CANADIAN STROKE BEST PRACTICE RECOMMENDATIONS

Rehabilitation, Recovery and Community Participation Following Stroke

Part Two: Delivery of Stroke Rehabilitation to Optimize Functional Recovery Evidence Tables

7th edition, update 2025

Management of Shoulder Pain & Complex Regional Pain Syndrome

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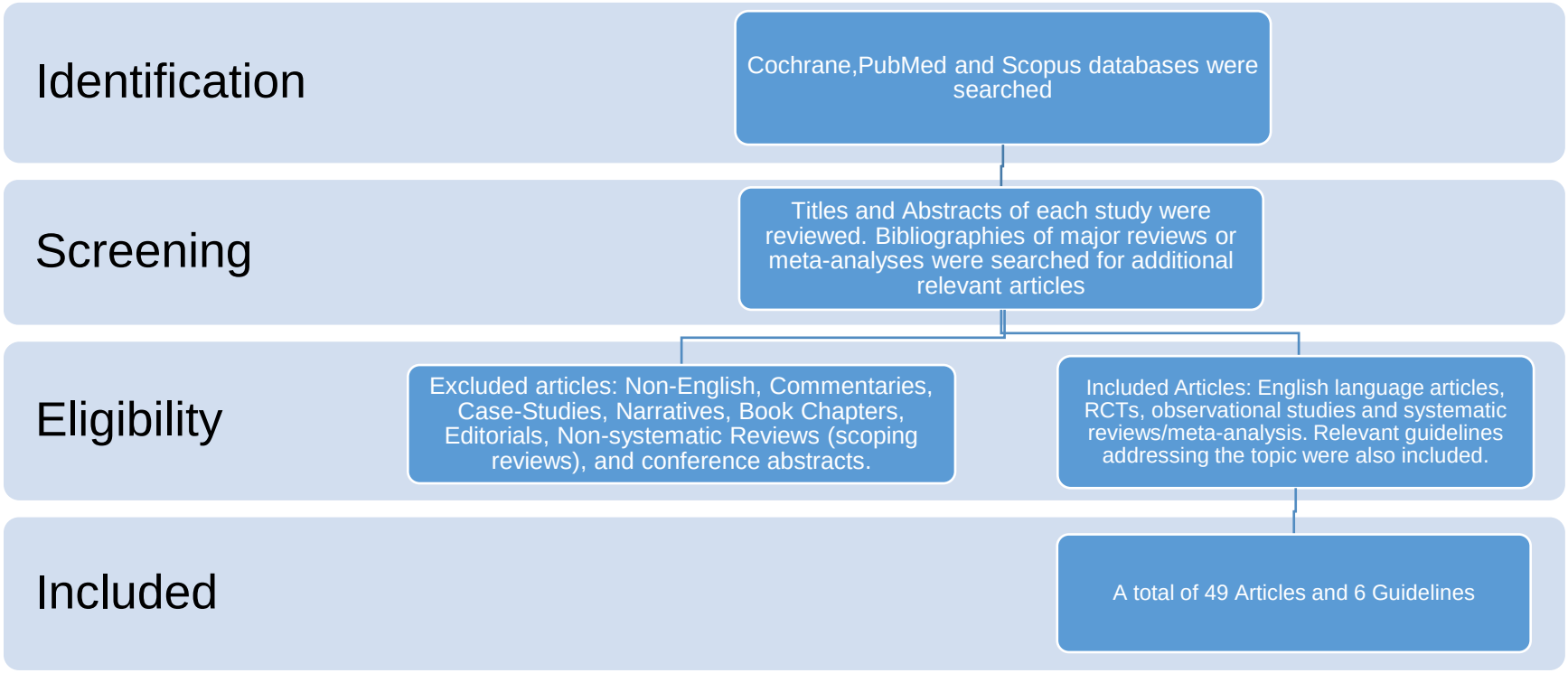
Search Strategy



Cochrane, PubMed and Scopus databases were searched using terms such as (Stroke OR cerebrovascular disease) AND shoulder pain and stroke OR complex regional pain syndrome. Titles and abstract of each article were reviewed for relevance. Bibliographies were reviewed to find additional relevant articles. Articles were excluded if they were: non-English, commentaries, case-studies, narrative, book chapters, editorials, non-systematic review, or conference abstracts. Additional searches for relevant best practice guidelines were completed and included in a separate section of the review. A total of 49 articles and 6 guidelines were included and were separated into categories designed to answer specific questions.

Published Guidelines (Shoulder Pain & Subluxation)

Guideline	Recommendations
National Institute for Health and Care Excellence **Stroke Rehabilitation in Adults Clinical guideline. 2023** **UK** https://www.nice.org.uk/guidance/ng236	We suggest offering functional electrical stimulation to manage shoulder subluxation. Weak (for)
National Clinical Guideline for Stroke for the UK and Ireland. London: Intercollegiate Stroke Working Party; 2023 May 4. **Available at:** www.strokeguideline.org. **(selected)**	People with functional loss in their arm after stroke should have the risk of shoulder pain reduced by: – careful positioning of the arm, with the weight of the limb supported, including the use of wheelchair arm rests; – ensuring that healthcare staff and family/carers handle the affected arm correctly, avoiding mechanical stress and excessive range of movement; – avoiding the use of overhead arm slings/ shoulder supports and pulleys People with shoulder pain after stroke should only be offered intra-articular steroid injections if they also have inflammatory arthritis. People with inferior shoulder subluxation within 6 months of hemiplegic stroke should be considered for neuromuscular electrical stimulation, unless contraindicated. The stimulation protocol should be individualised to the person's presentation and tolerance. The person with stroke, their family/carers and clinicians in all settings should be trained in the safe application and use of electrical stimulation devices. People with persistent shoulder pain after stroke should be considered for other interventions such as orthotic provision, spasticity management, or suprascapular nerve block, including specialist referral if required.
Minelli C, Bazan R, Pedatella MTA, Neves LO, Cacho RO, Magalhães SCSA et al. **Brazilian Academy of Neurology practice guidelines for stroke rehabilitation: part I.** ***Arq Neuropsiquiatr*. 2022 Jun;80(6):634-652.**	**Central pain** • Amitriptyline and lamotrigine should be used as firstline treatments for neuropathic pain. (Recommendation I-A); • Duloxetine can be considered as an adjuvant treatment. (Recommendation IIa-B); • Pregabalin and gabapentin can be used as second-line medication. (Recommendation IIa-B); • Fluvoxamine can be considered. (Recommendation IIb-B); • rTMS, deep brain, or spinal electrical stimulation may be considered in refractory cases. (Recommendation IIb-B); • Levetiracetam, carbamazepine, and opioids are not recommended. (Recommendation III-B).

Guideline	Recommendations
	Shoulder pain • Functional bandages are recommended for PS after stroke. (Recommendation I-A); • Botulinum toxin injection in the subscapular and pectoral muscles is recommended, mainly if PS is associated with spasticity. (Recommendation I-A); • Arm position and support during rest, arm protection, and support during functional movements can be considered to prevent PS. (Recommendation IIa-C); • Functional electrical stimulation can be considered in the prevention of PS. (Recommendation IIa-A); • PS can be treated with gentle alignment movements and mobilization with external rotation and abduction. (Recommendation IIa-B); • Analgesics, such as acetaminophen and ibuprofen, and neuromodulators, can be used. (Recommendation IIa-A); • Subacromial corticosteroid injections and suprascapular nerve block are reasonable options for hemiplegic PS. (Recommendation IIb-B); • Acupuncture, as an adjunctive treatment, has an uncertain value. (Recommendation IIb-B);
Zhang T, Zhao J, Li X, Bai Y, Wang B, Qu Y et al. **Chinese Stroke Association guidelines for clinical management of cerebrovascular disorders: executive summary and 2019 update of clinical management of stroke rehabilitation.** ***Stroke and Vascular Neurology* 2020 Sep;5(3):250-259.** **(selected)**	Botulinum toxin injection can effectively alleviate the pain caused (Class IIa recommendation, Level A evidence). For patients with subluxation of the shoulder joint, position fixation and supportive devices and shoulder straps should be considered (Class IIa recommendation, Level B evidence). Ultrasound can be used as a diagnostic tool for shoulder soft-tissue injury. Acupuncture, NMES, suprascapular nerve block, and subacromial or shoulder joint injection of corticosteroids can be used as an adjuvant treatment for hemiplegia (Class IIb recommendation, Level B evidence).
Clinical Guidelines for Stroke Management 2017/2022. Melbourne (Australia): National Stroke Foundation; 2017. Section 5. Rehabilitation	**Subluxation** For stroke survivors at risk of shoulder subluxation, electrical stimulation may be used in the first six months after stroke to prevent or reduce subluxation. (weak recommendation) For stroke survivors at risk of shoulder subluxation, shoulder strapping is not recommended to prevent or reduce subluxation. (weak recommendation) For stroke survivors at risk of shoulder subluxation, firm support devices (e.g. devices such as a laptray) may be used. A sling maybe used when standing or walking.

Guideline	Recommendations
	To prevent complications related to shoulder subluxation, education and training about correct manual handling and positioning should be provided to the stroke survivor, their family/carer and health professionals, and particularly nursing and allied health staff. **Contracture** For stroke survivors at risk of developing contracture, routine use of splints or prolonged positioning of upper or lower limb muscles in a lengthened position (stretch) is not recommended. (strong recommendation) For stroke survivors, serial casting may be trialled to reduce severe, persistent contracture when conventional therapy has failed. For stroke survivors at risk of developing contracture or who have developed contracture, active motor training or electrical stimulation to elicit muscle activity should be provided. Overhead pulley exercise should NOT be used routinely to maintain range of motion of the shoulder. **Shoulder Pain** For stroke survivors with shoulder pain, shoulder strapping may be used to reduce pain. (weak recommendation) For stroke survivors with shoulder pain, shoulder injections (either sub acromial steroid injections for patients with rotator cuff syndrome, or methylprednisolone and bupivacaine for suprascapular nerve block) may be used to reduce pain. (weak recommendation) For stroke survivors with shoulder pain and upper limb spasticity, Botulinum Toxin A may be used to reduce pain. (weak recommendation) For stroke survivors with shoulder pain, electrical stimulation is not recommended to manage pain. (weak recommendation) For stroke survivors with severe weakness who are at risk of developing shoulder pain, management may include: shoulder strapping; education of staff, carers and stroke survivors about preventing trauma; active motor training to improve function. For stroke survivors who develop shoulder pain, management should be based on evidence-based interventions for acute musculoskeletal pain.
Winstein CJ, Stein J, Arena R, Bates B, Cherney LR, Cramer SC et al; on behalf of the American Heart Association Stroke Council, Council on Cardiovascular and Stroke Nursing, Council on Clinical Cardiology, and Council on Quality of Care and Outcomes Research. **Guidelines for adult stroke rehabilitation and recovery: a guideline for healthcare professionals from the American Heart**	Positioning of hemiplegic shoulder in maximum external rotation while the patient is either sitting or in bed for 30 minutes daily is probably indicated. (B) Patient and family education (ie, range of motion, positioning) is recommended for shoulder pain and shoulder care after stroke, particularly before discharge or transitions in care. (C) Botulinum toxin injection can be useful to reduce severe hypertonicity in hemiplegic shoulder muscles. (A) A trial of neuromodulating pain medications is reasonable for patients with hemiplegic shoulder pain who have clinical signs and symptoms of neuropathic pain manifested as sensory change in the shoulder region, allodynia, or hyperpathia. (A) It is reasonable to consider positioning and use of supportive devices and slings for shoulder subluxation. (C) NMES may be considered (surface or intramuscular) for shoulder pain. (A)

