasticity	ROM	Proprio-ception	ADLs	Dexterity
Electromyography-triggered neuromuscular electrical stimulation with repetitive transcranial magnetic stimulation	electromyography-triggered neuromuscular electrical stimulation with Sham repetitive transcranial magnetic stimulation								
Low frequence repetitive transcranial magnetic stimulation with mental practice	repetitive transcranial magnetic stimulation with audiotape-led relaxation								
Neuromuscular electrical stimulation with repetitive transcranial magnetic stimulation	Sham neuromuscular electrical stimulation with repetitive transcranial magnetic stimulation								
Continuous theta burst stimulation with physiotherapy	Sham continuous theta burst stimulation with physiotherapy								
Ipsilesional Paired Associated Stimulation (PAS)	Conventional Care								
Ipsilesional Paired Associated Stimulation (PAS)	Contralesional PAS or Bilateral PAS								
Custom occupational therapy with repetitive transcranial magnetic stimulation-LF	Custom Occupational Therapy								
Soft Robotic Glove with Conventional therapy	Conventional therapy								
Soft Robotic Glove with Conventional therapy	Low frequency repetitive transcranial magnetic stimulation with Conventional therapy								
Low-frequency repetitive transcranial magnetic stimulation with peripheral repetitive magnetic stimulation (rPMS) and rehabilitation	rehabilitation								
Low-frequency repetitive transcranial magnetic stimulation with peripheral repetitive magnetic stimulation (rPMS) and rehabilitation	low-frequency repetitive transcranial magnetic stimulation with rehabilitation								
Graded motor imagery with repetitive transcranial magnetic stimulation and conventional rehabilitation	Graded motor imagery with conventional rehabilitation								
Graded motor imagery with repetitive transcranial magnetic stimulation and conventional rehabilitation	repetitive transcranial magnetic stimulation with conventional rehabilitation								
Repetitive transcranial magnetic stimulation with mirror therapy	bilateral tDCS with mirror therapy or sham tDCS with mirror therapy								
High-frequency rTMS combined with other interventions	sham								
Low-frequency rTMS combined with other interventions	conventional therapy								
Scalp acupuncture (SA)	SAEM-CS- SA and electromagnetic convergence stimulation (SA and LF-rTMS simultaneously)								
Repetitive transcranial magnetic stimulation (rTMS)	SAEM-CS- SA and electromagnetic convergence stimulation (SA and LF-rTMS simultaneously)								
Scalp acupuncture (SA)	Repetitive transcranial magnetic stimulation (rTMS)								
Low-frequency rTMS combined with other interventions	task-specific training or sham								
High frequency (10Hz) rTMS with task-oriented training	Sham rTMS with task-oriented training								
Paired associative stimulation (rTMS with rPMS) and physiotherapy	rTMS with physiotherapy								
Cerebello-Motor paired associated stimulation (PAS) with physiotherapy	Sham with physiotherapy								
Intermittent theta-burst stimulation of the affected motor cortex hand area with conventional therapy	Sham stimulation with conventional therapy								
Cortico-cortical paired associative stimulation (ccPAS) with routine rehabilitation	Sham ccPAS with routine rehabilitation								
1Hz repetitive transcranial magnetic stimulation	3Hz repetitive transcranial magnetic stimulation								
Low frequency Repetitive Transcranial Magnetic Stimulation to unaffected hemisphere with Brunnstrom movement therapy	Sham Repetitive Transcranial Magnetic Stimulation with Brunnstrom movement therapy								
Unilateral High-frequency repetitive transcranial magnetic stimulation (HF-rTMS)	Bilateral application of HF- and LF-rTMS (BL-rTMS)								
3Hz rTMS	10Hz rTMS								
High-frequency repetitive transcranial magnetic stimulation	low-frequency repetitive transcranial magnetic stimulation								
Low frequency repetitive transcranial magnetic stimulation with pinch motor training (a metronome-paced pinch of their index finger and thumb of the affected hand as fast as possible)	pinch motor training with sham repetitive transcranial magnetic stimulation								

Intervention	Compared to	Motor Funct.	Stroke Severity	Muscle Strength	Spasticity	ROM	Proprio-ception	ADLs	Dexterity
Low Frequency repetitive transcranial magnetic stimulation	ANodal transcranial direct current stimulation or Low Frequency repetitive transcranial magnetic stimulation with ANodal transcranial direct current stimulation								
Bilateral repetitive transcranial magnetic stimulation	Unaffected side repetitive transcranial magnetic stimulation or Affected side repetitive transcranial magnetic stimulation								
Paired associative stimulation (PAS) with Motor imagery	Sham PAS with motor imagery								
High-Frequency repetitive transcranial magnetic stimulation with Peripheral Somatosensory Stimulation (sensory level electrical stimulation and vibratory stimulation)	Sham repetitive transcranial magnetic stimulation with Peripheral Somatosensory Stimulation								
High-Frequency repetitive transcranial magnetic stimulation with Peripheral Somatosensory Stimulation (sensory level electrical stimulation and vibratory stimulation)	Low-Frequency repetitive transcranial magnetic stimulation with Peripheral Somatosensory Stimulation								
Simultaneous cathodal tDCS with 10hz rTMS	rTMS 10Hz with Sham tDCS								
Simultaneous anodal tDCS with 10hz rTMS	rTMS 10Hz with Sham tDCS								
Preconditioning cathodal tCDS with 10hz rTMS	rTMS 10Hz with Sham tDCS								
Preconditioning anodal tDCS with 10hz rTMS	rTMS 10Hz with Sham tDCS								
Interleaved combination method (ICM) repetitive transcranial magnetic stimulation with motor training	Preconditioned combination method (PCM) repetitive transcranial magnetic stimulation with motor training								
Active priming of low-frequency repetitive transcranial magnetic stimulation	sham priming								

