HEART & STROKE FOUNDATION | CANADIAN Stroke BEST PRACTICE RECOMMENDATIONS

CANADIAN STROKE BEST PRACTICE RECOMMENDATIONS

Stroke Rehabilitation Evidence Tables

Management of Shoulder Pain & Complex Regional Pain Syndrome (CRPS) following Stroke

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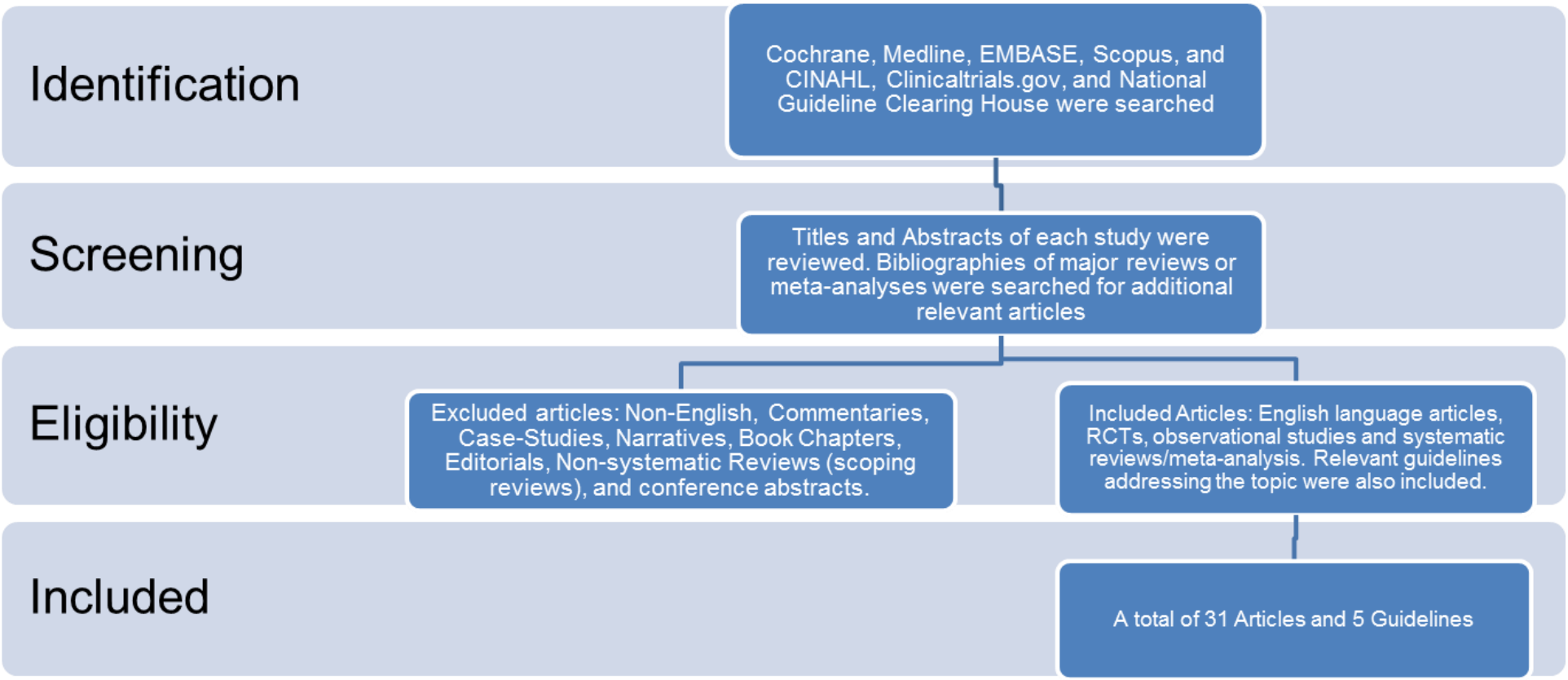
Search Strategy



Cochrane, clinicaltrials.gov, Medline, EMBASE, CINAHL and Scopus were searched using the keywords: Stroke AND Shoulder Pain and Stroke AND complex regional pain syndrome. One new section, acupuncture, was added for the 2014 update. The same databases were searched to identify paediatric related evidence using additional keywords: (stroke OR CVD OR cerebrovascular disease) AND (rehabilitation OR intervention OR therapy) AND (paediatric OR paediatrics OR youth OR child OR children OR young) AND ("upper limb" OR "upper extremity" OR shoulder OR hand OR arm).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 31 articles (12 new for the 2014 update) and 5 guidelines (1 new for the 2014 update) were included and were separated into categories designed to answer specific questions.