Guideline	Recommendations
Association/American Stroke Association. ***Stroke* 2016;47:e98–e169**	Ultrasound may be considered as a diagnostic tool for shoulder soft tissue injury. (B) Usefulness of acupuncture as an adjuvant treatment for hemiplegic shoulder pain is of uncertain value. (B) Usefulness of subacromial or glenohumeral corticosteroid injection for patients with inflammation in these locations is not well established. (B) Suprascapular nerve block may be considered as an adjunctive treatment for hemiplegic shoulder pain. (B) Surgical tenotomy of pectoralis major, lattisimus dorsi, teres major, or subscapularis may be considered for patients with severe hemiplegia and restrictions in shoulder range of motion. (C) The use of overhead pulley exercises is not recommended. (C)

Evidence Tables (Shoulder Pain)

Supportive Devices (Slings & Strapping)

Study/Type	Quality Rating	Sample Description	Method	Outcomes	Key Findings and Recommendations
Systematic reviews					
Deng et al. 2021 **China** **Systematic review & meta-analysis**	All trials were of good quality (PEDro score of ≥6)	9 RCTs, including 424 persons with shoulder pain following stroke. Most trials included patients in the acute/subacute stage of stroke. Mean age ranged from 51 to 68.5 years.	Trials compared kinesio taping + conventional physiotherapy vs. placebo or sham tape, or no tape +conventional physiotherapy to treat (n=8) or prevent (n=1) shoulder pain. Duration of treatment was 3-4 weeks.	**Primary outcomes:** Pain, motor function (FMA-UE), shoulder subluxation and ADL (BI)	Kinesio taping was associated with a significant reduction in pain (MD= –1.45, 95% CI −1.98 to–0.92 cm) and shoulder subluxation (SMD= –0.65, 95% CI −0.95 to −0.35). Kinesio taping was associated with a significant improvement in motor function (MD=4.22,95% CI 3.49 to 4.95) and performance of ADL (MD = 6.86, 95% CI 3.99 to 9.73)
Nadler & Pauls 2017 **UK** **Systematic review**	The PEDro score for the single RCT was 7.	8 studies (1 RCT, 1 quasi-RCT, 1 pre-post, 5 observational) including persons with shoulder pain following stroke. Neither demographic data, nor time since stroke were reported.	Studies evaluated the potential benefit of shoulder orthoses on preventing or reducing glenohumeral subluxation and hemiplegic shoulder pain. In the 2 controlled trials, usual care + orthoses vs. usual care only were compared. In the uncontrolled studies, 2-4 different orthoses were evaluated within participants (triangular bandage, Bobath, Hook hemi-harness, Henderson, Harris hemisling, Rolyan sling, and GivMohr sling).	**Primary outcomes:** Immediate repositioning of the humeral head, subluxation, pain, range of movement, spasticity, hand edema, patient satisfaction.	No studies evaluated if orthoses could prevent shoulder subluxation. Most orthoses tested reduced vertical subluxation during use. The most effective devices were those that provided whole arm support (i.e., triangular bandage, Harris). However, once vertical subluxation was present, improvements were not maintained without the orthosis, unless there was concurrent recovery of muscle power. There were modest improvements in pain when orthoses were worn for a prolonged time (mean of 6.6 weeks). Results from 3 studies suggest that wearing an orthosis did not increase the risk of contracture. There was no increase in adverse events, spasticity, or hand edema. Orthoses were tolerated well by most patients.

Study/Type	Quality Rating	Sample Description	Method	Outcomes	Key Findings and Recommendations
Appel et al. 2014 **UK** **Systematic review**	Among the 4 RCTs, the risk of bias was assessed as unclear or inadequate in ≥1 domain using the Cochrane tool	8 studies (5 RCTs/quasi RCT, 3 nonrandomized trials) including 340 participants with upper limb impairments and reduced upper limb function following stroke. Most participants were recruited within 4 weeks of stroke. Mean age was 65 years, 53% were men.	The potential benefit of shoulder strapping to reduce upper limb and shoulder impairments and dysfunction, was examined. Types of interventions were any form of strapping applied to the shoulder with therapeutic intent. Duration of treatment ranged from 5 days to 6 weeks	**Primary Outcomes:** Participation restriction, upper limb function, impairment outcomes (pain, subluxation, range of movement of the shoulder), and adverse events.	Pooling of results was possible for one outcome using the results of the 4 RCTs. Strapping was not associated with significant improvement in upper limb component of the Motor Assessment Scale (MD=0.87, 95% CI -0.7 to 1.81). Adverse events (skin reactions, itching or rash) were reported in 11 cases. The results for the other outcomes were mixed, with some studies reporting a benefit, while others did not.
Ada et al. 2005 **Australia** **Cochrane review**	PEDro scores were 8/8 in 2 trials and 2 and 3/8 in the remaining trials. (Since it was not possible to blind the patients or therapists to the treatment arm, the authors revised the total possible score from 10)	4 RCTs including 142 participants with a flaccid arm with no history of shoulder pain. Chronicity of stroke was < 4 weeks. Age ranged from 22 to 87 years, 49% were men.	3 differing strapping regimes using adhesive tape to support the shoulder, and changed every 2-4 days for up to 6 weeks. Subjects in 1 study wore a hemisling during waking hours for 2-3 weeks.	**Primary Outcomes:** Prevention of subluxation **Secondary Outcomes:** Pain, function (items 6-8 of the Motor Assessment Scale), contracture (degree of shoulder external rotation following intervention) Outcomes were assessed before and after treatment and up to 7 months, in 1 study.	*Subluxation* No patients developed subluxation (defined as 10) in the single trial in which persons wore a hemisling. *Pain* Shoulder strapping significantly delayed the onset of shoulder pain after admission to study (MD= 13.6 days, 95% CI 9.7 to 17.8, p<0.0001). Results from 2 studies included. F*unction* Strapping was not associated with a significant improvement in function (MD=0.83, 95% CI -1.46 to 3.12, p=0.5). Results from 1 study included. *Contracture* There was no significant difference in the number of persons with contracture in the hemisling group vs. hemisling group (OR=1.00, 95% CI 0.1-9.3, p=1.00). Results from 1 study included. Dropouts: There was a total of 17 participants from all studies combined.
Clinical Trials					
Pan et al. 2018	CA: ☑	120 inpatients recruited from a rehabilitation hospital with upper	In addition to inpatients rehabilitation, patients were	**Primary Outcomes:** Pain (VAS, NRS)	There was significant improvement in all outcomes within groups at 4 and 12 weeks,

Study/Type	Quality Rating	Sample Description	Method	Outcomes	Key Findings and Recommendations
China **RCT**	Blinding: Patient ☒ Assessor ☑ ITT: ☑	limb dysfunction, with/without shoulder pain following stroke. Mean age was 64 years, 60% were men. Mean time since stroke was 2 months.	randomized 1:1 to receive modified wheelchair arm-support for at least 60 minutes a day, 6 days/week, x 4 weeks or services including maintaining a normal limb position, and passive rehabilitation exercises.	**Secondary Outcomes:** Upper Extremity Fugl-Meyer Assessment (FMA-UE), Modified Barthel Index (MBI), Quality of Life Index (QLI). Measurements were made at baseline, post-intervention, and 12 weeks follow-up.	from baseline. Median pain scores were significantly lower in the intervention group at 12 weeks (0 vs. 3, p<0.0001, but not at the end of treatment (2 vs. 3, p=0.059). At 4 and 12 weeks, there was significantly greater improvement in median MBI and QLI scores in the intervention group. Among the 45 patients without shoulder pain at baseline, a significantly lower percentage of patients in the intervention group developed shoulder pain at the end of follow-up (1/25 vs. 6/20, p=0.034)
Ada et al. 2017 **Australia** **RCT**	CA: ☑ Blinding: Patient ☒ Assessor ☑ ITT: ☑	46 patients admitted to 3 inpatient units within 3 weeks of stroke who were at risk of shoulder subluxation. Mean age was 69 years, 56.5% were men.	Participants were randomized 1:1 to use a modified lap-tray while sitting and a triangular sling while standing to support the affected or to use a hemi-sling while sitting and standing. Duration of treatment was 4 weeks.	**Primary Outcome:** Shoulder subluxation. **Secondary Outcomes:** Pain, shoulder external rotation, forearm supination, wrist extension, Motor Assessment Scale (MAS).	There was no significant difference between groups in terms of shoulder subluxation (MD -3 mm, 95% CI -8 to 3), pain at rest (MD -0.7 out of 10, 95% CI -2.2 to 0.8), shoulder external rotation (MD -1.7 out of 10, 95% CI -3.7 to 0.3) or having less contracture of shoulder external rotation (MD -10 deg, 95% CI -22 to 2). There was no significant difference between groups in terms of other contractures and activity of the upper limb.
Van Bladel et al. 2017 **Belgium** **RCT**	CA: ☑ Blinding: Patient ☒ Assessor ☒ ITT: ☒	28 patients, recruited from 3 rehabilitation units following first-ever stroke with severe upper limb impairments. Mean age was approximately 55 years but varied significantly among study groups. 61% were men. Mean chronicity of stroke was approximately 9 weeks.	In addition to conventional rehabilitation, participants were randomized to wear one of 2 shoulder supports (an Actimove sling or Shoulderlif) or no sling (control group) for 6 weeks during their “active time” during the day.	**Primary Outcomes:** Subluxation (Acromiohumeral distance), pain (VAS). **Secondary Outcomes:** Passive ROM, spasticity, Trunk Impairment Scale, Fugl Meyer assessment upper limb. Outcomes were assessed at pre- and post-intervention.	At 6 weeks, there was no significant difference between groups on shoulder subluxation. Patients in the Actimove group reported more pain at rest (mean VAS 2.63 vs. 0.71 for Shoulderlift and 0 for the control group, p=0.036). There were no significant differences in pain scores between groups during activity or at night. There were no significant differences between groups for any of the secondary outcomes.

