Question 31 evidence tables

# Question 31: Does mirror therapy improve arm function after a stroke?

*NB Any discrepancies between reviewers in evidence quality and comment were discussed at the corresponding evidence review meeting*

MT = mirror therapy, ITT = intention to treat, OT = occupational therapy, tDCS = transcranial direct current stimulation, ARAT = action research arm test, FMA = Fugl-Meyer Assessment scale, MAL = motor activity log, AFT-FAS = Arm Functional Test-Functional Ability Scale, AFT-T = Arm Functional Test-Time, FMA-UE = Fugl-Meyer Assessment-Upper, MI-EU = Motricity Index of the upper extremity, WMFT = Wolf Motor Function Test, BBT = Box and Blocks Test, MMSE = mini mental state exam, MCID = minimum clinically important difference, ES = electrical stimulation, CR = conventional rehabilitation, NMES = neuromuscular electrical stimulation, EMG = electromyography, SR = systematic review, MA = meta-analysis, RCT = randomised controlled trial, IPDMA = individual patient data meta-analysis, MDT = multidisciplinary team, PICO = patient/population, intervention, comparison and outcomes, OR = odds ratio, CI = confidence interval, QoL = quality of life, ADL = activities of daily living, OR = odds ratio, RR = relative risk, aOR = adjusted odds ratio, cOR = crude odds ratio, CI = confidence interval, RoB = risk of bias, I2 = heterogeneity statistic.

| Ref ID | Source | Setting, design and subjects | Intervention | Outcomes | Results | Evidence quality (SIGN checklist score) and comment |
|---|---|---|---|---|---|---|
| 159 | P. Antoniotti et al. (2019). No evidence of effectiveness of mirror therapy early after stroke: an assessor-blinded randomized controlled trial. *Clinical rehabilitation,* 33(5): 885-893 | Inpatient rehabilitation centre in Italy. Single blind (assessor) RCT. Stroke patients (1st stroke) resulting in hemiparesis, enrolled within 4 weeks of stroke, adults (between 18 and 80) intact cognition (mini mental state >=24); no or mild comprehension deficits (token test score >40) with no significant uncorrectable visual deficit, and no other condition that would cause motor deficit. N=40 randomised to one of two arms, n=35 completed the study. demographics of patients that completed trial (n=35)= Age (SD): Sham therapy (ST) group n=19, 69.5 (14.1); Mirror therapy (MT) n=16, 68.2 (14.4). Sex: ST= 8 women, MT= 6 women. Time since stroke: ST=22 days (9.28); | MT (n=16) and ST (n=19) were treatments were added to a conventional rehabilitation programme. MT: A mirror (45 cm × 40 cm) was positioned between the two arms, at right angle with the patient's trunk. ST: the mirror was flipped so that the non-reflective side only was visible. Both groups performed the same movements which were simple, (e.g. flexion-extension of the elbow with the pronated forearm or | Primary outcome was the Fugl-Meyer Upper Extremity scale. Secondary outcomes included Action Research Arm Test and Functional Independence measure, Time points: baseline and 6 weeks (after completion of study) | Fugl Meyer upper extremity assessment: Baseline = ST = 30.9 (23.9); 6 weeks=40.6 (21.3); Baseline= MT 28.5 (21.8); 6 weeks=38.3 (23.4). Difference between MT and ST at 6 weeks (ITT, last measurement carried forwards) = 0 (95% Ci=16.1 to 16); No significant difference between groups. Action research arm test: Baseline= ST = 25.1 (25.5.); 6 weeks=31.9 (23); Baseline MT=23.5 (24.0); 6 weeks=30 (24.1). Difference between MT and ST at 6 weeks (ITT, last measurement carried forwards) = -1.9 (95% CI=-17 to 13.2). There were no significant differences between groups . | **+**<br><br>Moderate quality overall. Utilised block randomisation, allocation concealed from assessors but treating therapists are likely to have known about groups. Unclear how patients were blinded (therefore assumed not). Not sure if outcome tools were measured reliably and validly as training (e.g. for ARAT) was not stated. Drop outs = MT: 20% (n=4); ST= (5%) n=1. Conducted on one site therefore limited generalisability to others. Sample size needed = 20 in each group to detect a difference on primary outcome. After drop outs, the |

| Ref ID | Source | Setting, design and subjects | Intervention | Outcomes | Results | Evidence quality (SIGN checklist score) and comment |
|---|---|---|---|---|---|---|
| | | MT=23.3 (6.57). Side of stroke: ST=left=13; MT=left=13; Handedness: ST= right=20; MT=right=20 | flexion–extension of the wrist) , complex (e.g. simple movements performed with the elbow flexed at 45° or simple movements performed with the elbow flexed at 45° and lifted from the table and functional movements (e.g. reaching, grasping and moving or using different objects). One to one therapist supervision. Each session was 30 minutes long and 10 movements were practised in each session. Both groups had ST or MT once a day, five days a week for 30 days. From day 1 to 10, from day 11 to 20 and from day 21 to 30, patients practised simple, complex and functional movements. Conventional rehab comprised Physiotherapy 45 minutes, twice daily, five days a week plus Occupational Therapy 45 mins, once a day | | | sample size fell short of this (by n=5). No change in not recommending Mirror Therapy for motor recovery of the upper limb. This study did not focus on sensation and so there is no change to this section in the guidelines. |

| Ref ID | Source | Setting, design and subjects | Intervention | Outcomes | Results | Evidence quality (SIGN checklist score) and comment |
|---|---|---|---|---|---|---|
| | | | between 2 and 5 days a week. | | | |
| 159 | P. Antoniotti et al. (2019). No evidence of effectiveness of mirror therapy early after stroke: an assessor-blinded randomized controlled trial. *Clinical rehabilitation,* 33(5): 885-893 | Setting Italy. Neurorehabilitation Unit. RCT; Assessor-blinded. N=40 acute stroke. First ever ischaemic or haemorrhagic stroke within 4 weeks. Powered to detect MCID for 40 patients. Moderate -to-Severe UL impairment. | Computer generated random.40 stroke patient: 2 gps. MT (20 pts) vs Shame control gp (20 pts) .Intervention & sham therapy received 1:1 sessions, lasting 30 mins each, once daily, 5 days a week. 30 days (30 sessions). Patients practised simple, comlex and functional movements. Each session consisted of 10 different movements. In addition conventional therapy ( PT= 45 mins per session twice daily 5 days a week. OT 45 mins per session once a day 2 to 5 days per week). | FMA-UE -Primary outcome measure . Secondary outcome ARAT and FIM. Used blinding of outcome assessors. Performed intervention to treat analysis. Outcomes measured at baseline and at the end of treatment after 6 weeks. Assessors were blinded to group allocation. | No significant difference between the groups on FMA-UE and ARAT, FIM scores. | **++**<br><br>Minimised bias, intention to treat, powered sample size, blinded assessors, description of conventional therapy. No evidence of effectiveness of mirror therapy in early stroke. No follow up outcome measures. |
| 96 | R. H. Da-Silva et al. (2018). Self-directed therapy programmes for arm rehabilitation after stroke: a systematic review. *Clin Rehabil,* 32:8 1022-1036 | SR investigating the effectiveness of self-directed arm interventions post stroke. Included 40 studies (=1172 participants) up to Feb 2018. Followed PROSPERO. Included studies of self-directed arm interventions for participants over 18 years with any stroke related arm deficit, regardless of time since onset. An | Wide range of interventions (+ technologies) were included. | Outcomes varied across the included studies. | 19 RCTs and 21 before-after studies included in the SR. Studies grouped according to "no technology" or the "main additional technology" used. Only 1 of the included studies involved mirror therapy. Meta analyses conducted within each technology sub group to reduce heterogeneity of | **+**<br><br>This was a broad review including a wide range of different upper limb interventions, and with a focus on self-directed practice. Only one of the 40 papers included in this SR investigated mirror therapy - therefore it would be |