Theta Burst Stimulation (TBS) (29 conclusions)

Intervention	Compared to	Motor Funct.	Stroke Severity	Muscle Strength	Spasticity	ROM	Proprio-ception	ADLs	Dexterity
Theta burst stimulation combined with other interventions	sham								
Intermittent theta burst stimulation with high definition transcranial direct current stimulation and rehabilitation	sham transcranial direct current stimulation with intermittent theta burst stimulation and rehabilitation								
Neuronavigated Continuous Theta Burst Stimulation	Cathodal -transcranial direct current stimulation								
Theta burst stimulation	sham								
Intermittent theta burst stimulation with upper-limb training	Continuous theta burst stimulation with upper-limb training								
Intermittent theta burst stimulation with dexterity training	Sham theta burst stimulation with dexterity training								
Intermittent theta burst stimulation with dexterity training	Continuous theta burst stimulation with dexterity training								
Intermittent theta burst stimulation with Physical therapy	Physical Therapy								
Intermittent theta burst stimulation with Physical therapy	functional electrical stimulation with Physical therapy								
Intermittent theta burst stimulation with Virtual reality-based cycling training (bilateral upper limb)	sham intermittent theta burst stimulation with VCT								
Continuous theta burst stimulation with intermittent theta burst stimulation and robot assisted therapy	sham continuous theta burst stimulation with sham intermittent theta burst stimulation and robot-assisted therapy								
Continuous theta burst stimulation with intermittent theta burst stimulation and robot assisted therapy	sham continuous theta burst stimulation with intermittent theta burst stimulation and robot assisted training								
Intermittent theta burst stimulation with peripheral magnetic stimulation and conventional rehab	peripheral magnetic stimulation with central sham stimulation and conventional rehab								
Intermittent theta burst stimulation with peripheral magnetic stimulation and conventional rehab	intermittent theta burst stimulation with sham peripheral stimulation and conventional rehab								
Continuous theta burst stimulation with Conventional therapy	Sham continuous theta burst stimulation with Conventional therapy								
Low frequency repetitive transcranial magnetic stimulation with intermittent Theta Burst Stimulation	Sham with sham								
Low frequency repetitive transcranial magnetic stimulation with intermittent Theta Burst Stimulation	Low frequency repetitive transcranial magnetic stimulation with sham theta burst stimulation								

Intervention	Compared to	Motor Funct.	Stroke Severity	Muscle Strength	Spasticity	ROM	Proprio-ception	ADLs	Dexterity
10 Sessions Low Frequency repetitive transcranial magnetic stimulation before 10 Sessions Intermittent Theta Burst Stimulation	Sham repetitive transcranial magnetic stimulation or intermittent theta burst stimulation								
10 Sessions Low Frequency repetitive transcranial magnetic stimulation before 10 Sessions Intermittent Theta Burst Stimulation	10 Sessions Low Frequency repetitive transcranial magnetic stimulation before 10 Sessions Intermittent Theta Burst Stimulation								
Low frequency repetitive transcranial magnetic stimulation with intermittent theta burst stimulation	Sham repetitive transcranial magnetic stimulation with sham ltbs								
Low frequency repetitive transcranial magnetic stimulation with intermittent theta burst stimulation	Sham repetitive transcranial magnetic stimulation with intermittent theta burst stimulation or Low frequency repetitive transcranial magnetic stimulation and sham intermittent theta burst stimulation								
Sham repetitive transcranial magnetic stimulation with intermittent theta burst stimulation	Low frequency repetitive transcranial magnetic stimulation with sham intermittent theta burst stimulation								
Repetitive peripheral magnetic stimulation (rPMS) with intermittent theta burst stimulation and rehabilitation	sham rPMS with intermittent theta burst stimulation and rehabilitation								
Robot-assisted therapy with intermittent theta burst stimulation and therapy	Robot-assisted therapy with therapy								
CTBS with robotic therapy	Sham stimulation with robotic therapy								
Modified Constraint-induced movement therapy (mCIMT) with iTBS	mCIMT								
MCIMT with sham iTBS	mCIMT								
Active HD-tDCS-eTBS (high definition transcranial electrical theta burst superimposing direct current stimulation) with UE rehab	sham with UE rehab								
real anodal tDCS with iTBS output during conventional rehabilitation	sham tDCS with iTBS output during conventional rehabilitation								