Published Guidelines: Prevention & Treatment of Shoulder Pain

Guideline	Recommendations
Scottish Intercollegiate Guidelines Network (SIGN). Management of patients with stroke: rehabilitation, prevention and management of complications, and discharge planning. A national clinical guideline. Edinburgh (Scotland): Scottish Intercollegiate Guidelines Network (SIGN); 2010 June. p.34	Prevention & Treatment of Shoulder Subluxation (4.10.1) **Consider** Electrical stimulation **Insufficient evidence** Slings or supportive devices Prevention & Treatment of Post-Stroke shoulder Pain (4.12.1) **Not recommended** Overhead pulleys, functional electrical stimulation **Insufficient evidence** prolonged shoulder positioning, enhanced physical therapy (including EMG-biofeedback, behavioural interventions or device-delivered continuous passive motion), shoulder strapping, slings, transcutaneous electrical nerve stimulation, *Clostridium botulinum* toxin type A in patients with shoulder spasticity but without pain at baseline, intra-articular steroid injections, non-steroidal anti-inflammatory agents, ultrasound, intramuscular electrical stimulation, complementary therapies compared to standard care in at-risk individuals.
Management of Stroke Rehabilitation Working Group. VA/DoD clinical practice guideline for the management of stroke rehabilitation. Washington (DC): Veterans Health Administration, Department of Defense; 2010.	(No specific shoulder section) Shoulder mobility should be monitored and maintained during rehabilitation. Subluxation can be reduced and pain decreased using functional electrical stimulation applied to the shoulder girdle. [B] p. 18 Recommend FES for patients who have shoulder subluxation.[B] p. 36
Clinical Guidelines for Stroke Management 2010. Melbourne (Australia): National Stroke Foundation; 2010 Sep. p. 101	7.5 Subluxation For people with severe weakness who are risk of developing a subluxed shoulder, management should include one or more of the following options: electrical stimulation, firm supportive devices. 7.4 Contracture For stroke survivors at risk, or who have developed contractures and are undergoing comprehensive rehabilitation, the routine use of splints or prolonged positioning of the muscles in a lengthened position is NOT recommended. Overhead pulley exercises should NOT be used routinely to maintain ROM of the shoulder. Serial casting can be used to reduce severe, persistent contracture when conventional therapy has failed. 7.6.1 Shoulder Pain

Guideline	Recommendations
	For people with severe weakness who are at risk of developing shoulder pain, management may include: shoulder strapping, interventions to educate staff, carers and people with stroke about preventing trauma. For people who develop shoulder pain, management should be based on evidence-based interventions for acute musculoskeletal pain. The routine use of corticosteroid injections and ultrasound is NOT recommended for people who have already developed shoulder pain.
Duncan PW, Zorowitz R, Bates B, Choi JY, Glasberg JJ, Graham GD, Katz RC, Lamberty K, Reker D. Management of adult stroke rehabilitation care: a clinical practice guideline. Stroke, 2005;36:e100-e143.	Recommend considering the following interventions to **prevent** shoulder pain: Electrical stimulation to improve shoulder lateral rotation, shoulder strapping (sling), staff education to prevent trauma to the hemiplegic shoulder. Recommend avoiding the use of overhead pulleys, which encourage uncontrolled abduction Recommend considering the following interventions to **treat** shoulder pain: Intra-articular injections (Triamcinolone), shoulder strapping, improve range of motion (ROM) through stretching and mobilization techniques focusing especially on external rotation and abduction, as a means of preventing frozen shoulder and shoulder-hand–pain syndrome, modalities: ice, heat, and soft tissue massage, FES, strengthening exercises
Intercollegiate Stroke Working Party. *National clinical guideline for stroke,* 4th edition. London: Royal College of Physicians, 2012.	**4.16 Positioning** When lying and when sitting, patients should be positioned in such a way that minimises the risk of complications such as aspiration and other respiratory complications, shoulder pain, contractures and skin pressure ulceration **6.19.2 Shoulder pain and subluxation** A Every patient with functional loss in their arm should have the risk of developing shoulder pain reduced by: • ensuring that everybody handles the weak arm correctly, avoiding mechanical stress and excessive range of movement • avoiding the use of overhead arm slings • careful positioning of the arm. B Every patient with arm weakness should be regularly asked about shoulder pain. C Every patient who develops shoulder pain should: • have its severity assessed, recorded and monitored regularly • have preventative measures put in place • be offered regular simple analgesia.

Guideline	Recommendations
	D Any patient who has developed, or is developing, shoulder subluxation should be considered for functional electrical stimulation of the supraspinatus and deltoid muscles. E In the absence of inflammatory disorders, intra-articular steroid injections should not be used for post-stroke shoulder pain.

SUMMARY OF HEMIPLEGIC SHOULDER PAIN INTERVENTIONS AND ASSOCIATED STRENGTH OF EVIDENCE FROM SELECTED GUIDELINE DOCUMENTS

Intervention	CBPR 2013	SIGN 118 2010	NSF 2010	VA/DoD 2010	AHA/ASA 2010	RCP 2012
Joint protection strategies: positioning, slings, strapping	Recommended	I Strapping and Slings for prevention C Positioning A Strapping for treatment not recommended	B Strapping	I	I	Positioning Avoid overhead arm slings
Overhead pulleys	Not Recommended [Level A]	Not recommended	Not Included	Not Included	Not Included	Not Included
Passive Range of Motion (pROM)	Recommended ROM below 90 degrees unless the scapula is upwardly rotated [Level A]	I Device delivered pROM:	Not Included	Not Included	I	Not Included
Educate staff/caregivers	Recommended [Level A]	Not Included	C	Not Included	Not Included	Not Included
Mobilization (external rotation and abduction)	Recommended [Level B]	Not Included	Not Included	Not Included	Not Included	Not Included
Electrical Stimulation	Not Included	A Not recommended	A Not recommended for pain management A Recommended for subluxation	B	I Pain management A Recommended for subluxation	recommended for shoulder subluxation
Oral Analgesics	Recommended (Acetaminophen) [Level C]	I NSAIDs	Not Included	Not Included	Not Included	Simple analgeasic
Botulinum Toxin A	Recommended [Level B]	I	Not Included	Not Included	Not Included	Not Included
Intra-articular Corticosteroids injections	Included	I	C Not Recommended	B Not Recommended	Not Included	Recommended
Ultrasound	Not Included	I	C Not Recommended	B Not Recommended	Not Included	Not included