Study/Type	Quality Rating	Sample Description	Method	Outcomes	Key Findings and Recommendations
Chatterjee et al. 2016 **India** **RCT**	CA: ☒ Blinding: Patient ☒ Assessor ☑ ITT: ☒	30 patients who had sustained an acute stroke with evidence of shoulder subluxation (> 5 mm) and shoulder pain. Mean age was 63 years, 56.5% were men. The chronicity of stroke was 23 days.	All participants received conventional neurorehabilitation 5 days a week over 6 weeks. Patients were randomized 1:1 to receive shoulder taping using the California tri-pull shoulder method) or no taping.	**Primary Outcomes:** Pain, (VAS), active shoulder flexion range of motion (AFLXN), Fugl Meyer Assessment Upper Limb total score (FMA-T), proximal (FMA-P), distal (FMA-D).	At the end of treatment, the patients in the treatment group reported significantly less pain at rest than the control group (mean VAS 4.7 vs. 7.5; MD=- 2.80 points). At the end of treatment, the patients in the treatment group reported significantly greater mean AFLXN scores (24.3 vs. 19.13). Patients in the taping group had significantly greater improvement in mean FMA proximal (12.9 vs. 11.1, MD=1.80), but there were no significant differences between groups for the other upper arm FMA subscales or total scores.
Pandian et al. 2013 **Australia** **RCT**	CA: ☑ Blinding: Patient ☒ Assessor ☑ ITT: ☒	162 patients with first-ever stroke with upper limb weakness within <48 hours of the event, recruited from 3 hospitals. Mean age was approximately 58 years, 65% were men.	Patients were randomized to receive taping of the affected shoulder (i.e., tri-pull method) or to a sham taping group, with tape applied every 3 days for 14 days. Patients in both groups also received conventional treatment.	**Primary Outcomes**: Pain (VAS), Shoulder Pain and Disability Scale (SPDS) Outcomes were assessed at day 14 and 30 post treatment.	There was a significantly greater reduction in mean pain scores (VAS) and SPAD scores at 30 days post treatment, but not at 14 days.
Griffin & Bernhardt 2006 **Australia** **RCT**	CA: ☑ Blinding: Patient ☒ Assessor ☑ ITT: ☒	33 patients, recruited from 3 inpatient rehabilitation units who were at risk for the development of shoulder pain, within 3 weeks of stroke onset. Mean age varied across treatment groups from 59 to 65 years, 68% were women.	Patients were randomized to receive no strapping vs. therapeutic vs. placebo strapping technique using 2 lengths of adhesive tape. Strapping tape was removed and reapplied every 3-4 days, for 4 weeks. Patients in all groups received conventional rehabilitation therapies based on both Bobath and Motor Skill learning.	**Primary Outcomes:** Pain free days measured using the Ritchie Articular Index **Secondary Outcomes:** Modified Ashworth Scale, Motor Assessment Scale (MAS)(upper-arm component). Assessments were conducted at baseline and at the end of treatment.	The mean (±sd) number of pain-free days was highest in the therapeutic strapping group. Mean: 26.2 ± 3.9 vs. 19.1 ±10.8 (control strapping) vs. 15.9 ±11.6 (no strapping), p=0.023. 1 patient in the therapeutic strapping group developed pain over the study period compared with 5 patients in the other 2 groups. Median MAS scores at the end of treatment: 1 (therapeutic strapping) vs. 1 (placebo strapping) vs. 0 (control), p=0.346. Median MAS scores at the end of treatment: 1 (therapeutic strapping) vs. 1 (placebo strapping) vs. 2 (control), p=0.186.

Study/Type	Quality Rating	Sample Description	Method	Outcomes	Key Findings and Recommendations
					Drop-outs: therapeutic strapping group n=1, control group, n=2. Adverse events: 1 due to skin irritation
Hanger et al. 2000 **New Zealand** **RCT**	CA: ☑ Blinding: Patient☒ Assessor ☑ ITT: ☑	98 patients with acute stroke (mean of < 12 days post onset) with persistent weakness of shoulder abduction. Mean age was 79 years, 39% were men.	Patients were randomized to receive strapping with 3 lengths of nonstretch tape + comprehensive inpatient rehabilitation program of task-specific therapy or therapy only Strapping was continued for 6 weeks, or until patients achieved active abduction of the affected arm to 90 degrees against gravity for 2 seconds with a flexed elbow, or until discharge from the hospital. Strapping remained on at all times and was removed and replaced every 2-3 days.	**Primary Outcomes:** Pain, shoulder lateral range of movement measured at the point of pain (SROMP), VAS (10cm) **Secondary Outcomes:** Items 6-8 on the Motor Assessment Scale (MAS), FIM, Rankin Disability Scale Outcomes were at baseline, end of treatment, and 2 months later	There were no significant differences between groups at either the end of treatment or at final follow-up. The median value for patients in the strapping and control groups at baseline and final assessment were: SROMP (degrees): 55 and 35 vs. 60 and 40, p=0.15 Pain: 0 and 0 vs. 0 and 2, p=0.34 FIM: 29.5 and 47 vs. 31.5 and 41, p=0.71 Rankin: 4 and 3.5 vs. 4 and 4, p=0.64 Dropouts: strapping group n=13, control group n=12 Adverse events: skin reaction in 3 patients in the strapping group.

Positioning

Study/Type	Quality Rating	Sample Description	Method	Outcomes	Key Findings and Recommendations
Borisova & Bohannon 2009 **USA** **Systematic review & meta-analysis**	PEDro scores ranged from 6-8.	5 RCTs that included persons recovering from stroke with a paretic shoulder. Mean time from stroke onset ranged from 14 to 84 days.	Trials compared positioning programmes in addition to conventional rehabilitation vs. rehabilitation only. Programmes were provided for 20-30 minutes, 2-3x/day, 5-7 days/week for 4-12 weeks or from admission to discharge from hospital.	**Primary outcome:** Shoulder external ROM (degrees).	There was no significant difference in mean (± SE, 95% CI) losses in ROM at the end of treatment: Control vs. positioning groups were 15.0±7.7, -0.06 to -30.0 vs. 13.6 ± 5.5, 2.90 to -24.34 degrees. SMD= -0.216, -0.573 to 0.141, p=ns. Adverse events: No reporting
De Jong et al. 2006 **Netherlands** **RCT**	CA: ☑ Blinding: Patient ☒ Assessor ☑ ITT: ☒	19 patients who had experienced their first-ever stroke < 12 weeks previously, with no premorbid impairments of their affected arm, without severe shoulder pain and with Brunnstrom stage of recovery <4. 9 men and 8 women completed the trial. Their ages ranged from 36-63 years. Mean time from stroke was 36 days.	Patients in the experimental group participated in a positioning procedure twice a day for 30 minutes x 5 weeks. The arm was positioned with maximal shoulder abduction, external shoulder rotation, and elbow extension and forearm supination + conventional inpatient rehabilitation. Patients in the control group received conventional rehabilitation only.	**Primary Outcomes:** Passive range of motion (ROM) in external shoulder rotation, shoulder flexion, shoulder abduction, elbow extension, forearm supination. **Secondary Outcomes:** Ashworth Scale (elbow extension), Fugl-Meyer Assessment Scale (FMA), Barthel Index (BI) Assessments were conducted before and after treatment and 5 weeks follow-up.	At the end of the treatment period the mean (± sd) loss of shoulder abduction (degrees) was significantly less among subjects in the experimental group: -5.3 ±18 vs. -23 ± 13.4, p=0.042. There were no other significant differences in losses of passive ROM between groups (mean ± sd) over the study period. External shoulder rotation: -19.2 ± -18.4, shoulder flexion: -23.3 ± 19.6 vs. -28.8 ± 27.5, elbow extension: 0.6 ± 3.3 vs. -4 ±5.6, forearm supination: -11.5 ± 9.5 vs. -2.7 ± 12.7 There was no significant difference in the median FMA or BI change scores between groups: 1 vs. 0, p=0.917 and 6 vs. 4, p=ns The median change score for FMA scores was significantly greater among subjects in the experimental group: 11 vs. 1, p=0.038. (Statistical tests were not conducted for follow-up assessments due to high dropouts.) Dropouts: experimental group n=6, control group n=3

Study/Type	Quality Rating	Sample Description	Method	Outcomes	Key Findings and Recommendations
					Adverse events: severe shoulder pain was reported by 1 patient
Ada et al. 2005 **Australia** **RCT**	CA: ☒ Blinding: Patient ☒ Assessor ☑ ITT: ☒	36 persons at risk for the development of contracture (hemiplegia and little or no arm function) admitted for inpatient rehabilitation within 20 days of first stroke. Mean age was 68 years, 50% were men. Mean time since stroke was 14 days.	Persons in the experimental group received 2, 30-minute sessions of shoulder positioning, 5 days a week for 4 weeks (1 abduction in external rotation position, shoulder/elbow at 90 degrees flexion) + 10 minutes of shoulder exercises vs. 10 minutes of shoulder exercises only.	**Primary Outcomes:** Maximum passive shoulder external rotation and flexion (contracture) **Secondary Outcome:** Motor Assessment Scale (MAS)(Item 6) Assessments were conducted before and after treatment	There was significantly greater loss in mean maximum passive external shoulder rotation (degrees) in the control group at the end of treatment (-17.9 vs. -6.1 degrees). There was no significant difference between groups in the mean maximum passive shoulder flexion (-11.7 [experimental] vs. -9.1 [control] degrees) after treatment. Median change in MAS scores were not significantly different: 0 to 1 (exp. group) vs. 0 to 0 (control group), p=0.37 There were 5 dropouts: 3 in the experimental group and 2 in the control group).

Electrical Stimulation

Study/Type	Quality Rating	Sample Description	Method	Outcomes	Key Findings and Recommendations
Systematic Reviews					
Qiu et al. 2019 **China** **Systematic review & meta-analysis**	N/A	6 RCTs including persons with hemiplegic shoulder pain following stroke. Mean ages ranged from 53 to 66 years. Sample sizes ranged from 19 to 88. Mean time since stroke ranged from 16 days to 2.1 years.	Trials compared high TENS vs, low TENS vs. conventional rehabilitation; percutaneous nerve stimulation (PNS) vs. hemisling; TENS + conventional rehabilitation vs. sham TENS + conventional rehabilitation; PNS vs. conventional rehabilitation; FES + electric acupuncture + conventional rehabilitation vs. electric acupuncture + conventional rehabilitation; and low frequency electrical	**Primary Outcome:** Pain **Secondary Outcomes**: Pain-free external rotation (PFER), ADL. The results are based on the outcomes at post-intervention times.	Electrical stimulation was associated with a significant reduction in pain following treatment (SMD= -1.89, 95% CI -3.05 to -0.74; 4 trials, 193 participants) Electrical stimulation was associated with a significant improvement in PFER (degrees) (WMD=18.9, 95% CI 7.00-30.8; 4 trials, 164 participants). Electrical stimulation was associated with an improvement in ADL, assessed using the Barthel Index (WMD=8.96, 95% CI 5.26-12.66; 3 trials, 167 participants)