Transcranial Direct Current Stimulation (tDCS) (89 conclusions)

Intervention	Compared to	Motor Funct.	Stroke Severity	Muscle Strength	Spasticity	ROM	Proprio-ception	ADLs	Dexterity
Transcranial direct current stimulation	sham								
Anodal transcranial direct current stimulation with conventional physio	dual transcranial direct current stimulation with conventional physio								
Cathodal transcranial direct current stimulation with conventional physio	dual transcranial direct current stimulation with conventional physio								
Unilateral Hemisphere transcranial direct current stimulation	Dual Hemisphere transcranial direct current stimulation								
Anodal transcranial direct current stimulation with physical therapy and occupational therapy	Dual transcranial direct current stimulation with physical therapy and occupational therapy								
Anodal transcranial direct current stimulation	sham								
HD-transcranial direct current stimulation with Conventional therapy	a-transcranial direct current stimulation with Conventional therapy								
Anodal transcranial direct current stimulation at M1 and DLPFC	Anodal transcranial direct current stimulation at M1 only								
Dual transcranial direct current stimulation - on primary motor cortex and left dorsolateral prefrontal cortex (DLPFC)	transcranial direct current stimulation on M1 and sham transcranial direct current stimulation on DLPFC								
Dual transcranial direct current stimulation	sham								
Robot assisted therapy (InMotion WRIST Robot) with Anodal transcranial direct current stimulation	Robot assisted therapy with sham transcranial direct current stimulation								
Anodal transcranial direct current stimulation with Robot-Assisted Arm Training	Sham stimulation with Robot-Asssited Arm Training								
Dual transcranial direct current stimulation	Electroacupuncture								
Cathodal transcranial direct current stimulation with virtual reality	Sham transcranial direct current stimulation with virtual reality								
Anodal transcranial direct current stimulation with visuomotor gripforce tracking task	Sham transcranial direct current stimulation with visuomotor gripforce tracking task								
Cathodal transcranial direct current stimulation	sham								

Intervention	Compared to	Motor Funct.	Stroke Severity	Muscle Strength	Spasticity	ROM	Proprio-ception	ADLs	Dexterity
Anodal transcranial direct current stimulation on affected hemisphere with robot assisted arm training	Cathodal transcranial direct current stimulation on unaffected hemisphere with robot assisted arm training								
Bilateral transcranial direct current stimulation with motor imagery brain-computer interface	Sham transcranial direct current stimulation with motor imagery brain-computer interface								
Dual transcranial direct current stimulation combined with other interventions	sham or task-specific training								
Anodal transcranial direct current stimulation with occupational therapy	Sham with occupational therapy								
Dual transcranial direct current stimulation combined with other interventions	sham or fes								
Anodal transcranial direct current stimulation with virtual reality-based therapy and conventional physical therapy	conventional physiotherapy								
Anodal transcranial direct current stimulation with Repetitive Functional Task-Oriented Programme (RFTOP)	Repetitive Functional Task Oriented Programme								
Visuo-Motor Grip Force Tracking Task Training of the paretic hand with Anodal Unilateral transcranial direct current stimulation	Visuo-Motor Grip Force Tracking Task Training of the paretic hand with Placebo transcranial direct current stimulation								
Visuo-Motor Grip Force Tracking Task Training of the paretic hand with Anodal Unilateral transcranial direct current stimulation	Visuo-Motor Grip Force Tracking Task Training of the paretic hand with Bilateral transcranial direct current stimulation								
Anodal transcranial direct current stimulation with motor imagery and upper-limb functional training	sham tCDS with motor imagery and upper-limb functional training								
Anodal transcranial direct current stimulation with Virtual Reality	sham transcranial direct current stimulation with Virtual Reality								
Bilateral transcranial direct current stimulation with trunk restraint or training and Conventional physical therapy	Conventional physical therapy								
Bilateral transcranial direct current stimulation with trunk restraint or training and Conventional physical therapy	Sham transcranial direct current stimulation with trunk restraint or training and Conventional physical therapy								
Bilateral transcranial direct current stimulation with neuromuscular electrical stimulation and coventional care	Sham transcranial direct current stimulation and neuromuscular electrical stimulation with conventional care								
Anodal transcranial direct current stimulation with Upper extremity strength training	Sham transcranial direct current stimulation with Upper extremity strength training								
Dual transcranial direct current stimulation combined with other interventions	sham or exercise and custom physiotherapy protocols								
Bihemispheric transcranial direct current stimulation with Custum physiotherapy protocol	Unihemispheric transcranial direct current stimulation with Custum physiotherapy protocol								
Bilateral transcranial direct current stimulation with modified constraint-induced movement therapy and conventional rehab	Sham transcranial direct current stimulation with modified constraint-induced movement therapy and conventional rehab								
Anodal transcranial direct current stimulation with conventional	Sham transcranial direct current stimulation with conventional rehab								
Anodal tDCS with CIMT	sham tDCS with CIMT								
Bihemispheric transcranial direct current stimulation with Repetitive Peripheral Nerve Stimulation and Conventional Therapy	Sham transcranial direct current stimulation with Repetitive Peripheral Nerve Stimulation and Conventional Therapy								
Dual transcranial direct current stimulation with Sensorimotor training	Sham transcranial direct current stimulation with Sensorimotor training								
High frequency repetitive transcranial magnetic stimulation with cathodal transcranial direct current stimulation	High frequency repetitive transcranial magnetic stimulation								
Repetitive transcranial magnetic stimulation	Dual transcranial direct current stimulation								
Neuronavigated Continuous Theta Burst Stimulation	Sham								
Neuronavigated Continuous Theta Burst Stimulation	Cathodal -transcranial direct current stimulation								
Anodal transcranial direct current stimulation with robot assited arm training	robot assisted arm training with sham								
Robot-Assisted Therapy (RAT) with dual transcranial direct current stimulation	Robot-Assisted Therapy (RAT) with sham transcranial direct current stimulation								
Smart hand joint training device with bilateral transcranial direct current stimulation	Smart hand joint training device								
Personalized reach training (active control-restricted range) with anodal transcranial direct current stimulation and Virtual reality games	Personal reach training (active control-restricted range) with Sham transcranial direct current stimulation and video games								