| Ref ID | Source | Setting, design and subjects | Intervention | Outcomes | Results | Evidence quality (SIGN checklist score) and comment |
|---|---|---|---|---|---|---|
| | | intervention was classified as self-directed if at least 50% of the overall intended duration of therapy practice was independently initiated and carried out by the participant, in accordance with a pre-defined protocol. Meta analysis completed where participants had been randomised and clinical outcomes of arm functuon and/or independent use in ADLs was reported. Randomised studies underwent an assessment using Cochrane Risk of Bias Tool. | | | measures used. Treatment effect sizes were based on mean scores and s.d. from the randomised studies. | more relevant to ensure that specific paper is reviewed as part of this recommendation. |
| 96 | R. H. Da-Silva et al. (2018). Self-directed therapy programmes for arm rehabilitation after stroke: a systematic review. *Clin Rehabil,* 32:8 1022-1036 | SR & MA; 40 studies, any stroke related arm deficit, 1 mirror therapy participant only. | Self directed arm intervention with more than 50% of intended therapy practise was independently initiated and carried out by participant. | ARAT | Showed no impact on ARAT. | **+**<br><br>No evidence to support recommendation of mirror box therapy, sample size too small. |
| 165 | N. Darbois et al. (2018). Do Robotics and Virtual Reality Add Real Progress to Mirror Therapy Rehabilitation? A Scoping Review. *Rehabilitation Research & Practice Print,* 2018: 6412318 | This is a scoping review not specifically looking at effectiveness, but state of the research activity. Clear eligibility criteria but population is healthy subjects and any kind of patents. The review included 5 small RCTs with a total of 152 stroke participants. | Robotic or computerized mirror therapy. | Multiple and heterogeneous. | Not clear | **0**<br><br>Unacceptable for our purposes, the review was a scoping review and although the largest studies found were five stroke RCTs the numbers were small (27,30,54,30,21,) not all focussed on the upper limb, and these RCTs were not assessed properly for quality. |

| Ref ID | Source | Setting, design and subjects | Intervention | Outcomes | Results | Evidence quality (SIGN checklist score) and comment |
|---|---|---|---|---|---|---|
| 165 | N. Darbois et al. (2018). Do Robotics and Virtual Reality Add Real Progress to Mirror Therapy Rehabilitation? A Scoping Review. *Rehabilitation Research & Practice Print,* 2018: 6412318 | Scoping review. 75 articles. n=unknown. Healthy ppl or pts (7 RCTs on Stroke). | Computarized or rotobtic mirror thearpy (MT) or full body illusion +/- control. | Any outcome. Most common: pain, satisfaction, body fx + activities, motor fx, spasticity level, illusion level. | Low quality evidence. 81% (61 studies) found postive for ↓ pain, ↓spasticity ↑ motor skills ↑ satisfaction with 2nd gen MT. 19% (4 studies) found positive effect for all outcomes and patients. | Limited focus on stroke. Very low level of evidence and low quality of review. |
| 166 | D. Gandhi et al. (2020). Mirror therapy in stroke rehbilitation: Howearly, whyand effectssystematic review and meta analysis. *International Journal of Stroke,* 15(1 SUPPL): 57-58 | meta-analysis to - to determine the role of MT in improvement of ICIDH-2 (International Classification of Functioning, Disability, and Health) based outcomes of impairment, functional limitation, and participation restriction in the acute and chronic phases poststroke. 16 studies included 416 participants. | Mirror therapy, no specification on type or intensity. | Impairment: FMA, Brunnstrom stages, activity limitation: box and block test, independence ADL FIM | Brunnstrom stages acute phase: Arm MD 0.79, (0.05-1.54), hand MD 1.41 (0.8,2.01); no chronic results; FMA MD 2.77 (1.23,6.78); acute MD 1.66 (16.13,9.44); Box block test: no numerical results given; FIM both phases combined MD 3.61 (2.05,5.16). | Poor quality. There are a few details missing e.g. documentation of quality scores for each study, what was done about poor quality studies, heterogeneity found, and there may be publication bias in the results as not all outcomes are reports for acute and chronic also there is no detail on control conditions parity with intensity of the MT intervention, so interpretation is difficult. |
| 166 | D. Gandhi et al. (2020). Mirror therapy in stroke rehbilitation: Howearly, whyand effectssystematic review and meta analysis. *International Journal of Stroke,* 15(1 SUPPL): 57-58 | SR with meta-analysis of 16 RCTs including 416 participants. Settings: no information. Participants included those in acute, subacute and chronic stages. No other information on participant characteristics. | Mirror Therapy dose: intervention period ranged from 3 weeks to 4 months; frequency ranged from 3x pw to 2x pd; session duration ranged from 0.5 to 6 hours. In some studies MT was combined with other interventions | Upper limb motor impairment: FMA and Brunnstrom motor recovery stages Activity limitation: Box and Blocks Test (BBT) Participation restriction: FIM. | Statistically significant improvements in MT compared to Control in Brunnstrom motor recovery stages (arm and hand), FIM. Clinical importance not discussed. No significant between-group difference in FMA, BBT. Note: no evidence of adverse effects reported. | - Findings appear promising but absence of information, particularly on participant and intervention characteristics, impairs the ability to make recommendations. |

| Ref ID | Source | Setting, design and subjects | Intervention | Outcomes | Results | Evidence quality (SIGN checklist score) and comment |
|---|---|---|---|---|---|---|
| | | | but time allocated to MT not reported.<br>MT content: not reported.<br>Control interventions: no information on dose or content reported. | | None of the studies evaluated long-term effects, i.e. 6 months or more after end of the intervention period. | |
| 3 | D. Geller; D. M. Nilsen; L. Quinn; S. Van Lew; C. Bayona; G. Gillen | Outpatient OT department. Randomised controlled pilot trial with single blinding. Participants were aged 19 to 85 with a first-time stroke >3 months; Fugl-Meyer Assessment (FMA) score of 10–50 indicating moderate-to-severe arm impairment, able to follow directions and ability to grasp and release a washcloth with the affected hand. No hearing or visual impairments, aphasia or had botox in limb in last 3 months. Participants were randomised to either unimanual mirror therapy (n=10), bimanual mirror therapy (n=7) or usual care/traditional OT (n=8). | All participants undertook the home-based program for 30-min a day and 5 days a week. Each session was divided into three 10-min categories: (1) moving the arm/hand, (2) functional task with objects, and (3) object manipulation. The unimanual MT group placed their unaffected hand inside the mirror box, the bimanual group performed the tasks with both hands and the traditional therapy group performed the tasks without a mirror. All participants also received two 45 minute standard OT sessions in the clinic, plus 30 mins with a research OT every week. The | Primary outcome was the Action Research Arm Test. Secondary outcomes included the Fugl Meyer upper extremity assessment, the ABILHand, Grip strength, Stroke Impact Scale. Outcomes were measured at baseline and after the programme (6 weeks). | No ITT analysis. 3 patients in unimanual MT group dropped out. Data analysed for n=7 in unimanual group, n=7 in bimanual group and n=8 in traditional OT group. ARAT: no difference between groups but significant improvement for overall cohort from baseline to end. All secondary outcome measures also improved with time but showed no significant difference between groups. | -<br>Low quality as no ITT, no checking on the effectiveness of blinding, unclear if patients were blinded, not clear if training for outcome tools was provided and no mention of power with such small sample sizes. Conclusions were that mirror therapy was no more effective than usual care/traditional OT. Sample was so small that statistical differences were unlikely to be found. Authors suggest that n=54 would be required in future work. |