Study/Type	Quality Rating	Sample Description	Method	Outcomes	Key Findings and Recommendations
			stimulation + acupuncture + conventional rehabilitation vs. acupuncture + conventional rehabilitation. Treatment duration ranged from 3-6 weeks.		
Lee et al. 2017 **South Korea** **Systematic review & meta-analysis**	PEDro scores ranged from 4-6	11 RCTs including 432 persons with shoulder subluxation following stroke. Mean age ranged from 55 to 73 years. In 9 trials, data were available in the acute stage of stroke (mean of 1.8 months) and in 4 trials, data were available in the chronic stage of stroke (mean of 9.3 months).	Trials compared neuromuscular electrical stimulation (NMES) + conventional therapy vs. conventional therapy only. Treatment parameters: mean of 1.4 sessions/day, (range 1-4); 136 minutes/day (range 20-335); 5.2 sessions/week (range 3-7). Total mean NMES duration of treatment per week was 12.6 hours (range 1-31.5)	**Primary Outcomes:** Shoulder subluxation, motor function, shoulder pain. Outcomes were assessed for differences between groups at post-intervention.	Overall, NMES was associated with a significant reduction in shoulder subluxation (SMD=-1.17, 95% CI -1.63 to -0.71; 12 trials). The benefit was significant in the acute stage (SMD=-1.1, 95% CI -1.53 to -0.68; 8 trials), but not in the chronic stage (-1.25, 95% CI -2.61 to 0.11; 4 trials). NMES was not associated with a significant improvement in motor arm function in either the acute or chronic stage (SMD=1.06, 95% CI -0.17 to 2.29; 3 trials and SMD=0.43, 95% CI -0.51 to 1.02; 2 trials, respectively. NMES was not associated with a significant improvement in pain in either the acute or chronic stage (SMD=-1.07, 95% CI -4.43 to 2.29; 2 trials and SMD=-0.28, 95% CI -0.90 to 0.35; 1 trial, respectively.
Vafadar et al. 2015 **Canada** **Systematic review & meta-analysis**	PEDro scores were 3 (n=1), 4 (n=3), 5 (n=2), 6 (n=3 and 8 (n=1)	10 trials (9 RCTs and 1 quasi-RCT) including persons with stroke. Mean ages ranged from 55 to 75.5 years. In 9 trials, data were available for the acute stage of stroke (<6 months).	Trials compared conventional therapy (PT/OT) + functional electrical stimulation (FES) vs. sham FES or no FES + conventional therapy. FES was provided as 15–60-minute sessions, 1-5 sessions/day. Duration of therapy was 4-6 weeks.	**Primary Outcomes:** Shoulder subluxation, shoulder pain, upper limb motor function. Assessment time point of outcomes was not indicated.	*Early after stroke*: FES was associated with a significant reduction in shoulder subluxation (SMD= -0.70, 95% CI -0.98 to -0.42, n=6 trials). FES was not associated with a significant improvement in shoulder pain free range of lateral rotation (SMD=0.31, 95% CI -0.13 to 0.75; n=3 trials) or shoulder pain (SMD=-0.28, 95% CI -0.67 to 0.11; n=3 trials). FES was not associated with significant improvement in motor function (SMD=0.36, 95% CI -0.27 to 0.99; n=3 trials). *Later after stroke:* FES was associated with a significant reduction in

Study/Type	Quality Rating	Sample Description	Method	Outcomes	Key Findings and Recommendations
					shoulder subluxation (SMD=-0.42, 95% CI -1.04 to 0.21; n=2 trials).
Mathieson et al. 2014 **New Zealand** **Systematic Review**	Downs & Black score ranged from 15/28 to 26/28	14 studies (11 RCTs, 3 case reports) including 348 patients with upper limb dysfunction post-stroke. Mean age was 63 years, 60% were men. Time since stroke ranged from < 12 days-7 years.	Studies were categorized into four groups: 1) Passive studies (N=4) comprised of interventions which act on patients who are not actively involved in the intervention (FES + botulinum toxin A, ROM bracing, splinting). 2) Active-assisted (2 studies) where the interventions assisted the patients with the task at hand (FES, finger tracking device) 3) Usual care (N=6) where the interventions combined with FES were common exercise-based therapies (Bobath techniques, upper limb therapy) 4) Imagery (N=2), FES+ mirror therapy, and FES + mental imagery.	**Primary Outcomes**: Upper Extremity Fugl-Meyer (UEFM); Motor Assessment Scale; Action Research Arm Test **Secondary Outcomes:** Barthel Index; Modified Ashworth Scale; Motor Activity Log	Data were not pooled. 1) Passive: Variable findings whereby there were two positive and two negative studies. 2) Active-Assisted: Variable findings whereby there was one positive and one negative study. 3) Usual Care: Demonstrated significant functional improvements in four of six studies. 4) Imagery: Demonstrated the most clinically significant results, with significant improvements in the UEFM when compared to controls. Of all interventions, FES and mirror therapy was found to be the most effective.
Ada & Foongchomcheay 2002 **Australia** **Systematic review & meta-analysis**	PEDro scores ranged from 4-9/10	7 RCTs including persons with subluxation or shoulder muscle paralysis. In 4 trials (n=145) were considered early (mean of 2 to 50 days post stroke) and in 3 trials (n=38) were considered late (mean of 60 to 434 days post stroke. Ages ranged from 55 to 73 years, 49% were men.	Trials compared electrical stimulation (range 10 to 35 Hz, sufficient to produce muscle contraction) + conventional rehabilitation vs. conventional rehabilitation +/- hemisling, wheelchair support, joint mobilizations and/or stretching. Target muscles were the supraspinatus, supraspinous fossa and deltoid. Treatment duration: maximum of 15 minutes to 7 hours of stimulation, 1-4 sessions/day, 5-7 days/week for 4-6 weeks.	**Primary Outcomes:** Subluxation (mm) **Secondary Outcomes:** Function (Bobath Assessment chart, Motor Assessment Scale, Fugl-Meyer-all scores were converted to a %), Pain (pain-free passive shoulder external rotation, pain free active shoulder external rotation using goniometry, 15cm VAS)	*Subluxation* Electrical stimulation was associated with prevention or reduction in shoulder subluxation in the early trials (WMD=6.5 mm, 95% CI 4.4 to 8.6) but not in the later stage (WMD =1.9 mm, 95% CI -2.3 to 6.1). *Function* Electrical stimulation was not associated with an improvement in function in either the early (WMD=18.6%, 95% CI 0.4 to 36.7) or later trials (WMD=14.4%, 95% CI -5.4 to 34.2). *Pain* Electrical stimulation was not associated with an improvement in pain free ROM (degrees) in the early stage (WMD=3.7 degrees,95% CI -1.2 to

Study/Type	Quality Rating	Sample Description	Method	Outcomes	Key Findings and Recommendations
					8.6; n=3 trials). Electrical stimulation was associated with maintaining a pain-free active shoulder abduction, based on VAS (cm): WMD=1.6 cm, 95% CI 0.1 to 3.0; 2 trials included.
Price & Pandyan 2000 **UK** **Cochrane review**	N/A	4 RCTs, including 170 participants with hemiparesis following acute (n=2), sub-acute (3 months, n=1) and chronic (> 6 months, n=1) stroke. Ages ranged from 45 to 84 years, with most participants >60 years of age. 45% were men. Shoulder subluxation at recruitment was found in 5%-40% of participants.	RCTs included comparisons of: 1) no sham treatment vs. FES; 2) sham treatment vs. high-intensity TENS, vs. low intensity TENS; 3) no sham treatment vs. electrical stimulation (neither FES, nor TENS) and 4) no sham treatment vs. low-frequency TENS. Electrical stimulation: 30-35 Hz, Target muscles: supraspinatus, posterior deltoid, most tender areas of shoulder girdle, wrist extensors. Treatment frequency: 1) maximum of 6 hours/day, 7 days/week; 2) 3 sessions of unknown duration, 3 days/week; 3) 0.5-1 hr sessions, 4 sessions/day, 7 days/week; 4) 6-minute sessions, 5 days/week Treatment duration: 4 weeks, 6 weeks (n=2) and 3 months	**Primary Outcomes:** New incidence of pain, changes in pain intensity from baseline **Secondary Outcomes:** Pain-free range of passive humeral lateral rotation (PHLR), motor function, subluxation, Ashworth Scale (AS)	Electrical stimulation was not associated with a reduction in new reports of shoulder pain (OR=0.64, 95% CI 0.19 to 2.14; results from 2 studies included) Electrical stimulation was not associated with a change in pain intensity (SMD=0.10, 95% CI, -0.34 to 0.54; results from 2 studies included). Electrical stimulation was associated with PHLR (relative to baseline): WMD=6.53, 95% CI 4.71 to 8.35; results from 4 studies included. Electrical stimulation was not associated with motor score change from baseline (SMD=0.24, 95% CI -0.14 to 0.62; results from 3 studies included). Electrical stimulation was associated with improvement in subluxation compared with baseline (SMD= -1.13, 95% CI -1.66 to -0.60; results from 2 studies included). Electrical stimulation was not associated with a change in mean AS scores from baseline: (WMD=0.05, 95% CI -0.28 to 0.37; results from 2 studies included).
Clinical Trials					
Zhou et al. 2018 **China**	CA: ☑ Blinding: Patient ☒	90 patients recruited from a rehabilitation hospital with hemiplegic shoulder pain (HSP)	Participants were randomized to receive either NMES (n=36) or TENS (n=36) on supraspinatus and deltoids,	**Primary Outcome:** Pain (NRS) **Secondary Outcomes:**	At 8 weeks post treatment, the mean NRS scores in the NMES group were reduced significantly compared with the control group (-2.24 vs. -1.23).

Study/Type	Quality Rating	Sample Description	Method	Outcomes	Key Findings and Recommendations
RCT	Assessor ☑ ITT: ☒	following a first-ever stroke. Mean age was approximately 60 years, 75% were men. Mean time since stroke was approximately 90 days.	combined with standard rehabilitation (1hr/day, 5d/week, for 4 weeks) as intervention groups, or to receive standard rehabilitation alone (control group, n=18).	active/passive range of motion (AROM/PROM) of shoulder, upper extremity Fugl-Meyer Assessment (FMA), Modified Ashworth scale (MAS), Barthel Index (BI), stroke-specific quality of life scale (SSQOLS). Outcomes were assessed at baseline, 2, 4, and 8 weeks after treatment.	There was non significant improvement in mean NRS scores for the comparisons of TENS vs. control (-1.57 vs. -1.23) or for NMES vs. TENS (-2.24 vs. -1.57). There were significant improvements on secondary outcomes within groups over time, with no significant differences between study groups.
Wilson et al. 2014 **USA** **RCT**	CA: ☒ Blinding: Patient ☑ Assessor ☑ ITT: ☑	25 patients with new or worsened shoulder pain following stroke with onset >3 months. Median age was 46 years in the PNS group and 58 years in the usual care group, 52% were men. Median time since stroke was 2.4 years.	Patients were randomized to receive peripheral nerve stimulation (PNS), for 6 hours per day for 3 weeks, or to receive usual care (UC) plus 8 hours of outpatient physical therapy for a 4-week period.	**Primary Outcomes:** Brief Pain Inventory (BPI-SF3) for pain intensity and interference **Secondary Outcome:** ShoulderQ, Short-Form 36 version 2 (SF-36 v2) Outcomes were assessed post treatment and weeks 1, 4, 12, and 16.	There was a significant reduction in pain intensity from baseline to week 16 in both groups, with significantly greater improvement in the PNS group (from 7.5 to 3.0 vs. 7.6 to 6.1, p=0.04 for group x time interaction). There were no significant differences between groups on pain interference (p=0.398), ShoulderQ (p=0.059), or SF-36 v2 (p=0.98) at 16 weeks.
de Jong et al. 2013 **Netherlands** **RCT**	CA: ☑ Blinding: Patient ☑ Assessor ☑ ITT: ☑	46 patients recruited from 3 rehabilitation centres with paralysis or severe paresis of the affected arm (Brunnstrom stages 1-3) following stroke that occurred 2-8 weeks previously. Mean age was 57 years, 59% were men. Mean time since stroke was 43 days.	In addition to multidisciplinary rehabilitation, patients were randomized to receive arm stretch positioning combined with motor amplitude NMES, twice a day for 45 minutes, 5 days a week, for 8 weeks, or sham arm positioning and sham NMES (controls).	**Primary Outcomes:** Passive ROM of arm, pain in the hemiplegic shoulder. Outcomes were assessed at baseline, mid-treatment, at the end of treatment (8 weeks) and follow-up (20 weeks).	There were no significant group x time interactions for either primary outcome (p>0.05).