Intervention	Compared to	Motor Funct.	Stroke Severity	Muscle Strength	Spasticity	ROM	Proprio-ception	ADLs	Dexterity
Intermittent theta burst stimulation with high definition transcranial direct current stimulation and rehabilitation	Sham intermittent theta burst stimulation and transcranial direct current stimulation with rehabilitation								
Intermittent theta burst stimulation with high definition transcranial direct current stimulation and rehabilitation	sham transcranial direct current stimulation with intermittent theta burst stimulation and rehabilitation								
Bilateral transcranial direct current stimulation with Robotic training	Sham transcranial direct current stimulation with Robotic training								
Different approaches to anodal tDCS combined with peripheral nerve stimulation and robot-assisted training	one another								
High-definition tDCS with EMG-driven robotic hand (EMG-RH)	Sham tDCS with EMG-RH								
Anodal tDCS combined with other interventions	sham								
Dual tDCS combined with other interventions	sham or cimt								
Sequential Combination of Anodal tDCS with Mirror Therapy	Sham tDCS with Mirror Therapy								
Bilateral tDCS before mirror therapy	tDCS during mirror therapy								
Bilateral tDCS before mirror therapy	Sham tDCS with mirror therapy								
tDCS during mirror therapy	Sham tDCS with mirror therapy								
Dual-tDCS combined with PNMES with CIMT	CIMT								
Anodal tDCS with Modified CIMT	Sham tDCS with CIMT								
Dual tDCS with Mirror therapy	tDCS with Sham mirror								
Cathodal tDCS with physical therapy	Physical therapy								
Cathodal tDCS with VR	VR:								
Cathodal tDCS with VR	Cathodal tDCS								
Cathodal tDCS	VR:								
Active rTMS with cathodal tDCS	sham rTMS with sham cathodal tDCS								
Real bilateral tDCS with resistance training exercise	sham tDCS with resistance training exercise								
Robot-assisted therapy with dual tDCS	Robot-assisted therapy with sham tDCS								
Virtual reality with aNodal tDCS	virtual reality with sham								
Bilateral tDCS and CIMT	Sham tDCS with CIMT								
Anodal tDCS Ipsilesional PMC with CIMT	Anodal tDCS Ipsilesional M1 with CIMT								
Anodal tDCS Ipsilesional PMC with CIMT	Sham Stimulation with cMIT								
Concurrent Combination of tDCS with Mirror Therapy	Sham tDCS with Mirror Therapy								
Cathodal tDCS with Modified CIMT	Sham tDCS with CIMT								
Short lasting bilateral transcranial direct current stimulation online (during motor training)	Long lasting bilateral transcranial direct current stimulation offline (incongruent with motor training) or Short lasting transcranial direct current stimulation offline (incongruent with motor training)								
Dual transcranial direct current stimulation combined with other interventions	sham or motor relearning programmes								
Active repetitive peripheral nerve sensory stimulation (RPPS) with sham transcranial direct current stimulation	Sham RRPS with sham transcranial direct current stimulation								
Active repetitive peripheral nerve sensory stimulation (RPPS) with sham transcranial direct current stimulation	Sham RRPS with Anodal transcranial direct current stimulation or Active RRPS and active transcranial direct current stimulation								
Low Frequency repetitive transcranial magnetic stimulation	ANodal transcranial direct current stimulation or Low Frequency repetitive transcranial magnetic stimulation with ANodal transcranial direct current stimulation								
Bimanual motor skill learning with robot-assisted training and transcranial direct current stimulation	bimanual motor skill learning with sham stimulation								
Anodal transcranial direct current stimulation with functional electrical stimulation	Sham transcranial direct current stimulation with functional electrical stimulation								
Simultaneous cathodal tDCS with 10hz rTMS	rTMS 10Hz with Sham tDCS								