| Ref ID | Source | Setting, design and subjects | Intervention | Outcomes | Results | Evidence quality (SIGN checklist score) and comment |
|---|---|---|---|---|---|---|
| | | | intervention lasted for 6 weeks. | | | |
| 161 | D. Geller et al. (2021). Home mirror therapy: a randomized controlled pilot study comparing unimanual and bimanual mirror therapy for improved arm and hand function post-stroke. *Disability and rehabilitation,* : 01-Sep | RCT, n= 22, patients with subacute ischaemic stroke with the level of moderate to severe arm impairment. Randomised into 3 groups of intervention: unimanual (UMT), bimanual (BMT) or traditional OT. | 6 week programme of 2 days of OT, weekly session with research OT and 30 mins of a home based programme 5 days a week. | ARAT, ABILHAND, Fugl-Meyer (FMA) , grip strength and SIS. | Did not differ significantly on outcomes but indicators of clinical significance in favour of UMT at activity level. | **++**<br><br>Supports mirror box therapy. No definite conclusions between UMT or BMT. |
| 162 | M. Jin et al. (2019). Timing-dependent interaction effects of tDCS with mirror therapy on upper extremity motor recovery in patients with chronic stroke: A randomized controlled pilot study. *Journal of the Neurological Sciences,* 405 (no pagination): | Not clearly specified. Presumably community dwelling stroke survivors (recruited from stroke groups) with chronic stroke who attended a rehab centre. Design: A randomized, controlled pilot trial was conducted, wherein participants admitted consecutively were randomly allocated to one of three training groups to receive either prior tDCS then MT, concurrent tDCS and MT or sham tDCS and MT. Participants were suitable if they were aged ≥18 years old) who had experienced their first stroke more than six months ago; 2) upper extremity impairment ≥ second level in the Functional Test for the Hemiparetic Upper Extremity (FTHUE) [20]; 3) medically stable; 4) Mini-Mental State Examination (MMSE) score | 3 groups all n=10 at baseline. 1) had dual tDCS applied before MT (prior-tDCS group); 2) had dual tDCS applied simultaneously with MT (concurrent-tDCS group); and 3) had dual sham-tDCS applied before or simultaneously with MT (sham-tDCS group). Consequently this study cannot tell us about the effectiveness of MT alone. MT comprised five table-top tasks. The participants were instructed to perform as many trials as possible in each | 3 motor scales were used for the primary outcome. Fugl-Meyer Assessment-Upper Extremity Subscore (FMA-UE), the Action Research Arm Test (ARAT) and the Box and Block Test (BBT). All were conducted at baseline (T0), immediately post-intervention (T1), and at the two-week follow-up (T2) by trained investigators. | Final numbers: 1. Prior tDCS n=9, 2. Concurrent tDCS n=10, 3. Sham tDCS n=9 ITT used. Between group- significant difference on ARAT, post hoc tests showed significant difference between group 1 and the other 2 groups, favouring concurrent tDCS (Kruskal-Wallis test for between group differences in ARAT change scores baseline to immediate post intervention: 1.3 (SD:1.49). No other outcomes had significant differences between groups. Groups 1 and 3 showed significant improvement on FMA-UE, ARAT and FTHUE within group. The sham tDCS group showed significant improvement | Overall low quality. Lack of blinding is a significant concern. Ramdomisation process a little unclear as all 3 groups are equal. This study does not allow judgement of the effectiveness of MT as it was not compared to a usual care group and all three groups received MT. |

| Ref ID | Source | Setting, design and subjects | Intervention | Outcomes | Results | Evidence quality (SIGN checklist score) and comment |
|---|---|---|---|---|---|---|
| | | ≥ 21, to ensure the participant could understand the instructions and give consent; 5) not participating in other clinical, drug, or research studies at the same time; and 6) passed the safety screening for tDCS. Exclusion: Those who had severe health conditions that required intensive medical care, such as heart failure pneumonia, a poor nutritional state, or contraindications of tDCS, such as a cardiac pacemaker, cancer, bleeding tendencies, pregnancy, metal implants, a history of seizures, etc. | session, with a maximum of 30 trials per task, giving a total of 150 trials per session. Exercises were customized and based on the seven functional levels of the Functional Test for the Hemiplegic Upper Extremity (FTHUE). Each MT session lasted 30 mins (plus additional tDCS time of 30 mins for group 1). Conducted five days a week for two weeks. | | (within group ) on the ARAT but not on other outcomes. | |
| 162 | M. Jin et al. (2019). Timing-dependent interaction effects of tDCS with mirror therapy on upper extremity motor recovery in patients with chronic stroke: A randomized controlled pilot study. *Journal of the Neurological Sciences,* 405 (no pagination): | Setting: Hong Kong. RCT, Pilot study.N=30. Chronic stroke.Patients level 2 FTHUE upper limb impairment. | 3 groups (10 each arm) 1. tDCS applied before MT;2. tDCS applied during MT; 3. Sham tDCS applied randomly prior to or concurrent with MT. Dual tDCS at 1 mA applied bilaterally. Intervention:low intensity stimulator 30mins 5 days per week for 2 weeks (10 sessions). MT (30 mins) table top tasks 30 trials per tasks-150 trials per session. | FMA-UE, ARAT, Box and Blocks (BBT). Completed @ Assessment, post intervention and 2 week follow up. | No difference detected between all groups on FMA - UE and BBT. MCID ARAT 6pts from group 2 tDCS applied concurrently with MT. (33pts to 39pts). | **+**<br><br>No information on what is usual care. Limitiations: Low level of sessions 10 sessions of MT over 2 weeks (30mins) Not clear if people carrying the outcome measures were blinded. Disparity between FTHUE leve 2 score and FMA-UE. |

| Ref ID | Source | Setting, design and subjects | Intervention | Outcomes | Results | Evidence quality (SIGN checklist score) and comment |
|---|---|---|---|---|---|---|
| 163 | W. W. Liao et al. (2020). Timing-dependent effects of transcranial direct current stimulation with mirror therapy on daily function and motor control in chronic stroke: A randomized controlled pilot study. *Journal of NeuroEngineering and Rehabilitation,* 17(1) (no pagination): | Double blind RCT involving participants with chronic stroke (n=28); investigating the timing dependent effects of tDCS with MT on upper limb motor control and function. Subjects recruited from medical centres in Taiwan with: first unilateral stroke; 18 years +; stroke onsent > 6 months; FMA Scores 20-56 (mild to moderate stroke); MAS Scores < 3; adequate cognition to follow instructions (MMSE > 23). Patients were excluded if they had participated in a drug or rehabilitation trials in the past 6 months; had botulinum toxin injections in past 3 months; had severe visual or visual-perceptual impairments; other neurological conditions; any contraindications to NIBS. | Three groups: (1) sequentially combined tDCS with MT (SEQ); (2) concurrently combined tDCS with MT (CON); (3) sham tDCS with MT (SHAM). Intervention delivered for 90 mins/day, 5 days/week, for 4 weeks. Participants stratified based on FMA Scores. | NEADL, FMA, Movement Kinematics | All three groups had improvements in motor function pre and post intervention. SEQ Group showed greater improvement in daily function (NEADL) than the CON and SHAM groups. Movement time (kinematic analyses) showed movement time of paretic hand had significantly reduced in the SEQ group after intervention. All groups improved motor fuction/control - with no differences between groups. | **+**<br><br>Well designed trial with low risk of bias. However, small sample size and no evidence of a sample size calculation; no follow up period; and 27% drop out in two of the groups means that the results should be interpreted with caution. |
| 163 | W. W. Liao et al. (2020). Timing-dependent effects of transcranial direct current stimulation with mirror therapy on daily function and motor control in chronic stroke: A randomized controlled pilot study. *Journal of NeuroEngineering and Rehabilitation,* 17(1) (no pagination): | Medical Centre Taiwan. Double blinded RCT.Chronic Stroke n=28 FMA range 20-56 (mod-Mild). Pts stratfied on FMS 20-35 Vs 36-56 then randomly allocated into 3 Gps. | 3 Gps.Randomised generated online.tDCS stim intensity 2mA for 20mins. (GP1) SEQ: Sequential tDCS( 20mins); tDCS 20mins; sham tDCS + MT (20mins); 20 mins MT alone (G2) CON:Concurrent tDCS:= sham tDCS 20mins; 20min tDCS + MT;then 20min MT alone. (G3) SHAM: sham tDCS 20mins; tDCS sham + MT 20 | Pts assessed 1 WK before intervention and post : FMA, Kinematics (7 camera motion analysis system, reflective markers) Kinematic outcome variables: reaction time, Movement Time, Normalised total displacement. NEADL scale primary measure for ADL outcome. | All 3 groups had changes on the FMA. SEQ, CON group significant changes in NEADL (4.9 MCID). SEQ group only demonstrated significant changes in index finger movement. No differences in other kinematic variables. No follow up assessment. | **+**<br><br>No follow up assessment. Functional task individualised practice may affect treatment effects. Small sample size. Unsure that the overall effect on motor control and function is due to the intervention of tDCS and MT. |