I: Insufficient evidence to recommend for/against providing intervention

Evidence Tables (Shoulder Pain)

Supportive Devices (Slings & Strapping)

Study/Type	Quality Rating	Sample Description	Method	Outcomes	Key Findings and Recommendations
Pandian et al. 2013 **Australia** **RCT**	CA: ☑ Blinding: Assessor ☑ Therapists ☑ ITT: ☑	162 subjects with upper limb weakness <48 hours post stroke.	Subjects were randomized to two groups: 1) taping of the affected shoulder (i.e., tri-pull method) with conventional treatment, or 2) control group - sham taping of the affected shoulder with conventional treatment.	Primary Outcomes: VAS; Shoulder Pain and Disability Scale (SPDS) Outcomes were assessed at day 14 and 30 post treatment.	Compared to the control group, a greater reduction in VAS (day 14 p=0.45; day 30 p=0.03) and SPAD scores (day 14 p=0.33; day 30 p=0.04) was reported in the treatment group.
Ada et al. 2005 **Australia** **Cochrane review**	N/A	4 RCTs (142 subjects) evaluating strapping (n=3) and hemisling (n=1). All participating subjects were in the acute phase of stroke (<4 weeks) with a flaccid arm with no history of shoulder pain.	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:** 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.	Prevention of subluxation (number of participants with over 10 mm of subluxation). Pooling of data not possible as the outcome was assessed in a single trial and only 1 subject developed subluxation. Pain Number of pain-free days after admission to study WMD: 13.6, 95% CI 9.7 to 17.8, p<0.0001. Results from 2 studies included Function WMD=0.83, 95% CI -1.46 to 3.12, p=0.5. Results from 1 study included. Contracture WMD=-1.40, 95% CI -10.9 to 8.10, p=0.8. Results from 1 study included. Adverse events: The effect of strapping as a risk factor for the development of contracture was examined in a single trial, but no increase was reported. Drop outs: a total of 17 subjects from all studies combined.

Study/Type	Quality Rating	Sample Description	Method	Outcomes	Key Findings and Recommendations
Hanger et al. 2000 **New Zealand** **RCT**	CA: ☑ Blinding: Assessor ☑ ITT: ☑	98 patients with acute stroke (mean of < 12 days post onset) with persistent weakness of shoulder abduction.	Comparison of 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 Drop outs: strapping group n=13, control group n=12 Adverse events: skin reaction in 3 patients in the strapping group
Griffin & Bernhardt 2006 **Australia** **RCT**	CA: ☑ Blinding: Assessor ☑ ITT: ☑	33 patients at risk for the development of shoulder pain, with no previous history of shoulder pain who were admitted for inpatient stroke rehabilitation within 3 weeks of stroke onset.	Comparison of 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 Modified Ashworth Scale scores at the end of treatment: 1 (therapeutic strapping) vs. 1 (placebo strapping) vs. 2 (control), p=0.186. Drop-outs: therapeutic strapping group n=1, control group, n=2. Adverse events: 1 due to skin irritation

Positioning

Study/Type	Quality Rating	Sample Description	Method	Outcomes	Key Findings and Recommendations
Borisova & Bohannon 2009 **USA** **Systematic review & meta-analysis**	N/A	5 RCTs that focused on stroke and included a clear description of a positioning programme. Mean time from stroke onset ranged from 14 to 84 days.	Comparison of 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
Ada et al. 2005 **Australia** **RCT**	CA: ☒ Blinding: Assessor ☑ ITT: ☒	36 subjects at risk for the development of contracture (hemiplegia and little or no arm function) admitted for inpatient rehabilitation within 20 days of first stroke.	Subjects 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 **Secondary Outcome:** Motor Assessment Scale (Item 6) Assessments were conducted before and after treatment	Mean (± sd) maximum passive external shoulder rotation before and after treatment (degrees). Experimental group: 71.0 ±10.5 to 64.9 ± 11.4 Control group:74.3 ± 11.8 to 56.4 ± 21.5, p=0.03 Mean (± sd) maximum passive shoulder flexion before and after treatment (degrees). Experimental group: 158.5 ± 12.7 to 6146.8 ± 13.7 Control group:164.3 ± 13.5 to 155.3 ± 16.6, p=0.88 Median MAS scores were not significantly different: 0 to 1 (exp. group) vs. 0 to 0 (control group), p=0.37 Drop outs: n=5 (experimental group =3, control group=2) Adverse events: no reporting
De Jong et al. 2006 **Netherlands** **RCT**	CA: ☑ Blinding: Assessor ☑ ITT: ☒	19 subjects who had experienced their first stroke less than 12 weeks previously, with no premorbid impairments of their affected arm and without severe shoulder pain and with Brunnstrom stage of recovery <4.	Subjects 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 +	**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),	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