Intervention	Compared to	Motor Funct.	Stroke Severity	Muscle Strength	Spasticity	ROM	Proprio-ception	ADLs	Dexterity
Simultaneous anodal tDCS with 10hz rTMS	rTMS 10Hz with Sham tDCS								
Preconditioning cathodal tCDS with 10hz rTMS	rTMS 10Hz with Sham tDCS								
Preconditioning anodal tDCS with 10hz rTMS	rTMS 10Hz with Sham tDCS								
Dual transcranial direct current stimulation with bimanual cooperative task training	sham dual tDCS with bimanual cooperative task training								
Anodal tDCS Ipsilesional M1 with CIMT	Sham Stimulation with cMIT								
Dual transcranial direct current stimulation with robot-assisted upper limb therapy	Sham dual-transcranial direct current stimulation with robot-assisted upper limb therapy								
Dual tDCS with methylphenidate	tDCS with placebo								
Dual tDCS with methylphenidate	Sham tDCS with methylphenidate								

Other Non-Invasive Brain Stimulation Methods (3 conclusions)

Intervention	Compared to	Motor Funct.	Stroke Severity	Muscle Strength	Spasticity	ROM	Proprio-ception	ADLs	Dexterity
Transcranial Random Noise stimulation (tRNS) with FES	Sham-tRNS with active FES								
BCI-based, Low-Frequency, Frequency-Tuned Electromagnetic Network Targeting Field (ENTF) Therapy (BCI-EMF) with conventional therapy	Sham BCI-EMF with conventional therapy								
TNRS with GRASP	Sham tRNS with GRASP								

Botulinum Toxin (35 conclusions)

Intervention	Compared to	Motor Funct.	Stroke Severity	Muscle Strength	Spasticity	ROM	Proprio-ception	ADLs	Dexterity
Botulinum toxin (botox)	sham								
Botulinum Toxin A with Task Specific Training	Task-Specific Training								
Botulinum Toxin A injection with neuromuscular electrical stimulation	Placebo with neuromuscular electrical stimulation								
Intramuscular botulinum toxin A with physiotherapy	Intra-articular triamcinolone acetonide injection with physiotherapy								
BtxA (Dysport) with modified constraint-induced movement therapy	BtxA (Dysport) with conventional rehabilitation								
Botulinum toxin (botox) combined with other interventions	botulinum toxin (botox)								
Botulinumtoxin therapy in combination with dynamic electric neurostimulation (the explanation is consistent with transcutaneous electrical nerve stimulation) and basic therapy, including massage and therapeutic exercises	Basic Therapy								
Botulinumtoxin therapy in combination with dynamic electric neurostimulation (the explanation is consistent with transcutaneous electrical nerve stimulation) and basic therapy, including massage and therapeutic exercises	Botulinum toxin therapy and basic therapy								
Botulinumtoxin therapy in combination with dynamic electric neurostimulation (the explanation is consistent with transcutaneous electrical nerve stimulation) and basic therapy, including massage and therapeutic exercises	Dynamic electric neurostimulation and basic therapy								
Onabotulinumtoxin-A	Suprascapular Nerve Block								
Botulinum toxin type A injection with programme of upper limb therapy	upper limb therapy programme								
Botulinum toxin A injection with structured stretching exercises and conventional rehabilitation	Self-stretching exercises with conventional rehabilitation								
Robot assisted training with Botox	Conventional treatment with Botox								
Extracorpeal shockwave	Botox								

Intervention	Compared to	Motor Funct.	Stroke Severity	Muscle Strength	Spasticity	ROM	Proprio-ception	ADLs	Dexterity
Condensed Robot-assisted training with botulinum toxin A and Functional training	Distributed robot-assisted training with botulinum toxin A and Functional training								
Repetitive facilitative exercise (RFE) with botulinum toxin A injection, conventional self-training and conventional rehab	repetitive facilitative exercise (RFE) with conventional self-training and conventional rehab								
Botulinum toxin (botox) combined with other interventions	botulinum toxin (botox) or conventional therapy								
Botulinum toxin (botox)	conventional therapy								
Robot-assisted training (Bi-Manu-Track BMT robotic arm) with BoNT-A injection and functional practice	conventional task-oriented movement training with BoNT-A injection and functional practice								
Mirror therapy with BoNT-A injection and functional practice	conventional task-oriented movement training with BoNT-A injection and functional practice								
Botulinum toxin A with robotic training	Robotic training								
FES with botulinum toxin-A and home based task-oriented exercise	Botulinum toxin-A with home-based exercise program								
Intramuscular botulinum toxin A	Placebo								
Botox with movement training	Botox plus excercise handout								
Bot toxin A with physiotherapy	baclofenum with physiotherapy								
Different approaches to botulinum toxin (botox)	one another								
Letibotulinumtoxin (Botulax)	onabotuliNomtoxin (Botox)								
Non-Targeted High Volume Botulinum Toxin	Endplate-Targeted Low Volume Botulinum Toxin or Non-Targeted Low Volume Botulinum Toxin								
Botox-A with adhesive taping	Botox-A with Manual Stretching (with splint to maintain maximum stretching)								
Ultrasound guided BotulinumToxin A Injections	No treatment								
Botox 1000u with cyclic neuromuscular electrical stimulation	Placebo								
Botolinum Toxin-A with Extracorporeal shock wave therapy (extracorporeal shockwave therapy)	botulinum toxin A with electrical stimulation (ES)								
Transcutaneous electrical nerve stimulation with BTA infiltration	transcutaneous electrical nerve stimulation with Placebo 2.5mL saline								
Botox with intensive rehabilitation program	Botox								
Suprascapular botulinum toxin A injections	placebo								