| Ref ID | Source | Setting, design and subjects | Intervention | Outcomes | Results | Evidence quality (SIGN checklist score) and comment |
|---|---|---|---|---|---|---|
| | | | mins; 20 mins MT alone. 30 min of functional task practice (individualised) after MT for all groups. 90 min/day 5days/week for 4 weeks. | | | |
| 167 | I. H. Lin et al. (2019). Effectiveness and Superiority of Rehabilitative Treatments in Enhancing Motor Recovery Within 6 Months Poststroke: A Systemic Review. *Archives of physical medicine and rehabilitation,* 100:2 366-378 | This is a metaanalysis of RCTs taken from literature reviews, eligibility criteria was that participants were stroke patients within 6 months of onset. Results from 7450 participants were analysed in this metaanalysis | Rehabilitation treatments for enhancing motor recovery, included mirror therapy and virtual reality for UL. | various impairment and functional level outcomes expressed as standard mean difference (effect size) and CI. | Mirror therapy: 6 studies in comparison of effectiveness, 256 patients, SMD 0.71 (0.22-1.20); 5 studies in comparison of superiority, 190 participants, SMD 0.23 (-0.11, 0.57) so mirror therapy effective when compared with no treatment or placebo, but not when compared with equivalent amount of conventional exercise based interventions. Virtual reality: comparison of effectiveness 3 studies, 115 participants, SMD 0.23 (-0.14,0.60), comparison of superiority, 6 studies, 522 participants,SMD -0.04 (-0.21,0.13) so VR no evidence of effectiveness or superiority. | Score acceptable. |
| 167 | I. H. Lin et al. (2019). Effectiveness and Superiority of Rehabilitative Treatments in Enhancing Motor Recovery Within 6 Months Poststroke: A Systemic Review. | SR with meta-analysis, exploring (1) effectiveness of Mirror Therapy (i.e. Mirror Therapy compared with no treatment, or with placebo) and (2) superiority (i.e. Mirror Therapy compared with conventional rehabilitation). | Mirror Therapy defined as: 'This entails placing the affected limb behind a mirror so that thereflection of the opposing limb appears in place of the hidden limb,creating a | All measures assessing motor impairment (e.g. Fugl-Meyer assessment [FMA], Brunnstrom stage, Motricity Index) and motor function (e.g., Action Research Arm Test and Wolf Motor Function Test). | A total of 6 studies with 256 participants (N=144 in MT group and N=112 in Control group) tested the effectiveness of MT compared with no treatment/ placebo and found a significant benefit in favour of MT. | **+**<br><br>Limited evidence suggests that MT improves arm motor impairment/ function compared to no/ placebo interventions - but no differentiation was made between impairment/ function. |

| Ref ID | Source | Setting, design and subjects | Intervention | Outcomes | Results | Evidence quality (SIGN checklist score) and comment |
|---|---|---|---|---|---|---|
| | *Archives of physical medicine and rehabilitation,* 100:2 366-378 | Participants' mean age ranged from 51 to 67 y. Time since stroke: < 6 months.<br><br>Severity: Brunnstrom between stages I-V. No information on cognitive/ communication impairments.<br><br>Settings: most studies conducted in a rehabilitation setting. | reflective illusion of motion of the paretic limb bymoving the unaffected limb.'<br>Mirror Therapy dose: intervention period ranged from 3 to 6 weeks; frequency ranged from from 4x pw to twice per day, 5x pw; session duration ranged from from 20 to 60 min. MT content varied; some studies involved action observation only; others involved copying movements of the unaffected UE by the affected UE, no information in other studies. In some studies, participants performed movements, in others they undertook functional activities, no information in other studies.<br>Conventional rehabilitation: all studies were dose matched to Mirror Therapy.<br>Control interventions content varied and included: no mirror present; bilateral UE movements with | | A total of 5 studies with 190 participants (N=93 in MT group and N=97 in Control group) tested the superiority of MT compared with conventional rehabilitation and found no significant benefit of MT.<br>No information reported on adverse events. | Limited evidence suggests that MT is not superior compared to dose-matched conventional rehabilitation that involves some form of UE action observation/ movement/ functional training. |

| Ref ID | Source | Setting, design and subjects | Intervention | Outcomes | Results | Evidence quality (SIGN checklist score) and comment |
|---|---|---|---|---|---|---|
| | | | action observation of the affected UE and motor imagery of the non-affected UE; bilateral UE movement with functional electrical stimulation (FES) of the affected UE; bilateral UE functional task training. | | | |
| 168 | S. H. Lin & T. P. Dionne (2018). Interventions to Improve Movement and Functional Outcomes in Adult Stroke Rehabilitation: Review and Evidence Summary. *Journal of Participatory Medicine,* 10:1 e3 | Department of Occupational therapy. Boston. Review of Level 1 evidence systematic review or meta analysis. 348 articles identified -173 articles met the inclusion criteria (not clear what this is). Subjects acute and chronic stroke. A comprehensive lit search . Did not include non-English systematic reviews. | Upper limb interventions include; cardiorespiratory training, therapeutic exercise, CMIT, repetitive task practice, mental practice, mirror therapy, neuromuscular electrical stimulation. Excluded robotic therapy, aquatic therapy, virtual reality. Included acute and chronic stroke patients. Limited description of dosage. | Cardiorespiratory training, aerobic exercise can improve moderate improvement on global indices of disability. Task - oriented training is dependent on dosage and intensity. Task -orientated training minimal impact on performance of ADL . Outcomes from task - orientated training depend upon dosage. Higher dose can improve arm functioning (35 review modest outcomes to leg functioning, less so on UL). Treadmill training and body-weight supported treadmill training improve on walking distance. CMIT (26 systematic reviews) appears to improve UL function than dose matched interventions, only some of the RCT | No single intervention is superior to another in stroke rehab to improve functional performance. Moderate evidence of effectiveness of cardiorespiratory training, therapeutic exercise, task-specific training, CIMT, mental practice and MT. | **+**<br><br>No single intervention.<br><br>Moderate evidence of effectiveness. Analyzing these findings are challenging to identify the type of intervention to apply, e.g. acute vs chronic, timing, dosage and intensity therefore limited detail, and outcome measures not clear. |

| Ref ID | Source | Setting, design and subjects | Intervention | Outcomes | Results | Evidence quality (SIGN checklist score) and comment |
|---|---|---|---|---|---|---|
| | | | | results produced MCID. High does CIMT difficult to implement. Mental Practice 14 reviews suggest MP effective when paired with functional task. MT moderate quality from Cochrane review. NMES-insufficient evidence with a wide variety of therapy protocols. | | |
| 168 | S. H. Lin & T. P. Dionne (2018). Interventions to Improve Movement and Functional Outcomes in Adult Stroke Rehabilitation: Review and Evidence Summary. *Journal of Participatory Medicine,* 10:1 e3 | Design Rapid Review of reviews of treatments to improve function after stroke, participants not detailed | Any interventions that are targeted at improving functional outcomes for the UL or LL after stroke. Interventions should be available in routine clinical practice (e.g. not robotics). Studies that were included in the review were: any published systematic reviews and meta-analyses, which reported outcomes of functional movement or motor skills of the upper and lower limbs, using non-pharmacological interventions commonly delivered to poststroke population (acute and chronic), that were | Any outcomes relating to function. | 12 systematic reviews were included that evaluated MT. 'the majority' found positive effect. No details of the included studies, size of populations in the reviews or outcomes were included nor which studies were on the UL. No assessment of overall quality of studies in the reviews was included nor the risk if bias or consideration of a control. | -<br><br>Poor review. Very little data on which to base conclusions, not clear on screening process or rigour of approach. |