Study/Type	Quality Rating	Sample Description	Method	Outcomes	Key Findings and Recommendations
Church et al. 2006 **UK** **RCT**	CA: ☑ Blinding: Patient ☒ Assessor ☑ ITT: ☒	178 patients recruited from 2 acute stroke units with a new upper-limb problem resulting from stroke, which occurred within the previous 10 days. Median age was 74 years, 50% were men.	In addition to standard acute stroke care, patients were randomized to receive surface NMES to the shoulder for 1 hour, 3x daily for 4 weeks (stimulation frequency was 30 Hz, which was increased steadily to produce a muscle contraction) or sham stimulation.	**Primary Outcome:** Action Research Arm Test (ARAT) at 3 months **Secondary Outcomes:** ARAT (4 weeks), Frenchay Arm test (FAT), Motricity Index (MI), Star Cancellation test, upper-limb pain Assessments were conducted at baseline, 4 weeks and 3 months	Median ARAT scores at baseline, 4 weeks and 3 months were: FES group: 0, 45.0 and 50.0 Control group: 3, 45.5 and 55.5 p=0.888 (4 weeks), p=0.068 (3 months) Median FAT scores at baseline, 4 weeks and 3 months were: FES group: 0.5, 4, 4 Control group: 0, 4, 5 p=0.923 (4 weeks), p=0.012 (3 months) Median MI scores at baseline, 4 weeks and 3 months were: FES group: 61.3, 80, 88 Control group: 63.3, 77, 89 p=0.574 (4 weeks), p=0.248 at 3 months) Star Cancellation test (% fail) at baseline, 4 weeks and 3 months were: FES group: 42, 33, 31 Control group: 36, 34, 24 p=0.870 (4 weeks), p=0.371 (3 months) Upper-limb pain (%) at baseline, 4 weeks and 3 months were: FES group: 21, 22, 46 Control group: 22, 26, 45 p=0.462 (4 weeks), p=1.00 (3 months)

Botulinum Toxin-Type A (BoNT-A)

Study/Type	Quality Rating	Sample Description	Method	Outcomes	Key Findings and Recommendations
Xie et al. 2021 **China** **Systematic Review & meta-analysis**	Risk of bias was assessed as low (or uncertain) for all domains in all trials, except one domain (attrition bias) which was rated as high in one trial.	9 RCTs including 301 participants with hemiplegic shoulder pain associated with stroke occurring >3 months previously. Mean ages ranged from 46 to 70 years, 53% were men. Mean time since stroke ranged from 3.5 to 46.5 months.	Trials compared BoNT vs. placebo (n=2), BoNT+TENS vs. placebo + TENS (n=1), BoNT + physiotherapy vs. placebo + physiotherapy (n=2); BoNT + ROM exercises vs. triamcinolone acetonide + ROM exercises (n=3); BoNT vs. triamcinolone acetonide (n=1).	**Primary Outcomes:** Pain (VAS), range of Motion (ROM) **Secondary Outcomes:** Fugl-Meyer (FM) score, Modified Ashworth (MAS) Results were pooled at weeks 1,2, 4 and 12 weeks post injection.	Pain scores were reduced significantly in the BoNT groups at 1, 4, and 12 weeks after injection, compared with the control condition. Shoulder abduction ROM was improved significantly in the BoNT groups at 1, 4, and 12 weeks after injection. Shoulder external rotation ROM was improved significantly in the BoNT groups at 1, 2 and 4 weeks after injection. Shoulder flexion ROM was not increased significantly compared with the control condition at any of the assessment points. BoNT was associated with a significant improvement in FM scores (MD=3.93, 95% CI 0.05-7.61; n=5 trials included), but not in MAS scores (MD=0.13, 95% CI -0.56 to 0.82; 5 trials included).
Tan et al. 2021 **China** **RCT**	CA: ☑ Blinding: Patients ☑ Assessor ☑ ITT: ☑	36 patients with spastic hemiparesis due to a stroke occurring ≥2 months previously and with moderate-severe spastic shoulder pain (VAS >4 cm) a modified Ashworth scale (MAS) score of 1+ or more points for spasticity in external rotation and abduction; limited passive ROM of the shoulder. Mean age was 52 years, 75% were men. Mean time since stroke was 5.5 months.	Participants were randomized to receive either Ultrasound-Guided BoNT-A (100 U) or 2.0-mL saline (placebo). All participants received routine rehabilitation during the study period.	**Primary Outcome:** Pain (VAS) **Secondary Outcomes:** Modified Ashworth Scale (MAS), pain-free passive ROM of shoulder, Fugl-Meyer Assessment (FMA) scale, Stroke-Specific QoL scale. Outcomes were assessed at baseline, and 1-, 4-, 12-, and 24-weeks post-injection.	At the end of 4 weeks the mean VAS pain score had improved in both groups, but the change from baseline was significantly greater in the BoNT-A group (7.1 to 2.8 vs. 7.3 to 4.2, mean change= −1.39, 95% CI −2.41 to −0.36, p=0.002). At week 24, there was no significant difference in mean VAS scores between groups (4.2 vs. 5.2, p=0.073). At the end of 4 weeks, there was significantly greater improvement in the BoNT-A group in mean MAS scores for the shoulder external rotation, but not for shoulder abduction. At the end of 4 weeks the mean FMA change scores from baseline was significantly greater in the BoNT -A group (10.95 vs. 6.4, p=0.014)

Study/Type	Quality Rating	Sample Description	Method	Outcomes	Key Findings and Recommendations
Singh & Fitzgerald 2010 **USA** **Cochrane review**	Risk of bias was considered low	6 RCTs, (164 subjects) of which 5 recruited participants following stroke. Subjects in 1 study had arthritis. Subjects in 2 studies were recruited more than 3 months following stroke. Subjects in the remaining trials were recruited > 6 months following stroke or had shoulder pain of duration > 6 months.	Treatment contrasts included a single injection of 500 U Dysport vs. placebo (n=3); 50 U Botox vs. placebo (n=2) and 100 U Botox vs. 40 mg triamcinolone acetonide (n=1). Subjects in 1 study received additional physical therapy and subjects in 1 study received treatment with TENS for 6 weeks.	**Primary Outcomes:** Pain, measured using a 10 cm VAS or verbal rating scale, adverse events **Secondary Outcomes:** Modified Ashworth Scale (MAS), ROM (flexion, extension, abduction and adduction)	BoNT-A was not associated with a significant reduction in pain at 4-6 weeks following treatment (MD= -1.12, 95% CI -2.89 to 0.66; results from 4 studies included) but was at 12-24 weeks (MD= -1.22, 95% CI -2.37 to -0.07; results from 3 studies included). BoNT-A was not associated with a significant risk in adverse events (RR=1.46, 95% CI 0.64 to 3.36; results from 3 studies included). BoNT-A was not associated with a significant reduction in mean MAS scores at 4-6 weeks (MD= -0.62, 95% CI -1.40 to 0.17; results from 2 studies included) or at 12-24 weeks (MD= -0.13, 95% CI -0.65 to 0.38; results from 2 studies included). BoNT-A was not associated with a significant improvement in passive abduction (0-180 degrees) at 4-6 weeks (MD=8.49, 95% CI -2.40 to 19.39; results from 3 studies included) or at 12-24 weeks (MD=17.72, 95% CI -9.61 to 45.04; results from 2 studies included). BoNT-A was associated with a significant improvement shoulder external rotation (0-90 degrees) at 4-6 weeks (MD=9.84, 95% CI 0.20 to 19.49; results from 3 studies included) but not at 12-24 weeks (MD=11.86, 95% CI -0.61 to 24.33; results from 2 studies included.
De Boer et al. 2008 **The Netherlands** **RCT**	CA: ☒ Blinding: Patient ☑ Assessor ☑ ITT: ☒	22 patients, with significant post-stroke shoulder pain (> 40 mm on a VAS) of at least 1 week's duration that restricted passive external rotation of the humerus. Mean age was 57 years, 54.5% were men. Mean time since stroke was 279 days in the experimental group and 147 days in the	Patients were randomized to receive a single injection of BoNT-A (2x50 units Botox) vs. placebo injection applied to the subscapularis muscle at two locations. All patients received some form of physical therapy.	**Primary Outcomes:** Pain (100 mm VAS) Humeral external rotation (degrees) Outcomes were assessed at baseline, 6- and 12-weeks following treatment.	There was no significant difference in mean (± sd) pain scores between groups at 12 weeks (p=0.08) Experimental group: 44.9±15.2 (baseline) to 38.1 ± 18.2 (12 weeks) Control group: 61.7 ± 23.2 (baseline) to 46.8 ± 27.2 (12 weeks) Mean (± sd) humerus external rotation increased significantly more among patients in the experimental group (p=0.001). Experimental group: 20.4 ± 16.6 (baseline) to 32.1

Study/Type	Quality Rating	Sample Description	Method	Outcomes	Key Findings and Recommendations
		control group.			± 14 (12 weeks) Control group: 10.3 ± 19.5 (baseline) to 23.7 ± 20.7 (12 weeks).