Antispastic Medications (7 conclusions)

Intervention	Compared to	Motor Funct.	Stroke Severity	Muscle Strength	Spasticity	ROM	Proprio-ception	ADLs	Dexterity
Antispastic medications	sham								
Cyproheptadine with EMG-controlled VAEDA glove	Placebo with EMG-controlled VAEDA glove or Placebo with passive stretching VAEDA with glove								
Intramuscular botulinum toxin A	Placebo								
Isradipine	Placebo								
Isradipine	Tizanidine								
Bot toxin A with physiotherapy	baclofenum with physiotherapy								
Intrathecal Baclofen	Conventional Spasticity Management								

Nerve Block (14 conclusions)

Intervention	Compared to	Motor Funct.	Stroke Severity	Muscle Strength	Spasticity	ROM	Proprio-ception	ADLs	Dexterity
Ultrasound-guided stellate ganglion block with Conventional Therapy	Conventional therapy								

Intervention	Compared to	Motor Funct.	Stroke Severity	Muscle Strength	Spasticity	ROM	Proprio-ception	ADLs	Dexterity
Ultrasound-guided stellate ganglion block with Conventional Therapy	Ultrasound-guided stellate ganglion block with Extracorporeal shock wave therapy and Conventional therapy								
Extracorporeal shock wave therapy with Conventional therapy	Ultrasound-guided stellate ganglion block with Extracorporeal shock wave therapy and Conventional therapy								
Ultrasound-guided stellate ganglion block with Conventional Therapy	Extracorporeal shock wave therapy with Conventional therapy								
Onabotulinumtoxin-A	Suprascapular Nerve Block								
Suprascapular nerve block (methylprednisone with bupivacaine hydrochloride)	Placebo (saline injection)								
Transcutaneous electrical nerve stimulation with conventional rehab	Suprascapular nerve block with conventional rehab								
Suprascapular nerve block	Ultrasound								
Lidocaine Injection (suprascapular nerve block)	Placebo injection								
Lidocaine Injection (suprascapular nerve block)	5ml Lidocaine AND betamethasone								
Intra-Articular Steroid Injection (IASI)	Suprascapular Nerve Block (SSNB)								
Suprascapular nerve pulsed radiofrequency	Suprascapular Nerve Block with lidocain								
Different approaches to nerve block	one another								
Anesthesia of Intact Hand	No Anesthesia								

Steroids (13 conclusions)

Intervention	Compared to	Motor Funct.	Stroke Severity	Muscle Strength	Spasticity	ROM	Proprio-ception	ADLs	Dexterity
Steroids	sham								
Steroids	conventional therapy								
Dual corticosteroid injection with conventional therapy	single corticosteroid injection with conventional therapy								
Ultrasonic-guided betamethasone local injection with Rehabilitation	Extracorporeal shock wave therapy with Rehabilitation								
Intramuscular botulinum toxin A with physiotherapy	Intra-articular triamcinolone acetonide injection with physiotherapy								
Oral Prednisolone	Discontinued Prednisone								
Triamcinolone acetonide with transcutaneous electrical nerve stimulation and Therapeutic exercise program	transcutaneous electrical nerve stimulation with Therapeutic exercise program								
Intra-Articular Steroid Injection (IASI)	Suprascapular Nerve Block (SSNB)								
Lidocaine Injection (suprascapular nerve block)	Placebo injection								
Lidocaine Injection (suprascapular nerve block)	5ml Lidocaine AND betamethasone								
Pulsed Radiofrequency with rehabilitation therapy	Intra-articular corticosteroid injection with rehabilitation therapy								
Hyaluronic acid (2mL)	Triamcinolone acetonide (40mg)								
Oral Prednisolone	Oral Piroxicam								

Cerebrolysin (1 conclusion)

Intervention	Compared to	Motor Funct.	Stroke Severity	Muscle Strength	Spasticity	ROM	Proprio-ception	ADLs	Dexterity
Cerebrolysin	sham								