Study/Type	Quality Rating	Sample Description	Method	Outcomes	Key Findings and Recommendations
			conventional inpatient rehabilitation. Subjects in the control group received conventional rehabilitation only.	Barthel Index (BI) Assessments were conducted before and after treatment and 5 weeks follow-up.	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 drop-outs.) Drop outs: experimental group n=6, control group n=3 Adverse events: severe shoulder pain was reported by 1 patient

Electrical Stimulation

Study/Type	Quality Rating	Sample Description	Method	Outcomes	Key Findings and Recommendations
Mathieson et al. 2014 **New Zealand** **Systematic Review**	N/A	14 studies (11 RCTs, 3 case reports; N=348 patients) that examined the use of functional electrical stimulation (FES) combined with mirror therapy and other treatment modalities for upper limb dysfunction post-stroke. Mean age: 63 yr Gender: males=209, females=139 Time since stroke: less than 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	Primary Outcomes: Upper Extremity Fugl-Meyer (UEFM); Motor Assessment Scale; Action Research Arm Test Secondary Outcome: Barthel Index; Modified Ashworth Scale; Motor Activity Log	1) Passive: Variable findings whereby there were two positive and two negatives 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.

Study/Type	Quality Rating	Sample Description	Method	Outcomes	Key Findings and Recommendations
			therapies (Bobath techniques, upper limb therapy) 4) Imagery (N=2), FES+ mirror therapy, and FES+mental imagery.		
Wilson et al. 2014 **USA** **RCT**	CA: ☒ Blinding: Assessor ☑ Subjects ☑ ITT: ☒	25 subjects (Brief Pain Inventory (BPI) range 4-10; shoulder abduction weakness ≤4), ≥3 months post stroke.	Subjects were randomized into two groups: 1) peripheral nerve stimulation (PNS) 6 hours per day for 3 weeks, or 2) 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.	Both groups had a significant reduction in pain intensity as assessed by BPI-SF3, although more so in the treatment group (IIT, p=0.04; per protocol, p=0.068). There were no significant differences between groups on pain interference (p=0.398), ShoulderQ (p=0.059), and SF-36 v2 (p=0.98).
Manigandan et al. 2014 **India** **PCT**	CA: ☒ Blinding: Assessor ☑ ITT: ☒	24 subjects who were <3 post stroke	Subjects were consecutively assigned to one of two groups: 1) electrical stimulation to supraspinatus and posterior deltoid plus physio- and occupational therapy for 5 weeks, or 2) electrical stimulation to supraspinatus, posterior deltoid and long head of biceps plus physio- and occupational therapy for 5 weeks.	**Primary Outcomes:** Shoulder subluxation, shoulder pain (measured by passive pain free external rotation), active shoulder abduction ROM. Outcomes were assessed at baseline and 5 weeks of therapy.	Shoulder subluxation was reduced by a greater amount in group 2 (54.74%) compared to group 1 (22.4%; p<0.001). Passive pain free external rotation improved from 33.5 to 42.75 degrees in group 1, and from 30.16 to 46.41 degrees in group 2; improvement was greater for group 2 (p=0.001). The mean improvement in range of active shoulder abduction ROM in group 1 was 8.5 degrees while in group 2 it was 16.84 degrees; again group 2 improved by a greater amount (p<0.001).
Kojima et al. 2014 **Japan** **Cross-over RCT**	CA: ☒ Blinding: Assessor ☒ ITT: ☒	13 subjects with hemiparesis, 30-180 days post stroke.	Subjects were randomized to 1) an immediate NMES mirror therapy group plus physical and occupational therapy (PT + OT) for 4 weeks, followed by 4 weeks with just PT + OT, or 2) delayed NMES where PT + OT was administered alone for the 4 weeks, followed by 4	**Primary Outcomes:** Fugl-Meyer Assessment (FMA), Motor Assessment Log (MAL) **Secondary Outcome:** Active ROM	The immediate NMES group showed a greater gain in FMA during the first 4 weeks of therapy (p=0.003) but not between week 4 and 8 (p=0.20) compared to the delayed NMES group. There were no significant differences between groups on MAL for amount or quality of use between baseline and week 4 or between week 4 and 8 (p>0.05 for both). The delayed NMES group showed a greater gain in active ROM between week 4 and 8 (p=0.01) compared to the immediate NMES group.