Oral Analgesic Agents

Study/Type	Quality Rating	Sample Description	Method	Outcomes	Key Findings and Recommendations
Poduri 1993 **USA** **Controlled trial**	N/A	43 patients discharged from outpatient stroke rehabilitation with shoulder pain (identified retrospectively from medical charts) for which a referral was made to a physiatrist. Mean age was 65 years, 63% were men. Mean time since stroke was 135 days in group 1 and 279 days in group 2. Subluxation was present in 13 group 1 and 11 group 2 patients.	Patients were divided into groups I (n=23) and 2 (n=20). Patients in group 1 received a nonsteroidal anti-inflammatory agent (Ibuprofen 400-800g tid, and sulindac, 150 mg bid) taken 30 to 60 minutes prior to occupational therapy. 10 of the patients in group 1 also received ultrasound therapy (3x/week for 2 weeks prior to therapy). Patients in group 2 received only occupational therapy consisting of range of motion, active assistive and strengthening exercises and activities of daily living training. One patient in Group 2 received ultrasound treatment. Patients in both groups attended therapy sessions an average of 2-3x/week for 4 months.	**Primary Outcome:** Pain relief (% of responders) **Secondary Outcomes**: Increase in ROM in shoulder flexion and abduction (% responders), increase in function (% responders) Timing of assessments was not stated (assumed to be before and after treatment	The percentage of patients who achieved pain relief was significantly higher in group 1 (91% vs. 15%, p<0.001) There was significantly greater Increase in ROM (flexion) in group 1 patients (78% vs. 40%, p<0.006) and greater increase in ROM (degrees) (28.4 vs. 13.3, p<0.03). Increase in ROM (abduction): 75% vs. 50%, p<0.055; Increase in ROM (degrees) 29.9 vs. 18.3, p=0.125 Increase in function: 100% vs. 55%, p<0.0001. Adverse events: No reporting

Intra-articular Injections

Study/Type	Quality Rating	Sample Description	Method	Outcomes	Key Findings and Recommendations
Park et al. 2017 **UK** **Retrospective study**	N/A	20 patients with hemiplegic shoulder pain admitted to a single centre, who were identified retrospectively. Mean age was 65 years, 45% were men. Mean time since stroke was 3.5 months.	All patients included in this study underwent ultrasound-guided intra-articular triamcinolone (TA) or polydeoxyribonucleotide (PDRN) injections in the hemiplegic shoulder. The TA group received intra-articular injections of TA 40mg/1 mL and normal saline (N/S) 14mL (total 15mL). The PDRN group received intra-articular injections of PDRN 1 ampoule (PDRN sodium 5.625mg/3mL) and N/S 12mL (total 15mL).	**Primary Outcomes:** Shoulder pain during passive ROM, assessed using NRS Assessment was performed just before the first injection, 1 day after the first injection, 1 week after the first injection, 1 week after the second injection, 2 weeks after the second injection, 3 weeks after the second injection, and 4 weeks after the second injection.	There was significant improvement within groups for all outcomes, but there were no significant differences between the groups at any time interval.
Huang et al. 2016 **Taiwan** **RCT**	CA: ☒ Blinding: Assessor ☑ Patient ☑ ITT: ☒	26 patients recruited from a rehabilitation unit with hemiplegic shoulder pain following stroke. Mean age was 62 years, 65% were men. Mean time since stroke was 30 days.	Patients were randomized to receive ultrasound-guided, subacromial HA injections once per week for 3 weeks + conventional rehabilitation (n=16) or 0.9% sodium chloride injections once per week for 3 weeks + conventional rehabilitation (n=10).	**Primary Outcomes:** Pain (VAS), Fugl Meyer Assessment (FMA-UE). Outcomes were assessed before and after the intervention.	In the experimental group, there were significant improvements in pain, VAS (P = 0.003), shoulder flexion (P = 0.03) and abduction (P = 0.02), and FMA-UE (P = 0.003) after treatment. In the control group, there were significant improvements in pain VAS (P = 0.007), shoulder flexion (P = 0.035), and FMA-UE (P = 0.042) after treatment. The only significant difference between groups was for pain VAS in favour of the HA group (-2 vs, -1, p<0.001).
Jang et al. 2016 **South Korea** **RCT**	CA: ☒ Blinding: Assessor ☒ Patient ☒ ITT: ☑	31 patients who developed hemiplegic shoulder pain and limited range of motion, within 3 months of stroke onset. Mean age was 58 years, 87% were men. Mean time since stroke was 54 days.	Patients were randomized to receive 3 weekly intra-articular hyaluronic acid (IAHA) injection (Group A) or a single intra-articular steroid (IAS) injection (Group B). All injections were administered by an expert physician until the	**Primary Outcomes:** Wong-Baker Scale (WBS), Passive range of motion (PROM). The assessment of therapeutic effects was performed prior to the start of the study, and in the 1st, 4th,	Group A showed significant improvement in WBS and movement at 4wk and 8wk (p≤0.003), while Group B showed significant improvement only for movement at 4wk and 8wk (p≤0.001). Group A showed significant improvement in ROM in shoulder flexion and external rotation at 4wk and 8wk (p≤0.006), while Group B showed significant improvement only at 8wk (p≤0.014).

Study/Type	Quality Rating	Sample Description	Method	Outcomes	Key Findings and Recommendations
			8th week using a posterior ultrasonography-guided approach.	and 8th weeks.	There were no significant differences between groups for WBS or ROM (p>0.05).
Rah et al. 2012 **South Korea** **RCT**	CA: ☒ Blinding: Subjects ☑ Therapists ☑ Assessor ☑ ITT: ☒	58 patients with chronic HSP (at least 3/10 on a VAS, of at least 1 month's duration) and evidence of rotator cuff disorder. Deltoid muscle grade of 2 or more on the manual muscle test of the Medical Research Council Scale. Mean age was 55 years, 67% were men. Mean time since stroke was 20 months.	Patients were randomized to receive a single ultrasound-guided subacromial injection with triamcinolone acetonide 40mg (treatment group, n=29), or lidocaine (placebo group, n=29). All patients participated in an exercise program, which included (in progressive order) gentle and active range of motion (AROM) exercises without weight, progressive strengthening exercises for the scapular stabilizing muscles and rotator cuff strengthening with closed chain exercises. Exercises were performed 3 times a day for 10 minutes.	**Primary Outcomes:** Average shoulder pain level at day and night (10 cm VAS). **Secondary Outcomes:** Modified Barthel Index, Shoulder Disability Questionnaire (SDQ), and angles of shoulder active range of motion (flexion, abduction, external rotation, and internal rotation). Assessments were conducted at baseline, and at weeks 2, 4 and 8.	Mean (±sd) changes from baseline to week 8 *VAS (day)* Treatment group: 5.7 ± 1.7 to 3.0 ± 1.8 Control group: 5.7 ± 1.7 to 4.9 ± 2.3 p=0.001 *VAS (night)* Treatment group: 5.5 ± 1.5 to 2.7 ± 1.7 Control group: 5.9 ± 2.0 to 5.0 ± 2.6 p<0.001 *SDQ* Treatment group: 16.9 ± 3.8 to 11.1 ± 5.7 Control group: 16.6 ± 2.7 to 15.2 ± 3.9 p<0.001 *MBI* Treatment group: 75.7 ± 17.8 to 77.5 ± 17.2 Control group: 71.0 ± 26.3 to 72.7 ± 25.6 P=0.737 There were significant differences favouring the treatment group for flexion, external rotation and internal rotation. Drop-outs: treatment group n=1, control group n=1. Adverse events: facial flushing (n=2 treatment), dizziness (n=1 control)
Snels et al. 2000 **Netherlands** **RCT**	CA: ☑ Blinding: Subjects ☑ Therapists ☑ Assessor ☑ ITT: ☒	37 patients with hemiplegic shoulder pain (≥ 4 on a 0 to 10 VAS), of at least 2 week's duration with a limitation of passive ROM. Mean age was 61 years, 49% were men. Stroke onset was < 6 months for 24 patients,	Patients were randomized to receive either 3 injections (1-2 weeks apart) of triamcinolone acetonide (40 mg Kenacrot A-40 in 1ml) or 3 placebo injections (1 ml saline solution).	**Primary Outcomes:** Pain during the previous week (10 cm VAS) **Secondary Outcomes:** Passive external rotation, ARAT, Fugl Meyer, BI, Rehabilitation Activities Profile (% of maximum	There were no significant differences in change scores between groups for any of the outcomes. Median change in scores from baseline to 3 weeks following last injection: Pain: -2.3 vs. -0.2, p=0.06 ARAT: 0 vs. 0, p=0.17

Study/Type	Quality Rating	Sample Description	Method	Outcomes	Key Findings and Recommendations
		and ≥6 months for 13 patients		possible score). Outcomes were assessed one week prior to treatment, 1 week later, prior to randomization and prior to first injection, one week later, prior to the second injection, 2 weeks later prior to the third injection. Follow-up assessments were conducted 3 and 9 weeks following the third injection.	Fugl-Meyer: 3.5 vs. 1.0, p=0.41 Passive external rotation: 2.5 vs. 0, p=0.71 BI: 1.5 vs. 1.0, p=0.85 Rehabilitation Activities Profile: 15.9 vs. 6.3, p=0.17 Dropouts: treatment group: n=2, control group n=2 Adverse events: n=29 (treatment group), n=22 (control group)

Acupuncture

Study/Type	Quality Rating	Sample Description	Method	Outcomes	Key Findings and Recommendations
Zhan et al. 2022 **China** **Systematic review & meta-analysis**	35% of included trials were of moderate-to-high quality, assessed using the Cochrane risk of bias tool.	40 RCTs including persons with hemiplegic shoulder pain following stroke. Mean ages ranged from 53 to 70 years. Mean time since stroke ranged from 3 days to 60 months.	Trials compared any acupuncture technique + rehabilitation (AR) vs. rehabilitation only. The treatment duration ranged from 5 to 60 sessions, provided from 7 days to 4 months. Types of acupuncture provided were auricular acupuncture, abdominal acupuncture, balancing acupuncture, body acupuncture, carpus–ankle acupuncture, electroacupuncture, fire acupuncture, relaxing needling at meridian muscle nodes, scalp acupuncture, traditional	**Primary outcome:** Pain **Secondary outcomes:** Upper limb motor function (assessed using FMA), ADL (BI), shoulder range of motion (ROM), and adverse event	AR was associated with a significantly greater reduction in pain scores (MD= −1.32, 95% CI −1.58 to −1.07; 31 trials included). AR was associated with significantly greater improvement in motor function (MD=6.81, 95% CI 4.95–8.67; 29 trials included). AR was associated with significantly greater improvement in ADL performance (MD=11.17, 95% CI 9.44–12.91; 12 trials included). AR was associated with significantly greater improvement in shoulder ROM (internal rotation: MD=10.48, 95% CI 8.14–12.83; 2 trials included; backward extension (MD=7.82, 95% CI 6.00–9.64; 2 trials included), anteflexion (MD=12.88, 95% CI 5.47–20.29; 5 trials included); external rotation (MD= 11.40, 95% CI 6.17–16.64; 5 trials included) and abduction (MD=16.96, 95% CI 8.61–25.31; 5 trials included).

Study/Type	Quality Rating	Sample Description	Method	Outcomes	Key Findings and Recommendations
			acupuncture and warm acupuncture		
Zhao et al. 2015 **China** **RCT**	CA: ☑ Blinding: Assessor ☑ Patient ☒ ITT: ☒	124 patients recruited from a single facility with hemiplegia and pain or discomfort of the shoulder after hemiplegia following stroke. Mean age was 64 years, 72% were men. Mean time since stroke was 112 days.	Patients were randomized to receive warm needling therapy and acupuncture at meridian-sinew sites based on the meridian-sinew theory or usual care. One treatment was administered for a maximum of 30– 40 min five times per week for 2 weeks.	**Primary Outcomes:** Visual analog scale (VAS), range of motion (ROM) **Secondary Outcomes:** Barthel Index (BI) The VAS score was evaluated after each treatment, and the other three scales (ROM, BI) were applied before and 2 weeks after treatment. The VAS score and BI were also determined 3 months after the end of treatment.	The changes from baseline to after treatment on the VAS were significantly greater in the treatment group compared to the control group ($p<0.01$). This same trend was found baseline to follow-up ($p<0.01$). There were significant differences in active and passive ROM between the two groups; the improvement in the treatment group was greater than that in the control group (both $P < 0.01$) after 2wk of treatment. After 2 weeks of treatment, the BI scores were not significantly different between the two groups ($P = 0.25$). At the 3-month follow-up after treatment, the BI scores were greater in the treatment group compared to the control group ($P < 0.01$).
Seo et al. 2013 **South Korea** **RCT**	CA: ☑ Blinding: Assessor ☑ Patient ☑ ITT: ☒	29 patients with shoulder pain (NRS > 2) following stroke. Mean age was 65 years, 34% were men. Mean time since stroke was approximately 54 days.	Patients were randomized to receive Ouhyul Herbal Acupuncture Point Injections (O-API) 3 times per week for 2 weeks or saline injections.	**Primary Outcomes:** Pain (NRS), Passive ROM, Fugl-Meyer Motor Assessment (FMA) Outcomes were measured at baseline and weeks 1-3.	There was significant improvement in median NRS scores in the O-API group, which was achieved by 2 weeks and maintained over follow-up. There was no significant decrease in median pain scores in the placebo group. Passive ROM decreased significantly in both groups, with no significant difference between groups. FMA scores increased significantly for both groups but scores were significant higher for O-API group compared to the placebo group ($p=0.039$).