Levodopa (2 conclusions)

Intervention	Compared to	Motor Funct.	Stroke Severity	Muscle Strength	Spasticity	ROM	Proprio-ception	ADLs	Dexterity
Amphetamine with Levodopa and conventional physiotherapy	Amphetamine-Placebo with Levodopa-Placebo and conventional physiotherapy								
Levodopa (L-DOPA) with Carbidopa	Placebo								

Statins and Antihypertensives (6 conclusions)

Intervention	Compared to	Motor Funct.	Stroke Severity	Muscle Strength	Spasticity	ROM	Proprio-ception	ADLs	Dexterity
Secondary prevention (atorvastatin and clopidogrel) with physical rehabilitation	physical rehabilitation								
Telmisartan	Mannitol								
Olmesartan	Amlodipine								
Phosphodiesterase inhibitor 6mg	Sham								
Isradipine	Placebo								
Isradipine	Tizanidine								

Antidepressants (3 conclusions)

Intervention	Compared to	Motor Funct.	Stroke Severity	Muscle Strength	Spasticity	ROM	Proprio-ception	ADLs	Dexterity
Antidepressants	sham								
Active repetitive transcranial magnetic stimulation with fluoxetine	Sham repetitive transcranial magnetic stimulation with placebo fluoxetine								
Active repetitive transcranial magnetic stimulation with fluoxetine	Sham repetitive transcranial magnetic stimulation with fluoxetine								

Central Nervous System Stimulants (6 conclusions)

Intervention	Compared to	Motor Funct.	Stroke Severity	Muscle Strength	Spasticity	ROM	Proprio-ception	ADLs	Dexterity
Dextroamphetamine with physiotherapy	Placebo with Physiotherapy								
Amphetamine with Levodopa and conventional physiotherapy	Amphetamine-Placebo with Levodopa-Placebo and conventional physiotherapy								
Central nervous system stimulants	sham								
CIMT-6hr with cycloserine	CIMT-6hr with placebo								
Dual tDCS with methylphenidate	tDCS with placebo								
Dual tDCS with methylphenidate	Sham tDCS with methylphenidate								

Neuroprotectants and Regenerative Therapies (5 conclusions)

Intervention	Compared to	Motor Funct.	Stroke Severity	Muscle Strength	Spasticity	ROM	Proprio-ception	ADLs	Dexterity
Stem cell therapy	conventional therapy								
Neuroprotective biologics	sham								
Hyperabaric oxygen therapy	Sham Hyperbaric oxygen therapy								
Erythropoiegtin with Granulocyte-Colony Stimulating Factor	Placebo								

Intervention	Compared to	Motor Funct.	Stroke Severity	Muscle Strength	Spasticity	ROM	Proprio-ception	ADLs	Dexterity
Platelet-Rich Plasma Injections	Placebo Injections								

Other Pharmacological and Medical Interventions (15 conclusions)

Intervention	Compared to	Motor Funct.	Stroke Severity	Muscle Strength	Spasticity	ROM	Proprio-ception	ADLs	Dexterity
Segmental neuromyotherapy (SNMT) with therapy	therapy								
Hyaluronic acid	sham								
Traditional medicines and massage	piracetam with usual post-stroke medications								
Acupuncture (aligned acupuncture at the muscle regions plus cutaneous needle therapy)	Piracetam Injection								
Donepezil with constraint-induced movement therapy	Placebo with constraint-induced movement therapy								
Lithium 300mg with Conventional therapy	Placebo tablet with Conventional therapy								
Atomoxetine with Task Oriented Upper Extremity Training	Placebo with Task Oriented Upper Extremity Training								
Major ozonated autohemotherapy with stroke usual medical management	stroke usual medical management								
Vitamin D Supplementation	Placebo								
Individualized homeopathic medicines with physiotherapy	Placebo with physiotherapy								
Telmisartan	Mannitol								
Conv rehab with Soymilk Ingestion	Conv rehab with Placebo Milk Ingestion								
Nabiximol cannabinoid	Placebo nabiximol								
Etanercept	Placebo (saline)								
Hyaluronic acid (2mL)	Triamcinolone acetonide (40mg)								

Acupuncture (33 conclusions)

Intervention	Compared to	Motor Funct.	Stroke Severity	Muscle Strength	Spasticity	ROM	Proprio-ception	ADLs	Dexterity
Acupuncture	conventional therapy								
Contralateral acupuncture	conventional acupuncture								
Acupuncture	sham								
Different approaches to Acupuncture	one another								
Acupuncture	Physiotherapy Bobath								
Acupuncture	Acupuncture with Physiotherapy Bobath								
Physiotherapy Bobath	Acupuncture with Physiotherapy Bobath								
Acupuncture (aligned acupuncture at the muscle regions plus cutaneous needle therapy)	Piracetam Injection								
Acupuncture combined with other interventions	acupuncture								
Different approaches to dry Needling	one another								
Dry Needling	sham								
Physiotherapy	Acupuncture								
Physiotherapy	Physiotherapy with Acupuncture								
Acupuncture	Physiotherapy with Acupuncture								
Dry Needling with Neurorehabilitation protocol (electrotherapy (functional electrical stimulation and hot pack) and stroke conventional exercise)	Sham-Needling with functional electrical stimulation with hot pack and Conventional exercise training								