| Ref ID | Source | Setting, design and subjects | Intervention | Outcomes | Results | Evidence quality (SIGN checklist score) and comment |
|---|---|---|---|---|---|---|
| | | | published in the English language. | | | |
| 169 | Z. Luo et al. (2020). Synergistic Effect of Combined Mirror Therapy on Upper Extremity in Patients With Stroke: A Systematic Review and Meta-Analysis. *Frontiers in neurology [electronic resource].,* 11: 155 | SR and MA 10 studies n=444 stroke. | MT combined with each of the following:<br>1. Electromyographic Biofeedback (EMGBF)<br>2. Mesh Glove (MG)<br>3. Acupuncture (AT) 4. EMG-triggered electrical stimulation (ES) | Fugel Meyer UL. | Overall MT combined with another rehab therapy (1-4) signifincantly improved arm fx. Overall effect 7.20 (p<0.00001). Total mean weighted difference 8.07 (95% CI 5.87-10.26). 1. EMGBF Sig improve arm fx Mean diff 8.95 (95% CI 6.33-11.58). 2. MG Non sig 0.53 (-4.18-5.25) 3. AT Sig improve 9.90 (5.55-14.26). 4. ES Sig improve 10.14 (5.27-15.01). Significanlty more improvement seen in sub-acute than chronic pts (x2=10.86, p=0.0010). | **+**<br><br>Limited number of studies. High heterogeneity of studies.<br><br>N5. |
| 169 | Z. Luo et al. (2020). Synergistic Effect of Combined Mirror Therapy on Upper Extremity in Patients With Stroke: A Systematic Review and Meta-Analysis. *Frontiers in neurology [electronic resource].,* 11: 155 | SR with meta analysis. Settings: no information. Data related to two relevant subgroup analyses: 3 studies (N= 160) on MT with Electromyographic biofeedback (EMGBF) compared with EMGBF alone; 2 studies (N=55) on MT with EMG-triggered electrical stimulation (ES)compared with ES alone.<br><br>Participants in EMGBF studies: mean age 47-62 y, subacute stage.<br><br>Participants in ES studies: mean age 55-63 y, subacute stage. | Combined Mirror Therapy with EMG/BF total dose: intervention period ranged from 3 to 8w; frequency ranged from 5 to 6x pw; session duration ranged from 20 to 40 min.<br><br>In all studies MT was combined with other interventions but time allocated to MT not reported.<br>Unclear if time allocated to MT was | Fugl-Meyer Assessment-upper extremity. | Results taken only from one subgroup analysis where the additional effect of MT could be determined:<br>MT with EMGBF compared with EMGBF alone: statistically significant benefit of additional MT.<br>MT with ES compared with ES alone: statistically significant benefit of additional MT.<br>Clinical importance not discussed.<br>Note: no evidence of adverse effects reported. | **+**<br><br>Limited evidence suggests that adding MT to EMGBF or ES improves arm motor impairment, but it is not clear if this is due to the MT intervention itself or due to additional time provided. Intervention detail (of all interventions included in the SR) is insufficient to replicate the interventions. |

| Ref ID | Source | Setting, design and subjects | Intervention | Outcomes | Results | Evidence quality (SIGN checklist score) and comment |
|---|---|---|---|---|---|---|
| | | | dose-matched in the control groups. | | | |
| 170 | N. Morkisch et al. (2019). How to perform mirror therapy after stroke? Evidence from a meta-analysis. *Restorative Neurology & Neuroscience,* 37:5 421-435 | This is a secondary meta-analysis of a Cochrane review- aim to provide evidence-based recommendation for mirror size, uni- or bilateral movement execution, and type of exercise. Participants all stroke. 31 trials were included in the sub group analysis, 1031 participants | Mirror therapy using active movement of UL - trials that combined MT with any type of electrical or magnetic stimulation or executed MT as group intervention or used Virtual / Augmented Reality were excluded. | Motor function, motor impairment. | Overall, 32 trials were included. The use of a large mirror compared to a small mirror showed a higher effect on motor function (large mirror: motor function SMD 0.77, 95%CI(0.20,1.33); small mirror SMD 0.28 (0.02-0.54). Large mirror motor impairment (SMD0.62,(0.27,0.98); small mirror SMD 0.26,(-0.06,0.57) Movements executed unilaterally showed a higher effect on motor function than a bilateral execution Unilateral mvt motor function SMD 0.69,(0.11,1.27) ; bilateral mvt 0.36, (0.14,0.59). motor impairment unilateral SMD 0.56, (0.10,1.03); bilateral mvt Smd 0.40, (0.15,0.64 MT exercises including manipulation of objects showed a minor effect on motor function compared to movements excluding the manipulation of objects. None of the subgroup differences reached statistical significance. Motor function Body positions :SMD 0.67(0.18,1.16); Objects SMD 0.39,(-0.03,0.80). Motor impairment Body positions | **++**<br><br>This is a secondary meta-analysis of a Cochrane review. Some details would be in the original review paper (I have not checked). Very useful article to guide protocol for best effects of MT. |

| Ref ID | Source | Setting, design and subjects | Intervention | Outcomes | Results | Evidence quality (SIGN checklist score) and comment |
|---|---|---|---|---|---|---|
| | | | | | SMD 0.42, (0.18,0.67), objects SMD 0.43, (0.10,0.75). | |
| 170 | N. Morkisch et al. (2019). How to perform mirror therapy after stroke? Evidence from a meta-analysis. *Restorative Neurology & Neuroscience,* 37:5 421-435 | Setting international research conducted in hospital and community settings. | All patients in the EXP group received some form of mirror therapy (MT). This meta analysis sought to determine the effect of specific protocols upon outcomes - 1. The size of mirror used, 2. whether the movement was uni or bilateral 3. Movement outcomes (i.e. whether an object was manipulated or not). | Meta analysis of effectiveness of MT upon measures of (i) motor function and (ii) motor impairment. | 1. Effect of mirror size: (i) motor function – 9 trials (n=317), MT performed with a large mirror had a statistically significant effect on motor function (SMD 0.77, 95% CI 0.20 to 1.33; I2 = 82 %, as did a small mirror (SMD 0.28, 95% CI 0.02 to 0.54; I2 = 0%) (Fig. 3). The difference between subgroups was statistically non-significant (P = 0.12).<br><br>(ii) motor impairment – 12 trials (n=372), MT performed with a large mirror had a significant effect on motor impairment in participants with upper limb paresis after stroke (SMD 0.62, 95% CI 0.27 to 0.98; I2 = 62%). 9 trials (n= 256) on-significant effect on motor impairment for this type of device (SMD 0.26, 95% CI –0.06 to 0.57; I2 = 28%). Subgroup differences did not demonstrate statistical significance (P = 0.13)<br><br>2. Uni or bilateral movement<br><br>(i) motor function – Unilateral movement 12 trials with a total of 360 participants there was a statistically significant | Acceptable.<br><br>This was a reanalysis of data already included in the updated Cochrane review so does not make any different recommendations on the overall effectiveness of MT. It sought to identify if specific protocol components were more or less effective. |

| Ref ID | Source | Setting, design and subjects | Intervention | Outcomes | Results | Evidence quality (SIGN checklist score) and comment |
|---|---|---|---|---|---|---|
| | | | | | effect on motor function (SMD 0.69, 95% CI 0.11 to 1.27; I2 = 84%). Bilateral movements 11 trials (n=367) found a statistically significant effect (SMD 0.36, 95% CI 0.14 to 0.59; I2 = 12%) (Fig. 4). The test for subgroup differences did not reach statistical significance (P = 0.31)<br><br>(ii) motor impairment – Unilateral movement 11 trials (n=322) showed a statistically significant effect on motor impairment (SMD 0.56, 95% CI 0.10 to 1.03; I2 = 75%). Bilateral movement 4 trials (n=493) found statistically significant effect (SMD 0.40; 95 % CI 0.15 to 0.64; I2 = 40%). The subgroup differences did not demonstrate statistical significance (P = 0.53).<br><br>3. Type of exercise<br><br>(i) motor function – 10 trials (n=276) did not use objects during MT and found a significant effect SMD 0.67, 95% CI 0.18 to 1.16; I2 = 73 %). here was a statistically non-significant effect on motor function, when the required movements contained the manipulation of objects 13 trials with a total of 460 participants (SMD 0.39, 95 % | |