Hand Edema

Study/Type	Quality Rating	Sample Description	Method	Outcomes	Key Findings and Recommendations
Bernocchi et al. 2018 **Italy** **Prospective study**	NA	21 hemiplegic stroke patients (Ashworth spasticity index ≤3) discharged from in-hospital rehabilitation.	Patients participated in a 2-month home-based program of intensive hand training using the Gloreha Lite glove that provides computer-controlled passive mobilization of the fingers.	**Primary outcome:** Feasibility: number of patients who completed home program, minutes of exercise, number of sessions/patients performed. **Secondary outcomes:** Hand pain (VAS), Ashworth spasticity for finger flexors, wrist flexors, hand edema (circumference of fingers and wrist), motor function (Motricity Index [MI], 9-hole peg test (NHPT), grip strength. Outcomes (i.e. safety and motor function) were evaluated at baseline and after the intervention.	The mean VAS score of hand pain, Ashworth spasticity index and hand edema did not change significantly from baseline to the end of intervention. The MI, NHPT and Grip test improved significantly ($p = 0.0020$, 0.0156 and 0.0024, respectively) compared to baseline.
Borboni et al. 2017 **Italy** **Prospective trial**	NA	30 patients with partial (n=16) or full paralysis (n=14) of the wrist and finger following stroke. Mean age was 68 years, 50% were men. Mean time since stroke was 51 days.	Patients in both groups used the Gloreha device for passive or active mobilization of the hand, depending on the degree of paralysis, twice a day for 2 consecutive weeks.	**Primary outcomes:** Hand edema (measured using wrist and hand circumference), pain (VAS), Modified Ashworth Scale (MAS), range of motion (ROM). Assessments were conducted before and after the intervention	There was significant improvement in mean pain scores in at the end of the intervention for the active group (3.7 to 2.7), but not passive group (0.5 to 0.5). There was significant improvement in wrist circumference in the active group at the end of treatment (18.5 to 17.5), but no change in the passive group (19.5 to 19.5). There was no significant improvement in hand circumference in either group at the end of the intervention. There was no significant improvement in mean MAS scores after the intervention in wither group.
Giang et al. 2016 **Singapore**	PEDro scores for the 5 RCTs were 5 (n=1), 6	9 trials (5 RCTs, 3 non-RCTs, 1 crossover) including 424 participants with post stoke hand edema. Mean age	Interventions included: compression therapy (3 trials), orthoses (3 trials), laser therapy (1 trial), mobilization (1 trial) and	**Primary outcome:** Hand edema	Interventions associated with significant improvements in hand edema included the Lycra garment and glove splint, bilateral passive range of upper-limb motion exercises, laser therapy, and acupressure. However, because the intervention

Study/Type	Quality Rating	Sample Description	Method	Outcomes	Key Findings and Recommendations
Systematic review	(n=2), 7 (n=1) and 8 (n=1)	ranged from 55.2 to 74.5 years, 59% were men. Time since stroke ranged from within 72 hours to 56 weeks and was described as acute stroke (n=1), subacute stroke (n=4), subacute and chronic stroke (n=1) and 2 trials did not report on chronicity.	acupressure (1 trial). Study length ranged from 2 days to 13 weeks		period for the Lycra garment with glove splint was only 3 hours, the significance of the study may not be translatable into clinical practice due to its small changes. The mobilization exercises (i.e. range of motion exercises) were effective in reducing post stroke hand edema in patients with acute stroke within the previous 72 hours; the results might not be generalized to subacute or chronic stroke. Nonsignificant treatment effects were found with bandaging, intermittent compression, kinesio tape, neutral functional realignment orthosis, and hand realignment orthosis.

Extracorporeal Shockwave Therapy

Study/Type	Quality Rating	Sample Description	Method	Outcomes	Key Findings and Recommendations
Zhang & Zhang 2023 **China** **Systematic review & meta-analysis**	Risk of bias was assessed as low or unclear for most domains using the Cochrane tool	18 RCTs including 1,248 participants with shoulder pain following stroke, or with shoulder hand syndrome. Mean age ranged from 48 to 69 years. Time since stroke was not reported.	Trials compared extracorporeal shock wave therapy (ESWT) +/- cointerventions vs. conventional rehabilitation +/- other modalities. Duration of the intervention ranged from 14 to 30 days.	**Primary Outcomes:** Pain (VAS), Fugl-Meyer assessment upper extremity scale (FMA-UE) **Secondary Outcomes:** Active range of motion (AROM), Functional comprehensive assessment (FCA)	ESWT was associated with a significant reduction in pain scores (MD= − 1.19, 95% CI − 1.43 to − 0.95; 18 trials included) and motor function (MD = 6.25, 95% CI 4.64 to 7.87; 15 trials included). Data from 2 trials were available for the outcomes of AROM and FCA. ESWT was associated with significant improvement for both outcomes (MD = 11.28, 95% CI 5.26 to 17.30 and MD=5.47, 95% CI 4.45 to 6.49, respectively).

Published Guidelines for Complex Regional Pain Syndrome-Type I (CRPS-1)

Guideline	Recommendations
National Institute for Health and Care Excellence **Stroke Rehabilitation in Adults Clinical guideline. 2023** **UK** **https://www.nice.org.uk/guidance/ng236**	No recommendations specific to treatment of CRPS
National Clinical Guideline for Stroke for the UK and Ireland. London: Intercollegiate Stroke Working Party; 2023 May 4. **Available at:** www.strokeguideline.org**.**	No recommendations specific to treatment of CRPS
Harden RN, McCabe CS, Goebel A, Massey M, Suvar T, Grieve S, Bruehl S. **Complex Regional Pain Syndrome: Practical Diagnostic and Treatment Guidelines, 5th Edition.** ***Pain Med*. 2022 Jun 10;23(Suppl 1):S1-S53.** **(selected)**	Statements related to the treatment of post-stroke CRPS include: Acupuncture may improve pain and motor function in post-stroke CRPS (LOE 2). Mirror therapy may help the treatment of pain and motor function in post-stroke CRPS (LOE 2).
Zhang T, Zhao J, Li X, Bai Y, Wang B, Qu Y et al. **Chinese Stroke Association guidelines for clinical management of cerebrovascular disorders: executive summary and 2019 update of clinical management of stroke rehabilitation.** ***Stroke Vasc Neurol.* 2020 Sep;5(3):250-259.**	1. In patients with SHS, it is reasonable to moderately raise the affected limb in co-ordination with passive activities. Combination with neuromuscular electrical stimulation is more effective (Class IIa recommendation, Level B evidence). 2. For patients with obvious swelling of the hand, short term steroid therapy should be considered (Class IIa recommendation, Level B evidence). 3. External compression device should be considered to reduce swelling of the extremity of the limb (Class IIa recommendation, Level B evidence).

Guideline	Recommendations
Clinical Guidelines for Stroke Management 2017. Melbourne (Australia): National Stroke Foundation.	For stroke survivors with mild to moderate weakness, complex regional pain syndrome and/or neglect, mirror therapy may be used as an adjunct to routine therapy to improve arm function after stroke. (weak recommendation)
Winstein CJ, Stein J, Arena R, Bates B, Cherney LR, Cramer SC et al; on behalf of the American Heart Association Stroke Council, Council on Cardiovascular and Stroke Nursing, Council on Clinical Cardiology, and Council on Quality of Care and Outcomes Research. **Guidelines for adult stroke rehabilitation and recovery: a guideline for healthcare professionals from the American Heart Association/American Stroke Association.** ***Stroke* 2016;47:e98–e169**	No recommendations specific to treatment of CRPS

Evidence Tables (CRPS-1)

Corticosteroid Treatment

Study/Type	Quality Rating	Sample Description	Method	Outcomes	Key Findings and Recommendations
Kalita et al. 2016 **India** **RCT**	CA: ☒ Blinding: Assessor ☒ Patient ☒ ITT: ☒	52 patients with CRPS-1 following stroke with a score of ≥ 8/14 of the CRPS scale. Mean age was 54 years, 44% were women. Mean time since stroke was 9 weeks.	All patients were prescribed 40 mg prednisolone for 2 weeks followed by tapering in the next 2 weeks. Patients who responded were randomized to receive 10 mg prednisolone daily (group I) or no prednisolone (group II).	**Primary Outcome**: CRPS score **Secondary Outcomes:** Pain (VAS), mRS, BI scores, and severe adverse events (SAE) Assessments were performed after the first and second month of randomization.	There were 52 responders after the run-in period. One month after randomization, the mean CRPS score was significantly lower in Group1 patients (2.7 vs. 5.8, p<0.001) 50% of patients in group II had deterioration at one month and were reinstitution on prednisolone; following which 77% of them improved in the next month. The improvement in CRPS score paralleled the VAS pain score but not mRS and BI scores in the first and second months in group I compared to group II. There was no SAE necessitating withdrawal of prednisolone.
O'Connell et al. 2013 **Australia** **Cochrane review of reviews**	Total AMSTAR scores ranged from 3-10/11.	19 systematic reviews (6 Cochrane reviews and 13 non-Cochrane systematic reviews) including persons ≥ 18 years suffering from CRPS.	Reviews evaluated any intervention (pharmacologic, surgical, physical, or alternative) aimed at treating pain, disability or both in CRPS. Interventions evaluated included intravenous regional blockage, bisphosphates, calcitonin, ketamine, imagery, local anaesthetic, and physiotherapy.	**Primary Outcomes:** Pain (VAS, NRS), disability **Secondary outcomes:** Quality of life, emotional well being, and participant ratings of improvement or satisfaction with treatment	There was moderate quality evidence that intravenous regional blockade with guanethidine is not effective in CRPS, and the procedure is associated with adverse events. There was low quality evidence that bisphosphates, calcitonin or a daily intravenous ketamine may be effective for pain compared to placebo. Graded motor imagery may be effective for pain and function when compared with usual care; mirror therapy was effective for pain relief compared to a control condition. There was low quality evidence that local anaesthetic sympathetic blockade, physiotherapy, and occupational therapy are not effective for CRPS.