Intervention	Compared to	Motor Funct.	Stroke Severity	Muscle Strength	Spasticity	ROM	Proprio-ception	ADLs	Dexterity
Dry Needling with exercise therapy	Exercise therapy								
Low frequency repetitive transcranial magnetic stimulation with scalp acupuncture	Scalp Acupuncture								
Scalp cluster acupuncture with constraint-induced movement therapy	Body acupuncture with traditional rehabilitation								
Botox with dry needling and conventional rehab	Botox with conventionalrehab								
Standard Acupuncture with Shixuan & Xiaohai acupoints with Functional training	Standard Acupuncture only with Functional training								
Scalp acupuncture (SA)	Conventional therapy								
Repetitive transcranial magnetic stimulation (rTMS)	Conventional therapy								
SAEM-CS- SA and electromagnetic convergence stimulation (SA and LF-rTMS simultaneously)	Conventional therapy								
Scalp acupuncture (SA)	SAEM-CS- SA and electromagnetic convergence stimulation (SA and LF-rTMS simultaneously)								
Repetitive transcranial magnetic stimulation (rTMS)	SAEM-CS- SA and electromagnetic convergence stimulation (SA and LF-rTMS simultaneously)								
Scalp acupuncture (SA)	Repetitive transcranial magnetic stimulation (rTMS)								
Dry Needling	conventional therapy								
Dry needling	Dry needling								
Electroacupunture with acupuncture therapy	acupuncture therapy								
Traditional Chinese medicine with Tuina treatment (massage techniques), Acupuncture kinesiotherapy and Basic stroke treatment	Basic stroke treatment with modern rehabilitation techniques								
Acupuncture combined with other interventions	conventional therapy								
Electroacupuncture with Standard rehab	Minimal acupuncture with Standard rehab								
Acupuncture with individualized rehabilitation training	individualized rehabilitation training alone								

Electroacupuncture and Transcutaneous Electrical Acupoint Stimulation (11 conclusions)

Intervention	Compared to	Motor Funct.	Stroke Severity	Muscle Strength	Spasticity	ROM	Proprio-ception	ADLs	Dexterity
Electroacupuncture and transcutaneous electrical acupoint stimulation	sham								
Different approaches to Electroacupuncture and transcutaneous electrical acupoint stimulation	one another								
Electroacupuncture and transcutaneous electrical acupoint stimulation	conventional therapy								
Electroacupoint stimulation with conventional rehab	Sham stimulation with conventional rehab								
Electroacupuncture with moxibustion	Regular rehabilitation therapy								
Dual transcranial direct current stimulation	Electroacupuncture								
Electroacupuncture with massage	Conventional therapy								
Electroacupuncture with cycling	Electroacupuncture								
Transcutaneous electrical acupoint stimulation	Transcutaneous electrical acupoint stimulation								
Electroacupuncture with strength training	Strength training								
Electroacupunture with acupuncture therapy	acupuncture therapy								

Meridian Acupressure and Massage Therapy (7 conclusions)

Intervention	Compared to	Motor Funct.	Stroke Severity	Muscle Strength	Spasticity	ROM	Proprio-ception	ADLs	Dexterity
Massage	Traditional medicine (Conventional unani drug therapy (Munzij, Mushil, Muaqwwi Aasab))								
Electroacupuncture with massage	Conventional therapy								
Vibrational heated pressure therapy with Meridian dredging exercise and conventional rehab	meridian dredging exercise with conventional treatment								
Tui Na Chinese massage therapy with conventional rehabilitation	sham with conventional rehabilitation								
Nurse-led acupressure with usual care	usual care alone								
Meridian acupressure and massage therapy	conventional therapy								
Traditional Chinese medicine with Tuina treatment, Acupuncture and standard therapy	Kinesiotherapy exercises with standard therapy								

Traditional Herbal Medicine (7 conclusions)

Intervention	Compared to	Motor Funct.	Stroke Severity	Muscle Strength	Spasticity	ROM	Proprio-ception	ADLs	Dexterity
Traditional medicines and massage	piracetam with usual post-stroke medications								
Traditional herbal medicines	conventional therapy								
Traditional herbal medicines	sham								
Massage	Traditional medicine (Conventional unani drug therapy (Munzij, Mushil, Muaqwwi Aasab))								
Electroacupuncture with moxibustion	Regular rehabilitation therapy								
Traditional Chinese medicine with Tuina treatment (massage techniques), Acupuncture kinesiotherapy and Basic stroke treatment	Basic stroke treatment with modern rehabilitation techniques								
Electroacupunture with acupuncture therapy	acupuncture therapy								

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