| Ref ID | Source | Setting, design and subjects | Intervention | Outcomes | Results | Evidence quality (SIGN checklist score) and comment |
|---|---|---|---|---|---|---|
| | | | | | CI –0.03 to 0.80; I2 = 77 %). Subgroup differences did not demonstrate statistical significance (P = 0.39).<br><br>(ii) motor impairment – 11 trials (n=286) did not use objects during MT statistically<br><br>significant effect (SMD 0.42, 95% CI 0.18 to 0.67; I2 = 7 %). In the 16 trials (n=573) that did use objects there was a statistically significant effect on motor impairment for this type of exercise (SMD 0.43, 95% CI 0.10 to 0.75; I2 = 70%). Between subgroups, there was no statistically significant difference (P = 0.99). | |
| 171 | N. Nogueira et al. (2021). Mirror therapy in upper limb motor recovery and activities of daily living, and its neural correlates in stroke individuals: A systematic review and meta-analysis. *Brain Research Bulletin,* 177: 217-238 | Systematic review and meta-analysis to review and synthesize clinical evidence on the use of mirror therapy on motor recovery of the upper limb, ADL and its neural correlates in stroke patients. 29 studies included, published between 2008-2020. A total of 1179 participants. Patients studied were between 8.5 days post stroke to 4.76 years post stroke. | Mirror therapy or sham therapy. Measured using two general measures, upper limb assessment and activities of daily living.<br><br>9 studies compared mirror therapy to sham therapy, 15 studies compared mirror therapy to some type of physical practice, 2 studies compared mirror therapy with motor | Four used the Fugl-Meyer Assessment, Action Research Arm Test, Brunnstrom Stages for the upper limb assessment. Functional Independence Measure, Modified Barthel Index and the Test d'Evaluation des Membres Superieurs by Personnes Agees was used to measure ADL. | Mirror therapy was better than sham therapy mainly in the subacute phase, but meta-analysis was non-significant. | **++**<br><br>Studies used different outcome measures for upper limb and ADL assessment.<br><br>Small sample size of the individual studies.<br><br>Many stroke patients in the studies were in hospital and were under going intensive rehabilitation in addition to mirror therapy so the effect of other therapies and interventions cannot be ruled out. |

| Ref ID | Source | Setting, design and subjects | Intervention | Outcomes | Results | Evidence quality (SIGN checklist score) and comment |
|---|---|---|---|---|---|---|
| | | | imagery or virtual reality, 2 studies compared mirror therapy to uni and bimanual movements. Methodology quality was evaluated using the PEDRO scale. | | | Stroke survivors at different stage of their recovery. |
| 172 | D. Perez-Cruzado et al. (2017). Systematic review of mirror therapy compared with conventional rehabilitation in upper extremity function in stroke survivors. *Australian Occupational Therapy Journal,* 64:2 91-112 | Systematic review and meta-analysis - investigating the use of mirror therapy on upper limb motor recovery, ADL's and neural correlates. Acute and chronic stroke. Include studies from 2005-2020; published in English. | Conventional mirror therapy. | Mirror therapy x Sham - non significant effect size. Meta-analysis not performed for other comparisons. | 29 papers involving 1179 participants were included. Meta-analysis comparing mirror therapy to sham therapy demonstrates small benefit mirror therapy for both UL assessment and ADLs (completed to sham therapy) - but this did not reach significance | +<br><br>Limited search terms used. Most studies included have small sample size, narrow inclusion criteria and limited follow up - generalizability unknown. |
| 172 | D. Perez-Cruzado et al. (2017). Systematic review of mirror therapy compared with conventional rehabilitation in upper extremity function in stroke survivors. *Australian Occupational Therapy Journal,* 64:2 91-112 | Systematic review. Physiotherapy Dept. University of Malaga Spain. Clearly defined inclusion/ exculsion criteria (PEDro 6 cut off).Comprenhensive lit. search. 2 independent blinded researches. Excluded studies and identified why. 15 studies included (47 identied). 6 studies chronic stroke. 9 studies acute stroke. | Number of participants varied from 24-7. Conventional rehabilitation Vs MT. Session length varied form 90 min/ day, 60 min/day, 30min/ day for 5 days. Intervention length ranged from 8 wks, 6 wks, 4 wks. | Eight studies reported intergroup differences statisically in Motor recovery, upper limb function and gross manual dexterity with mod effect size. Combination of MT with CR more effective than MT alone.Secondary variables (pain, ADLs, ROM, grip strength, spasticity, difficulty performing bimanual activities) no intergroup differences found. | Waithe results identified Primary Variables: Intergroup differences indicated that MT more effective on promoting motor recovery UL, upper limb function and gross manual dexterity than CR. MT combined with CR, NMES, task functional orientated practice more effective than CR alone. | -<br><br>Low number of participants in some papers (7). Low intensity in most paper (20 hours in total). One paper did deliver 60 hours of intervention over 8 weeks. Evidence of comparing acute participants and chronic patients. |

| Ref ID | Source | Setting, design and subjects | Intervention | Outcomes | Results | Evidence quality (SIGN checklist score) and comment |
|---|---|---|---|---|---|---|
| 172 | D. Perez-Cruzado et al. (2017). Systematic review of mirror therapy compared with conventional rehabilitation in upper extremity function in stroke survivors. *Australian Occupational Therapy Journal,* 64:2 91-112 | SR, 15 RCTs, n= unclear (416 + Selles study 5 groups). Stroke (9 acute, 6 chronic) | MT vs other Rx for UL function . | 1) Motor recovery.<br>2) UL Function.<br>3) Gross Manual Dexterity | 1. Motor recovery: MT more effective. Intergroup Cohen's d 0.28-0.17. Pre-post MT 0.19-1.55<br>2. UL Function: MT more effective. Intergroup Cohen's d 0.58-1.03 [inverse scale Cacchio -2.35]. Pre-post MT 1.58-1.81 [Inverse scale Cacchio -2.03].<br>3. Gross Manual Dexterity: MT more effective. Intergroup Cohen's d 0.18-1.26. Pre-post MT 0.55-0.83. | -<br>Good homogeneity and internal validity but control not clearly defined. |
| 173 | A. Saavedra-Garcia et al. (2021). Mirror therapy simultaneously combined with electrical stimulation for upper limb motor function recovery after stroke: a systematic review and meta-analysis of randomized controlled trials. *Clinical Rehabilitation,* 35:1 39-50 | SR with meta analysis. Settings: no information. Data related to three relevant subgroup analyses: 4 studies (N=131) on MT with electrical stimulation (ES)compared with ES alone. Participants in ES studies: mean age 44-73 y, acute/subacute stage. Severity: Brunnstrom between stages I-V. Other baseline data on arm function, hypertonia, cognitive, visual, auditory function provided. | Combined Mirror Therapy with electrical stimulation (ES) total dose: intervention period ranged from 2 to 4w; frequency ranged from 5x to 6x pw; session duration was 30 min. n all studies.<br>Time allocated to MT not reported.<br>Unclear if intervention time was dose-matched in the control groups. | Fugl-Meyer Assessment-Upper Extremity (FMA-UE)<br>Box and Blocks test (BBT)<br>Action Research Arm test (ARAT) | Results taken only from studies where the additional effect of MT could be determined:<br>Adding MT to electrical stimulation resulted in no significant benefit in terms of FMA-UE, BBT or ARAT | +<br>Limited evidence suggests that adding MT to ES has no effect on arm motor impairment or capacity. Intervention detail (of all interventions included in the SR) is insufficient to replicate the interventions. |
| 173 | A. Saavedra-Garcia et al. (2021). Mirror therapy simultaneously combined with electrical stimulation for upper limb motor | Systematic review Setting - international studies included based in community and hospital Participants 8 articles were included in this systematic review, 7 were included in the meta-analysis. Total of 314 | Intervention Intervention groups had MT plus another treatment including different forms of electrical stimulation, somatosensory | Tools that measure motor function of the UL - Upper-Extremity Fugl-Meyer Assessment, Box and Block Test and Action Research Arm Test | Meta analysis of 7 studies revealed that there was no overall significant mean difference on Upper-Extremity Fugl-Meyer Assessment MD 1.56 (95%CI = –2.08, 5.20, P = 0.40). The Box | +<br>This systematic review combined MT with other forms of therapy (electrical stimulation) finding that overall there was little benefit to |