Study/Type	Quality Rating	Sample Description	Method	Outcomes	Key Findings and Recommendations
Kalita et al. 2006 **India** **RCT**	CA: ☒ Blinding: Subjects ☑ Therapists ☑ Assessor ☑ ITT: ☑	60 patients with a diagnosis of CRPS-I following stroke. Diagnosis was confirmed by a score ≥8 on the Shoulder-Hand Syndrome Scale. Mean age was 56 years, 33% were women. Median time since stroke was 28 days.	Patients were randomized to receive 40 mg prednisolone for 14 days followed by a 10 mg/week taper for 10 days (treatment group) or 20 mg piroxicam (NSAID) (control group) daily.	**Primary Outcome:** ≥ 2-point reductions in CRPS score. **Secondary Outcome:** Barthel Index Assessments were conducted before treatment and at 1 month.	25 (83.3%) patients in the prednisolone group achieved the primary outcome vs. 5 (16.7%) in the piroxicam group. Mean (± sd) scores at baseline and 1 months following treatment were: *CRPS scores:* Treatment group: 10.73 ± 1.95 and 4.27 ± 2.83, Mean change=6.47 (95%CI 4.37–7.36 Control group: 9.83 ± 2.34 and 9.37 ± 9.37 ± 2.89 Mean change=0.47 (95% CI not reported) p<0.0001 *BI scores:* Treatment group: 1.97 ± 4.94 and 9.87 ± 4.43 Mean change= 7.9 (95% CI 0.82–5.98) Control group: 2.57 ± 4.32 and 7.07 ± 5.56 Mean change=4.5 (95% CI not reported) p=0.06 Adverse events: gastritis (n=4 treatment group, n=1 control group), upper respiratory tract infection (n=1 treatment group, n=1 control group)
Braus et al. 1994 **Germany** **RCT**	CA: ☒ Blinding: Subjects ☒ Therapists ☒ Assessor ☒ ITT: ☒	132 hemiplegic patients following stroke of the middle cerebral artery. Mean age was 62 years, 68% were men.	36 patients developed definitive Shoulder Hand Syndrome within 12 to 18 weeks following stroke. These patients were randomized 1:1 to receive either 8 mg 4x/day methylprednisolone orally for 14 days after which treatment was tapered off for 14 days or a placebo over 4 weeks. For patients in the placebo group, if no improvement was noted in shoulder-hand syndrome then they	**Primary Outcome:** Shoulder-Hand Syndrome Scale score (0 to 14-point scale where higher scores indicated greater severity). Cut-off score ≥8 was used to distinguish between patient with and without SHS Assessments were conducted weekly during inpatient hospital stay and at 6 months.	Since patients in the control group continued to experience symptoms after 4 weeks, all but 2 received corticoid therapy. 31/34 patients became symptom free an average of 10 days following initiation of treatment (range=6 to 14 days). These patients remained symptom free (SHS score < 4) for 6 months. Adverse events: transient increase in blood glucose (n=15), sleeping problems (n=7), steroid acne (n=5), slight increase in blood pressure (n=1)

Study/Type	Quality Rating	Sample Description	Method	Outcomes	Key Findings and Recommendations
			were given 4 weeks of corticosteroid treatment as per the experimental group. All patients received daily physical therapy.		

Physical Therapy

Study/Type	Quality Rating	Sample Description	Method	Outcomes	Key Findings and Recommendations
Feng et al. 2023 **China** **Systematic review & meta-analysis**	Risk of bias was assessed as low or unclear in all trials using the Cochrane tool	45 RCTs, including 3,379 participants, with shoulder-hand syndrome following stroke. Mean ages ranged from 46.5 to 69 years. Time since stroke was not reported.	Trials compared rehabilitation training (RT) + physical factor therapy (PFT) including electrotherapy (ET), light therapy (LT), ultrasound therapy (UWT), conductive heat therapy (CHT), pressure therapy (PT) magnetotherapy (MT), and magnetic stimulation, and biofeedback therapy (BFT) vs. rehabilitation training +/- cointerventions. The duration of treatment ranged from 10 days to 6 weeks.	**Primary Outcomes:** Fugl-Meyer Upper Extremity (FMA-UE), Pain (VAS)	BFT+ RT was associated with the greatest improvement in motor function compared with RT only (MD=10.21, 95% credible interval [CrI] 6.85-13.58). Other PFTs associated with significant improvements were CHT, PT, UWT, MT, ET and LT. BFT+ RT was associated with the greatest reduction in pain (MD = −2.10 95% CrI −3.01 to −1.20). Except for LT, all other intervention + RT were associated with significant improvements in pain compared to RT only. In descending order of benefit, the other PFTs were PT, CHT, ET, UWT and MT.
Smart et al. 2022 **UK** **Cochrane review**	27 trials were assessed as having a high risk of bias	34 RCTs including 1,339 participants with CRPS-1 (n=33) and CRPS-2 (n=1) of the upper and lower limbs. 24 trials included persons with upper limb CRPS-1. Etiology of CRPS included persons with fractures, soft tissue	Trials compared 1) physiotherapy interventions vs. placebo, no treatment, another intervention or usual care, or 2) physiotherapy interventions vs. each other. Interventions included:	**Primary Outcomes:** Pain, disability **Secondary outcomes:** Health-related quality of life (HRQoL), Patient global impression of change (PGIC)	Multimodal physiotherapy was associated with a reduction in mean impairment level sum score, measured 12 months after recruitment, compared with a social work intervention (MD=-3.7, 95% CI I -7.13 to 0.27; 1 trial; 91 participants). GRADE: very low. GMI was associated with significantly reduced pain post treatment (MD= -14.45, 95% CI -23.02 to -5.87, p<0.001) and improved function (MD=1.87,

Study/Type	Quality Rating	Sample Description	Method	Outcomes	Key Findings and Recommendations
		injuries, stroke, surgery, carpal tunnel syndrome and unknown etiology. Participants had acute symptoms in 8 trials, chronic symptoms in 14 trials, and a mix of acute and chronic in 5 trials.	ultrasound, TENS, laser, interferential therapy, pulsed electromagnetic field therapy, whirlpool baths, neuromuscular electrical stimulation, fluidotherapy, contrast baths, graded motor imagery (GMI), mirror therapy, virtual body swapping, tactile sensory discrimination training, prism adaptation treatment, exercise (active-assisted, passive, stretching, strengthening, mobilising, functional), cognitive behavioural interventions manual lymphatic drainage and pain management advice.		95% CI 1.03 to 2.71, p<0.001), assessed using an 11-point numeric rating scale. No other pooled analyses were conducted. Results from 2 trials including persons recovering from stroke, suggested that 4 weeks of mirror therapy + conventional stroke rehabilitation was effective for reducing pain at rest and during movement (by 38% and 45%, at 6 months) and reducing disability.
Wei et al. 2019 **China** **Systematic review & meta-analysis**	All trials were considered to be of good quality using PEDro scale (6-9/10). Using the Cochrane tool, 2 trials were assessed as being at low risk of bias	13 RCTs, including 1,040 patients with a confirmed diagnosis of type I RSD, mainly due to stroke. Mean ages ranged from 50-62 years, 50% were men.	Trials compared electroacupuncture (EA) +/- conventional rehabilitation with conventional rehabilitation therapy. Treatments were provided 5-7 X/week, for 20-30 minutes, for 2-12 weeks. The intensity of the current was determined by the patient maximum tolerance threshold and local muscles twitch.	**Primary Outcomes:** Pain, Fugl-Meyer (FM) upper limb motor score, hand edema	Treatment with EA was associated with a significant reduction in pain (WMD =- 1.122, 95% CI. -1.682 to -0.562], p<0.0001, n=13 trials), improved FM scores (WMD=6.039, 95% CI 2.231-9.85, p=0.002, n=13 trials) and decreased hand edema (WMD= -0.800, 95% CI-1.972 to -0.212, p<0.0001, n=5 trials).

Acupuncture

Study/Type	Quality Rating	Sample Description	Method	Outcomes	Key Findings and Recommendations
Liu et al. 2019 **China** **Systematic review & meta-analysis**	All trials were assessed as being at low or unclear risk of bias for all domains assessed, except for blinding of participants, in which bias was high, using the Cochrane Tool.	38 RCTs or quasi-RCTs, including 3,184 participants with post-stroke shoulder-hand syndrome (SHS). Mean age and sex distribution data were not reported. The time post stroke ranged from 10 days to 19 months.	Trials compared manual or electro-acupuncture (n=12) + routine rehabilitation vs. routine rehabilitation only. In most trials, treatment with acupuncture was provided for 20-30 minutes/day 5 or 7 days/week for 3-6 weeks.	**Primary Outcomes:** Fugl-Meyer Assessment - upper limb; (FMA-UE), pain (VAS, NRS). **Secondary Outcomes:** ADL performance (BI, modified BI)	Overall, acupuncture + rehabilitation was associated with a significant improvement in FMA-UE scores (MD=8.01, 95% CI 6.69-9.33; 29 trials included). GRADE: low certainty. The effect was larger for electro-acupuncture (MD=9.08, 95% CI 6.81-11.35) than manual acupuncture (MD=7.80, 95% CI 6.30-9.30). Overall, acupuncture + rehabilitation was associated with a significant reduction in pain (MD= −1.59, 95% CI −1.86 to −1.32; 25 trials included) GRADE: low certainty. The effect was similar for electro-acupuncture and manual acupuncture (MD=-1.5 and -1.59, respectively). Acupuncture + rehabilitation was associated with a significant improvement in BI scores (MD=9.99, 95% CI 5.91-14.1; 11 trials included). GRADE: low certainty.
Peng et al. 2018 **China** **Systematic review & meta-analysis**	Risk of bias was high in all trials.	20 RCTs including 1,918 persons with shoulder-hand syndrome following stroke. Mean age ranged from 53 to 64.5 years. Mean time since stroke was not reported.	Trials compared acupuncture + rehabilitation therapy vs. placebo/sham acupuncture +/- rehabilitation therapy. Duration of treatment ranged from 10-40 days.	**Primary Outcomes:** Change from baseline to endpoint on visual analog scale (VAS), Fugl Meyer Assessment (FMA-UE) **Secondary Outcome**: ADL performance (BI or modified BI) Outcomes were evaluated at endpoint.	Overall, combination therapy was associated with a significantly greater improvement in pain from baseline up to 30 days (MD1.49, 95% CI 1.15-1.82; 9 trials included). Overall, combination therapy was associated with a significantly greater improvement in FMA-UE scores (MD=8.42, 95% CI 6.74 to 10.10; 20 trials included) Overall, combination therapy was associated with significantly greater improvement ADL performance (SMD=1.31, 95% CI 0.57 to 2.05; 6 trials included).

Abbreviations

ADL: Activities of daily living	BI: Barthel Index
CA: Concealed allocation	CI: Confidence interval
FIM: Functional Independence Measure	ITT: Intention to treat
MAS: Modified Ashworth Scale	N/A: Not assessed
NRS: Numeric rating scale	RCT: Randomized controlled trial
ROM: Range of motion	VAS: Visual Analogue Scale

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