Study/Type	Quality Rating	Sample Description	Method	Outcomes	Key Findings and Recommendations
			weeks with NMES.		
de Jong et al. 2013 **Netherlands** **RCT**	CA: ☑ Blinding: Assessor ☑ Patient ☑ ITT: ☑	46 subjects with severe arm motor deficits (1-3 Brunnstrom score; Fugl-Meyer Score ≤18), 2-8 weeks post stroke.	Subjects were randomized to two groups: 1) arm stretch positioning combined with motor amplitude NMES for two 45-minute sessions a day, five days a week, for eight weeks, or 2) 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 on all outcomes (p>0.05). The relative risk of shoulder pain in the experimental group was non-significant at 1.44 (95% CI 0.80 to 2.62).
Lin et al. 2014 **Taiwan** **RCT**	CA: ☑ Blinding: Assessor ☑ Subjects ☑ ITT: ☒	43 subjects (Brunnstrom stage 3 or above; Modified Ashworth Scale ≤ 2) with an onset of stroke of ≥6 months.	Subjects were randomized to one of three groups: 1) mirror therapy group (MT) including a 10 minute warm-up, an hour of mirror box training, and 20 minutes of functional task practice; 2) MT combined with mesh-glove (MT + MG); 3) Controls - 1.5 hr therapeutic activities equivalent in duration and intensity to MT and MT+MG groups.	**Primary Outcomes:** Fugl-meyer assessment (FMA); Box and block test (BBT), Motor assessment log (MAL)	For both MT and MT + MG groups, FMA total scores were significantly higher (p = 0.032 and p = 0.0031, respectively) compared to the control group. The MT + MG and control groups showed greater performance compared with MT on the BBT (p=0.007 and p=0.036, respectively). There were no significant differences between groups on the MAL amount of use or quality of use subscales (p>0.05).
Chae et al. 2013 **USA** **Case Series**	N/A	8 subjects with shoulder pain (Brief Pain Inventory Short-Form Question 3 (BPI3) ≥4), with a stroke onset of 50.3±48.6 months.	Subjects received one percutaneous intramuscular lead in the hemiparetic deltoid muscle and were then stimulated (12Hz, 20mA) for 6 hours/day for three weeks.	**Primary Outcomes:** BPI3 Outcomes were assessed immediately after treatment and 1- and 4-weeks post treatment	On average, participants exhibited 70% reduction in BPI3 scores at end of treatment and 61% reduction of scores at 4-weeks after the end of treatment. All participants satisfied the success criterion of at least a 2-point reduction in BPI3 at end of treatment. Longitudinal analysis revealed significant treatment effect for BPI3 (p<0.001).
Price & Pandyan 2000 **UK** **Cochrane review**	N/A	4 RCTs (170 subjects) with hemiparesis following acute (n=2), sub-acute (3 months, n=1) and chronic (> 6 months, n=1) stroke. A small number of subjects in 2 trials had shoulder pain at baseline	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)	**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,	New reports of shoulder pain: OR=0.64, 95% CI 0.19 to 2.14, p=0.5. Results from 2 studies included Change in pain intensity: SMD=0.10, 95% CI, -0.34 to 0.54, p0.7, Results from 2 studies included. PHLR (relative to baseline): WMD=6.53, 95% CI 4.71 to 8.35, p<0.0001. Results from 4 studies

Study/Type	Quality Rating	Sample Description	Method	Outcomes	Key Findings and Recommendations
		assessment	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	subluxation, Ashworth Scale	included. Motor score change from baseline: SMD=0.24, 95% CI 0.01 to 2.91, p=0.2. Results from 2 studies included Subluxation compared with baseline: SMD= -1.13, 95% CI -1.66 to -0.60, p=p<0.03. Results from 2 studies included. Change in AS scores from baseline: WMD=0.05, 95% CI -0.28 to 0.37, p=0.80. Results from 2 studies included.
Ada & Foongchomcheay 2002 **Australia** **Systematic review & meta-analysis**	NA	Included 7 trials that compared surface electrical stimulation at a frequency > 30Hz + conventional rehabilitation vs. conventional rehabilitation +/- hemisling, wheelchair support, joint mobilizations and/or stretching Subjects with subluxation or shoulder muscle paralysis were included. 4 trials (145 subjects) were considered early (mean	Electrical stimulation ranged from 10 to 35 Hz, sufficient to produce muscle contraction Target muscles: 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 Early: WMD (95% CI) =6.5 mm, 4.4 to 8.6, p<0.001 Late: WMD (95% CI)=1.9 mm, -2.3 to 6.1, p=0.40 Function Early: WMD (95% CI)=18.6%, 0.4 to 36.7, p=0.06 Late: WMD (95% CI)=14.4%, -5.4 to 34.2, p=0.15 Pain ROM (degrees): WMD (95% CI)=3.7 degrees, -1.2 to 8.6, p=0.14. Results from 3 studies included. VAS (cm): WMD (95% CI)=1.6 cm, 0.1 to 3.0, p=0.04. Results from 2 studies included.

Study/Type	Quality Rating	Sample Description	Method	Outcomes	Key Findings and Recommendations
		of 2 to 50 days post stroke) and 3 (38 subjects) were considered late (mean of 60 to 434 days post stroke)			
Church et al. 2006 **UK** **RCT**	CA: ☑ Blinding: Assessor ☑ ITT: ☒	178 patients with a new upper-limb problem resulting from stroke, which occurred within the previous 10 days.	Patients in the intervention group received 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. Patients in the control group received sham stimulation. Patients in both groups received standard stroke unit care.	**Primary Outcomes:** ARAT scores 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 FES group: 0, 45.0 and 50.0 Control group: 3, 45.5 and 55.5 =0.888 (4 weeks), p=0.068 (3 months) Median FAT scores at baseline, 4 weeks and 3 months 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 FES group: 61.3, 80, 88 p=0.574 (4 weeks), p=0.248 at 3 months) Control group: 63.3, 77, 89 Star Cancellation test (% fail) at baseline, 4 weeks and 3 months 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 FES group: 21, 22, 46 Control group: 22, 26, 45 p=0.462 (4 weeks), p=1.00 (3 months)