| Ref ID | Source | Setting, design and subjects | Intervention | Outcomes | Results | Evidence quality (SIGN checklist score) and comment |
|---|---|---|---|---|---|---|
| | function recovery after stroke: a systematic review and meta-analysis of randomized controlled trials. *Clinical Rehabilitation,* 35:1 39-50 | participants, age ranged from 44 and 73. | stimulation neuromuscular stimulation functional electrical stimulation, EMG-triggered multi-channel electrostimulation. Comparison groups had conventional therapy, MT or electrical stimulation isolated (in addition to conventional therapy). | | and Block Test also showed no overall significant mean difference MD 1.39 (95% CI = –2.14, 4.92, P=0.44) but there was a significant difference on the Action Research Arm Test MD 3.54 (95% CI = 0.18, 6.90, P = 0.04) in favour of the intervention group. It also showed that combining MT with other electrical stimulation was superior to MT alone mean difference 4.87 (95% CI = 0.44, 9.31, P = 0.03) on the ARAT. | motor function of the UL except when measured on the ARAT which showed significant benefit to the combined MT. It did not explicitly consider the effectiveness of MT alone. |
| 174 | H. Thieme et al. (2018). Mirror therapy for improving motor function after stroke. *Cochrane Database of Systematic Reviews,* :7 | Systematic review and meta analysis, including studies up to August 2017; 62 studies involving 1982 participants (57 RCT's and 5 randomised crossover trials). All 62 studies were included in the qualitative synthesis; 51 studies included in the meta-analysis | Mirror therapy (60 studies used a mirror box; 2 studies used a virtual reflection). 10 studies examined the effects of mirror therapy on the lower limb; 52 examined the effects on the upper limb. Dose varied across studies - ranging from 3-7 days per week, for between 2 and 8 weeks. Individual sessions lasted between 15 and 60 mins. | No treatment, placebo, sham treatment, or any other treatment aimed at improving motor function. | Mirror therapy had a statistically significant effect on a) motor function, b) motor impairment and c) ADL, when compared with all other types of intervention (in both acute and chronic phase). Improvements in motor function were not maintained at 6 months (2 studies), whereas improvements in motor impairment wre (3 studies) | **++**<br><br>Well conducted systematic review and meta-analysis, in line with Cochrane database standards. Included studies were typically of low-moderate methodological quality - with small sample sizes and a lack of proper reporting. |
| 174 | H. Thieme et al. (2018). Mirror therapy for improving motor function after stroke. | Cochrane stroke group. School of physiotherapy Germany. 62 relevant studies(RCTs) 2 review authors inclusion criteria methodological quality, assessed | MT is where the mirror is placed between the arms so that the image of a moving non-affected | 29 studies used the FMA for analysing treatment effects on motor impairment a total of 463 participants. MT had a | MT moderately improved movement of the affected upper limb and the ability to carry out daily activities. No Clear effect for improving | Major limitations are small sample sizes and lack of reporting of methodological details . |

| Ref ID | Source | Setting, design and subjects | Intervention | Outcomes | Results | Evidence quality (SIGN checklist score) and comment |
|---|---|---|---|---|---|---|
| | *Cochrane Database of Systematic Reviews,* :7 | risk of bias, analysed results. Included 62 studies with a total of 1982 participants. 57 RCTs 5randomised cross -over trials. Participants had mean age of 59 years. Stroke patients in the acute and chronic phase. Inpatient and outpatient. Control: no treatment, placebo, sham therapy or other treatments. | limb gives the illusion of normal movement in the affected arm. MT was provided 3 to 7 times a week. Between 15 to 60 mins for each session for 2 to 8 weeks (on average 5 times a week, 30 minutes a session for 4 weeks). | statistically significant effect on FMA but not MCID. The evidence for this outcome is low quality. | visuospatial neglect. They found low quality evidence for significant positive effect on pain. MT mainly reduced pain in people with a complex regional pain syndrome. MT did indicate some statistically significant improvements in motor impairment of the upper limb, as well as improving activities of daily living. The effects on motor function were more when mirror therapy was compared to sham. Mirror therefore can only be applied as an addition intervention in the rehab of people after stroke. No clear conclusion could be drawn if mirror therapy replace other interventions. | |
| 164 | M. Xu et al. (2021). Using brain functional magnetic resonance imaging to evaluate the effectiveness of acupuncture combined with mirror therapy on upper limb function in patients with cerebral ischemic stroke: a study protocol for a randomized, controlled trial. *Trials,* 22(1) (no pagination): | RCT, single blind, n = 60, stroke more than 2 weeks and less than 6 months. | Jins three needle acupuncture with mirror therapy or just acupuncture over 6 consecutive days per week for 4 weeks. | Fugl- Meyer assessment, motor assessment scale, ARAT, ADL scale and fMRI analysis at 12 weeks. | Currently recruiting participants due to complete 30 Dec 2020. | Study not completed. |

| Ref ID | Source | Setting, design and subjects | Intervention | Outcomes | Results | Evidence quality (SIGN checklist score) and comment |
|---|---|---|---|---|---|---|
| 175 | Y. Yang et al. (2018). Effect of Mirror Therapy on Recovery of Stroke Survivors: A Systematic Review and Network Meta-analysis. *Neuroscience,* 390: 318-336 | Systematic review and network meta-analysis to evaluate the effects of mirror therapy on motor function, activities of daily living and pain perception in stroke survivors. 37 RCT's were included (42 analyses, 1685 subjects). | Mirror therapy alone or combined with other rehabilitation methods. Methodology quality was evaluated using the PEDRO scale. | Fugl Meyer et all, FIM and MAS score for spasticity as the primary outcome measure of motor function. The secondary outcome measures included Brunnstrom stage score, action Research Arm Test (ARAT), Box and Block Test (BBT), Wolf Motor Function Test (WMFT). The outcome measures of ADL and pain used MBI, MAL to evaluate the ADL and quality of life. VAS was used to assess pain. | Network meta-analysis and the pairwise meta-analysis together demonstrated that mirror therapy might provide more improvement of motor function, ADL and pain perception compared with conventional therapy for stroke patients. Network meta-analysis revealed that mirror therapy combined, with electrical stimulation and conventional therapy for less than 4 weeks was the best to promote motor function, and mirror therapy combined with conventional therapy for less than 4 weeks was the most suitable to improve the ADL in stroke patients. | **++**<br><br>Included all stroke patients without restricting age, sex, country, paretic side, lesion type, severity of type, when rehabilitation started and frequency of intervention. Unclear what conventional therapy was. Different outcome measures were used in the studies. |
| 175 | Y. Yang et al. (2018). Effect of Mirror Therapy on Recovery of Stroke Survivors: A Systematic Review and Network Meta-analysis. *Neuroscience,* 390: 318-336 | SR and MA 37 RCTs, n=1685. Stroke | MT vs conventional therapy (CR) or sham | 1)Motor Function: Fugl Meyer Arm (FMA), FIM Self Care, MAS<br>2)ADL: MBI, MAL.<br>3)Pain: VAS | 1. Motor Fx. FMA: MT improved sig. SMD (95% CI) 0.73 (0.05-0.97). I2 84.8%<br>FIM: MT improved sig. 0.06 (0.36-0.43). I2 0.0%<br>MAS: No diff. -0.13 (-0.30 - 0.05) I2 0.0%<br>2. ADL MBI: MT improved sig. 1.32 (0.57-2.08). I2 94.5%<br>MAL: MT improved non sig. 0.36 (-0.14-0.86) I2 74.4%<br>3. VAS: MT improved sig. -1.73 (-2.63- -0.82) I2 88.8% | **+**<br><br>Large SR. Completed standard and network MA. CR was not unified. |
| 176 | W. Zeng et al. (2018). Mirror therapy for motor function of the upper extremity in | This is a metaanalysis of RCTs taken from databases from 2007-2017, eligibility criteria was that participants were stroke patients | Mirror therapy. | improvement on Fugl-Meyer UE score. | A moderate effect of mirror therapy (standardized mean difference 0.51, 95% confidence interval | **++**<br><br>Weakness is in not knowing whether the control |