Botulinum Toxin-Type A (BT-A)

Study/Type	Quality Rating	Sample Description	Method	Outcomes	Key Findings and Recommendations
Singh & Fitzgerald 2010 **USA** **Cochrane review**	N/A	Included 6 RCTs, (164 subjects) 5 of which recruited subjects 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)	Pain (4-6 weeks following treatment): MD= -1.12, 95% CI -2.89 to 0.66, p=0.22. Results from 4 studies included. Pain (12-24 weeks): MD= -1.22, 95% CI -2.37 to -0.07, p=0.037. Results from 3 studies included. Total adverse events: RR=1.46, 95% CI 0.64 to 3.36, p=0.37. Results from 3 studies included. MAS (4-6 weeks): MD= -0.62, 95% CI -1.40 to 0.17, p=0.12 Results from 2 studies included. MAS (12-24 weeks): MD= -0.13, 95% CI -0.65 to 0.38, p=0.61. Results from 2 studies included. Passive abduction (0-180 degrees at 4-6 weeks): MD=8.49, 95% CI -2.40 to 19.39, p=0.13. Results from 3 studies included. Passive abduction (0-180 degrees at 12-24 weeks): MD=17.72, 95% CI -9.61 to 45.04, p=0.20. Results from 2 studies included. Shoulder external rotation (0-90 degrees at 4-6 weeks) MD=9.84, 95% CI 0.20 to 19.49, p=0.045. Results from 3 studies included. Shoulder external rotation (0-90 degrees at 12-24 weeks) MD=11.86, 95% CI -0.61 to 24.33, p=0.062. Results from 2 studies included.
De Boer et al. 2008 **The Netherlands**	CA: ☒ Blinding: Assessor ☑ ITT: ☒	22 patients, an average of 6 months following stroke with significant shoulder pain (> 40 mm on a VAS) of at least 1 week's duration that	Patients in the experimental group received a single injection of either BT-A (2x50 units Botox) vs. placebo injection applied to the	**Primary Outcomes:** Pain (100 mm VAS) Humeral external rotation (degrees) **Secondary Outcomes:**	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)

Study/Type	Quality Rating	Sample Description	Method	Outcomes	Key Findings and Recommendations
RCT		restricted passive external rotation of the humerus.	subscapularis muscle at two locations. All patients received some form of physical therapy.	None Outcomes were assessed at baseline, 6 and 12 weeks following treatment.	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 ± 14 (12 weeks) Control group: 10.3 ± 19.5 (baseline) to 23.7 ± 20.7 (12 weeks). Drop outs: n=1 Adverse events: No reporting

Physical Therapy

Study/Type	Quality Rating	Sample Description	Method	Outcomes	Key Findings and Recommendations
Lynch et al. 2005 **USA** **RCT**	CA: ☒ Blinding: Assessor ☑ ITT: ☒	35 patients admitted for inpatient rehabilitation following first, unilateral stroke with significant motor impairment (<3 on MRC scale) in all upper limb muscles and a Fugl-Meyer score < 20 for shoulder/elbow. Subjects were recruited an average of 13 days post stroke	Patients in the experimental group (n=19) received continuous passive motion treatments with the use of a device (25 min sessions, 5 days/week until discharge) in additional to comprehensive rehabilitation. Patients in the control group (n=16) received self-range of motion exercises under the supervision of a physiotherapist All patients received rehabilitation therapies for 3.5 hours per day.	Primary Outcomes: Fugl Meyer Assessment (pain) Secondary Outcomes: Fugl-Meyer (shoulder & elbow), Modified Ashworth Scale (MAS), FIM (self-care), joint stability (0 to 9 scale, whereby 0 represented a stable joint), Motor Power Scale (wrist/hand, max score of 60) Motor Status Scale (shoulder and elbow, max score of 40) Assessments were conducted at baseline and at hospital discharge.	At discharge there were no significant differences in means between groups for any of the outcomes. Mean ± (SEM) discharge scores for patients in the experimental and control groups Fugl-Meyer (pain): 22.6 ± 0.5 vs. 21.8 ± 0.5, p=0.31 Joint stability: 2.4 ± 0.4 vs. 3.6 ± 0.4, p=0.06 MAS: 1.3 ± 0.5 vs. 2.1 ± 0.5, p=0.29 FIM: 27.7 ± 1.2 vs. 26.4 ± 1.3, p=0.52 Motor Power: 9.7 ± 1.3 vs. 7.0 ± 1.4, p=0.20 Motor Status Scale: 9.2 ± 1.3 vs. 8.3 ± 1.4, p=0.67 Fugl Meyer (shoulder/elbow): 10.9 ±1.1 vs. 8.9 ± 1.2, p=0.26 Drop outs: n=2 experimental group, n=1 control group Adverse events: No reporting

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. 28 of these patients were seen by a physiatrist (group 1), the other 20 patients (group 2) were not due to difficulties with transportation. Subluxation was present in 13 group 1 and 11 group 2 patients	23 patients in group 1 whose shoulder pain was of no discernible etiology received either a nonsteroidal anti-inflammatory drugs (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). A second group of patients 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 Outcomes: 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 in group 1 who responded to treatment was significantly greater compared with subjects in Group 2. Pain relief: 91% vs. 15%, $p<0.001$ Increase in ROM (flexion): 78% vs. 40%, $p<0.006$ 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 Corticosteroid Injections

Study/Type	Quality Rating	Sample Description	Method	Outcomes	Key Findings and Recommendations
Dogan et al. 2013 **Turkey** **PCT**	CA: ☒ Blinding: Assessor ☑ Patient ☑ ITT: ☒	60 subjects post stroke (time since stroke onset not provided).	Subjects were assigned to one of three groups: 1) conventional physical treatment and rehabilitation (PTR); 2) conventional PTR plus intra-articular steroid; 3) conventional PTR plus intra-articular steroid plus hydraulic distention.	Primary Outcomes: VAS, ROM Outcomes were assessed at baseline, after treatment and at 1 month follow-up.	Immediately after treatment joint ROM improved for both experimental groups (p<0.001 for both) but not controls. All three groups had significantly improved joint ROM at 1 month follow-up (p<0.001) with no significant differences between them. After treatment and at 1 month follow-up, VAS scores at rest and during activity were improved for both experimental groups (p<0.001 for both) but not controls. Among the two experimental groups, there was a greater reduction in at rest VAS scores for the steroid + hydraulic distention group compared to the other two groups (p<0.001).
Rah et al. 2012 **Korea** **RCT**	CA: ☒ Blinding: Subjects ☑ Therapists ☑ Assessor ☑ ITT: ☒	58 subjects 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.	Subjects received a single ultrasound-guided subacromial injection with triamcinolone acetonide 40mg (treatment group, n=29), or lidocaine (placebo group, n=29). All subjects 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, favouring the treatment group. 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. Stroke onset was < 6 months for 24 patients, and ≥6 months for 13 patients	Patients received either three injections (1-2 weeks apart) of triamcinolone acetonide (40 mg Kenacrot A-40 in 1ml) or three 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 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.	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 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 Drop outs: treatment group: n=2, control group n=2 Adverse events: n=29 (treatment group), n=22 (control group)

Ultrasound

Study/Type	Quality Rating	Sample Description	Method	Outcomes	Key Findings and Recommendations
Inaba & Piorkowski 1972 **USA** **RCT**	CA: ☒ Blinding: Assessor ☑ ITT: ☒	33 subjects with shoulder pain occurring within the range of 0 to 90 degrees of flexion or abduction of the arm following stroke occurring > 3 months previously.	Patients were randomly assigned to 1 of 3 groups: Range of motion (ROM) exercises and positioning group (control); ROM exercises and ultrasound (treatment); or ROM exercises and mock ultrasound (placebo). All patients received ROM exercises for 4 weeks and given a minimum of 15 treatments.	Primary Outcomes: Shoulder ROM (degrees) Measurements were conducted before and after treatment	Mean (±sd) change in ROM from baseline for control, treatment and placebo groups, respectively: Flexion: 7 ± 19 vs. 5 ± 33 vs. -12.5 ±15, p=ns Abduction in internal rotation: 0 ± 7 vs. -2 ± 14 vs. -2 ± 15, p=ns Abduction in external rotation: 4 ± 13 vs. 2 ± 22 vs. -2 ± 21, p=ns External rotation: 2 ± 15 vs. -6 ± 14 vs. -10 ± 16, p=ns Drop outs: none

Study/Type	Quality Rating	Sample Description	Method	Outcomes	Key Findings and Recommendations
					Adverse reports: No reporting

Acupuncture

Study/Type	Quality Rating	Sample Description	Method	Outcomes	Key Findings and Recommendations
Seo et al. 2013 **Korea** **RCT**	CA: ☑ Blinding: Assessor ☑ Patient ☑ ITT: ☒	29 subjects, 56.5±29.7 days (experimental) or 53.5±26.7 days (control) post stroke	Subjects were randomized to two groups: 1) Ouhyul Herbal Acupuncture Point Injections (O-API) 3 times per week for 2 weeks; 2) Controls received saline injections.	Primary Outcomes: Numerical Rating Scale, Passive ROM, Fugl-Meyer Motor Assessment (FMMA) Outcomes were measured at baseline and weeks 1-3.	The O-API group showed significant improvement on the NRS compared with that in the control group after 2 weeks of treatment, and the treatment effect was maintained until the follow-up period ($p<0.001$). Passive ROM decreased significantly in both groups, but there was no significant difference between groups. FMMA scores increased significantly for both groups but scores were significant higher for O-API group compared to controls ($p=0.039$).
Sheng & Zhi-yong, 2013 **China** **RCT**	CA: ☑ Blinding: Assessor ☒ Patient ☒ ITT: ☒	60 subjects post stroke	Subjects were randomized into an acupuncture or routine treatment group. Acupuncture was given once a day, for 4 weeks (1 course), with 4 courses given in total.	**Primary Outcomes:** Rates of cure, improvement or ineffectiveness.	The effective rate of acupuncture rehabilitation group was 90.9% (30/33), better than that of 70.4% (19/27) in the routine treatment group ($P < 0.05$).