| Ref ID | Source | Setting, design and subjects | Intervention | Outcomes | Results | Evidence quality (SIGN checklist score) and comment |
|---|---|---|---|---|---|---|
| | patients with stroke: A meta-analysis. *Journal of Rehabilitation Medicine,* 50:1 Aug-15 | impaired motor function of the UL evaluated by the UE part of the Fugl-Meyer Assessment (FMA-UE) (scores < 55).There were no limitations on age, sex, stroke lesions, severity levels, or time since onset of stroke. 11 trials with a total of 347 participants were included in the MA. | | | (CI) 0.29,0.73) on motor function of the upper extremity was found. However, a high degree of heterogeneity ($\chi 2 = 25.65$, $p = 0.004$; $I2 = 61\%$) was observed. The heterogeneity decreased a great deal ($\chi 2 = 6.26$, $p = 0.62$; $I2 = 0\%$) after 2 trials were excluded though sensitivity analysis.<br>For me the main weakness is in not knowing whether the control intervention was of equivalent duration of intensity to the MT. | intervention was of equivalent duration of intensity to the MT. |
| 176 | W. Zeng et al. (2018). Mirror therapy for motor function of the upper extremity in patients with stroke: A meta-analysis. *Journal of Rehabilitation Medicine,* 50:1 Aug-15 | SR with meta-analysis, comprising 11 studies with 347 participants: Mirror Therapy (N=172); conventional rehabilitation (N=175). Participants' mean age ranged from 42 to 65 y. Time since stroke: < 3 months (2 studies); < 6 months (1 study); > 6 months (7 studies).<br>Severity: Brunnstrom between stages I-V.<br>Settings: no information. | Mirror Therapy combined with another intervention was compared with another intervention of the same type alone.<br>Mirror Therapy dose: intervention period ranged from 3 to 8 weeks; frequency ranged from 3x to 5x pw; session duration ranged from 20 to 90 min.<br>Total time allocated to MT ranged from 400 to 1,920 min.<br>MT content: interventions were included where patients: (i) attempt to | Fugl-Meyer Assessment-Upper Extremity (FMA-UE) | Combining Mirror Therapy with another intervention leads to an improvement in arm impairment, of a medium effect size, compared with another intervention alone. | **+**<br><br>Limited evidence suggests that adding MT to other interventions improves arm motor impairment, but it is not clear if this is due to the MT intervention itself or due to additional time provided. Intervention detail (of all interventions included in the SR) is insufficient to replicate the interventions. |

| Ref ID | Source | Setting, design and subjects | Intervention | Outcomes | Results | Evidence quality (SIGN checklist score) and comment |
|---|---|---|---|---|---|---|
| | | | simulate movements by using their impaired limb actively when they directly watch the reflection of movements of their good limb; (ii) imagine movements of their affected limb when moving their unaffected arm; or (iii) are assisted to move their impaired extremity in order to be synchronous with movements of the intact arm.<br>Control interventions dose: not reported.<br>Control interventions content: broad type provided but no further details. | | | |
| 177 | Y. Zhang et al. (2021). Mirror therapy for unilateral neglect after stroke: A systematic review. *European Journal of Neurology,* 24: 24 | SR and MA, 5 RCT, n=238 stroke surviors with unilat neglect. | MT vs<br>(1) No rx,<br>(2) sham mirror therapy<br>(3) other routine therapy | 1)Neglect: Star Cancellation Test, Behavioural Inattention Test (BIT), Chinese Behavioural Inattention Test Hong Hong Version (CBIT-HK), Catherine Bergego Scale (CBS).<br><br>2)ADLs: FIM, mBI, MRS | 1)Neglect: MT alone orcombined with other therapies was more effective in improving neglect than other therapies combined, no rx or sham (SMD=1.62, 95% CI 10.3-2.21 P,0.00001). I2 73%.<br><br>2)ADL: Mirror therapy alone or combined with other therapies was more effective than no rx, other therapies combined or sham (SMD=2.09 (0.63-3.56) p=0.005. I2 95% . | **+**<br><br>Small sample size, high heterogeneity. |

| Ref ID | Source | Setting, design and subjects | Intervention | Outcomes | Results | Evidence quality (SIGN checklist score) and comment |
|---|---|---|---|---|---|---|
| | N. G. D. H. M. Nogueira et al (2021).Mirror therapy in upper limb motor recovery and activities of daily living, and its neural correlates in stroke individuals: A systematic review and meta-analysis. 177. 217-238. | Systematic review and meta-analysis to review and synthesize clinical evidence on the use of mirror therapy on motor recovery of the upper limb, ADL and its neural correlates in stroke patients. 29 studies included, published between 2008-2020. A total of 1179 participants. Patients studied were between 8.5 days post stroke to 4.76 years post stroke. | Mirror therapy or sham therapy. Measured using two general measures, upper limb assessment and activities of daily living. 9 studies compared mirror therapy to sham therapy, 15 studies compared mirror therapy to some type of physical practice, 2 studies compared mirror therapy with motor imagery or virtual reality, 2 studies compared mirror therapy to uni and bimanual movements. | Methodology quality was evaluated using the PEDRO scale. Four used the Fugl-Meyer Assessment, Action Research Arm Test, Brunnstrom Stages for the upper limb assessment. Functional Independence Measure, Modified Barthel Index and the Test d'Evaluation des Membres Superieurs by Personnes Agees was used to measure ADL. | Outcomes pulled together. Small overall effect size. inappropriate use of outcome measures for ADL (FIM and BI). | **+**<br><br>Small sample size of the individual studies. The meta-analysis both effect sizes were non-significant benefit over sham.<br><br>Many stroke patients in the studies were in hospital and were undergoing intensive rehabilitation in addition to mirror therapy so the effect of other therapies and interventions cannot be ruled out. |
| | N. G. D. H. M. Nogueira et al (2021).Mirror therapy in upper limb motor recovery and activities of daily living, and its neural correlates in stroke individuals: A systematic review and meta-analysis. 177. 217-238. | Systematic review and meta analysis | Included English language studies had to investigate: conventional mirror therapy and/or made a comparison with other techniques of physical or not physical (e.g. motor imagery techniques) practice, in humans who had stroke in the acute to chronic phases in articles | Quality – PEDro scale Measures related to UL motor and functional recovery and ADLs Assessed using Hedges g test | 29 studies were included N=1179 Quality on PEDro was 6 – moderate. Training was intiaited between 8.5 days to 4.76 years after stroke. Pooled all UL motor function data (inc FMA UE and ARAT, Brunstrom stages). Data for ADLS were also pooled from measures including RIM, mBI. UL motor function showed a small effect size (Hedges g=0.32) | **-**<br><br>No consideration of publication bias, 2 x data extraction, no list of excluded studies.<br><br>Appropriateness of pooling all UL measures together? |

| Ref ID | Source | Setting, design and subjects | Intervention | Outcomes | Results | Evidence quality (SIGN checklist score) and comment |
|---|---|---|---|---|---|---|
| | | | published between 2005 and 2020. | | For ALD heterogeneity was high and significant (I2=65.% and effect sixe was small (Hedges g=0.3).<br>Each had large CI. | |