Glossary
RCT= Randomized Controlled Trial
N/A = Not Applicable
CA = Concealed Allocation
ITT = Intention to treat
ROM = Range of Motion
VAS = Visual Analogue Scale
FIM = Functional Independence Measure
OR = Odds Ratio
CI = Confidence Interval
IQR = Interquartile Range

Published Guidelines: Complex Regional Pain Syndrome-Type I

Guideline	Recommendations
Scottish Intercollegiate Guidelines Network (SIGN). Management of patients with stroke: rehabilitation, prevention and management of complications, and discharge planning. A national clinical guideline. Edinburgh (Scotland): Scottish Intercollegiate Guidelines Network (SIGN); 2010 Jun.	Insufficient evidence Treatment of post-stroke related complex regional pain syndrome Patients with suspected CRPS should be referred to a clinician with expertise in the management of the condition
Management of Stroke Rehabilitation Working Group. VA/DoD clinical practice guideline for the management of stroke rehabilitation. Washington (DC): Veterans Health Administration, Department of Defense; 2010.	None specific to treatment of CRPS
Clinical Guidelines for Stroke Management 2010. Melbourne (Australia): National Stroke Foundation; 2010 Sep. p. 99.	None specific to treatment of CRPS
Duncan PW, Zorowitz R, Bates B, Choi JY, Glasberg JJ, Graham GD, Katz RC, Lamberty K, Reker D. Management of adult stroke rehabilitation care: a clinical practice guideline. Stroke, 2005;36:e100-e143.	None specific to treatment of CRPS
Intercollegiate Stroke Working Party. *National clinical guideline for stroke,* 4th edition. London: Royal College of Physicians, 2012.	None specific to treatment of CRPS

SUMMARY OF COMPLEX REGIONAL PAIN SYNDROME (CRPS) INTERVENTIONS AND ASSOCIATED STRENGTH OF EVIDENCE FROM SELECTED GUIDELINE DOCUMENTS

Intervention	CBPR 2013	SIGN 118 2010*	NSF 2010	VA/DoD 2010	AHA/ASA 2010	RCP 2012
Bone scan for diagnosis	Recommended	Not Included	Not Included	Not Included	Not Included	Not Included
Oral corticosteroids	Recommended	Not Included	Not Included	Not Included	Not Included	Not Included
Antidepressants	Not Included	Not Included	I Recommendation based on neuropathic pain studies	Not Included	Not Included	Not Included
Anticonvulsants	Not Included	Not Included	C	Not Included	Not Included	Not Included
Specialist referral	Not Included	C	Not Included	Not Included	Not Included	Not Included

Evidence Tables (CRPS-1)

Corticosteroid Treatment

Study/Type	Quality Rating	Sample Description	Method	Outcomes	Key Findings and Recommendations
O'Connell et al. 2013 **Australia** **Systematic review**	N/A	19 systematic reviews (6 Cochrane reviews and 13 non-Cochrane systematic reviews) that used any intervention (pharmacologic, surgical, physical, or alternative) aimed at treating pain, disability or both in CRPS. Subjects in all reviews were 18 years or older and suffering from CRPS.	Comparisons of multiple interventions (e.g., intravenous regional blockage, bisphosphates, calcitonin, ketamine, imagery, local anaesthetic, physiotherapy) for relieving pain caused by CRPS.	Primary Outcomes: VAS, Numerical Rating Scale (NRS)	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 biphosphates, 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. Finally, 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
Braus et al. 1994 **Germany** **RCT**	CA: ☒ Blinding: Subjects ☒ Therapists ☒ Assessor ☒ ITT: ☒	36 hemiplegic patients with definitive Shoulder Hand Syndrome secondary to a stroke of the middle cerebral artery. Shoulder pain developed from within 12 to 18 weeks following stroke.	Patients were randomized to orally receive either 8 mg 4x/day methylprednisolone 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 were given 4 weeks of corticosteroid treatment as per the experimental group. All patients received daily physical therapy	**Primary Outcomes:** 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. Drop outs: unclear Adverse events: transient increase in blood glucose (n=15), sleeping problems (n=7), steroid acne (n=5), slight increase in blood pressure(n=1)
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	Patients were randomly assigned 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 Outcomes:** ≥ 2 point reductions in CRPS score. **Secondary Outcome:** Barthel Index Assessments were conducted before treatment and at 1 month.	Mean (± sd) scores at baseline and 1 months following treatment were: CRPS scores: Treatment group: 10.73 ± 1.95 and 4.27 ± 2.83 Control group: 9.83 ± 2.34 and 9.37 ± 9.37 ± 2.89 p<0.0001 BI scores: Treatment group: 1.97 ± 4.94 and 9.87 ± 4.43 Control group: 2.57 ± 4.32 and 7.07 ± 5.56 p=0.06 Drop outs: none Adverse events: gastritis (n=4 treatment group, n=1 control group), upper respiratory tract infection (n=1 treatment group, n=1 control group)

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