Authors' objectives
To identify the most effective treatment for hemiplegic shoulder pain.

Searching
MEDLINE (from 1966 to October 1999), EMBASE (from 1988 to September 1998), CINAHL (from 1982 to September 1999), REHABDATA (from 1994 to July 1999) and the Cochrane Library (Issue 2, 1999) were searched. The keywords used were: 'hemiparesis', 'hemiplegia', 'stroke', 'cerebrovascular disease', 'cerebrovascular disorder', 'brain injury', 'brain ischaemia', 'shoulder', 'arm' and 'upper extremity'. Only studies published in Dutch, English, French or German were eligible. References of available articles were also examined.

Study selection
Study designs of evaluations included in the review
Eligible studies were not restricted by the study design. The included studies were randomised controlled trials (RCTs) including crossover designs, non-randomised controlled trials, multiple baseline design, case series and case reports. The duration of follow-up, where stated, ranged from none to 39 months.

Specific interventions included in the review
Treatments of hemiplegic shoulder pain were eligible. The following treatments were included in the review: electromyography (EMG) feedback; relaxation exercises; functional electrical stimulation (FES); surgical release of subscapularis tendon and insertion of pectoralis major muscle; surgery; cryotherapy; Bobath approach to shoulder; the injection of 6.7% aqueous phenol solution in nervus scapularis after local skin anaesthesia with xylocaine; phenol motor block to subscapularis muscle; three intra-articular injections of triamcinolone acetonide (40 mg/mL); auditory feedback devices; a sling consisting of shoulder and forearm support; a varney brace; a 'splint jacket'; and self-range of movement exercises. The cointerventions included: conventional physiotherapy; sedation for head-injured patients; a combination of ultrasound, anti-inflammatory drugs, and physiotherapy; motor point block to pectoralis major muscle; an exercise programme; conventional rehabilitation according to Bobath; advice and instruction about the management and positioning of shoulder; an exercise programme plus an abduction brace and suspension sling; and lifelong sling after operation.

Participants included in the review
People with hemiplegic shoulder pain were eligible for inclusion. Patients with hemiparesis of hemiplegia based on vascular disease, head injury, causal lesions and aneurysm, and patients with subluxation, were included in the review.

Outcomes assessed in the review
Studies that assessed pain were eligible. In the review, pain was assessed directly using the following methods: the Pain Rating Index; the Present Pain Intensity Scale; the McGill Pain Questionnaire; assessment by a therapist or recorded by a physician; patient complaint; a visual analogue scale; a 6-point scale for severity; a 5-point scale for frequency; and a 4-point scale for affective response to pain. Pain was also assessed indirectly using range of motion and arm function.

How were decisions on the relevance of primary studies made?
The authors do not state how the papers were selected for the review, or how many of the reviewers performed the selection.

Assessment of study quality
Validity was assessed and scored on the basis of the following criteria: stated selection criteria for patients; methods used for randomisation (if randomised); baseline comparability of the treatment groups; description of drop-outs; details of follow-up; losses to follow-up; intervention details; blinding and outcomes measurements; and data
presentation and analysis. The maximum possible score was 48 points. Only the scores for the outcome of pain were taken into account when calculating the methodological score. Two reviewers rated study quality independently. One study that was written by one of the authors was reviewed by a third author. No blinding was applied in the review process.

**Data extraction**
The authors do not state how the data were extracted for the review, or how many of the reviewers performed the data extraction.

Data were extracted on the following: author; study design; study population; intervention and cointervention details; main outcome measures; the success rate for each treatment group, calculated as intention to treat, where possible; and the duration of follow-up.

**Methods of synthesis**
How were the studies combined?
The studies were grouped according to the aim of the intervention (normalising muscle tone, reducing subluxation and treatment of the shoulder capsule) and a narrative synthesis was undertaken.

How were differences between studies investigated?
Differences between the studies were discussed in the text of the review.

**Results of the review**
Fourteen studies were included: 4 RCTs (164 patients), one non-randomised controlled trial (120 patients), one multiple baseline design (9 patients), 5 case series (85 patients) and 3 case reports (4 patients).

Overall, the trials were of poor methodological quality with methodological scores ranging from 2 to 25 out of a possible 48 points. Eight of the 14 studies scored less than 10 points. Nine of the 14 included studies did not use a control group. The information in many studies was inadequate in terms of the following: the study population; the duration of the shoulder pain; the exact intervention; blinding of the patient, therapist and assessor; drop-outs; follow-up; cointerventions; and statistical methods.

The success rates for treatment ranged from 0 to 100% (10 studies). It was not possible to calculate the success rates in 4 studies because either the results were only reported at group level or the number of patients who were treated successfully was not reported. The success rates were 46, 52 and 67% in the 3 studies that reported success rates on an intention to treat basis.

Results from the 3 methodologically flawed RCTs and the 1 non-randomised controlled trial are reported below.

One crossover RCT (20 patients, 3 to 16 weeks after stroke) found no significant difference in pain between one week of EMG biofeedback and one week of relaxation exercises after 2 weeks. Both treatments were applied without a washout period, and the follow-up period was different for both treatment groups. One multicentre RCT (85 patients) found no significant difference in pain at 12 weeks for cryotherapy followed by exercise, compared with the Bobath approach, but the frequency of the occurrence of pain was less for the Bobath group. Twenty patients withdrew before completion of the treatment.

One non-randomised controlled trial (120 patients) found that more patients who received FES, compared with no additional FES, were without pain at 3 and 24 months’ post-treatment: with FES, 70% of the patients were without pain at 3 months versus 36% for the control, and 81% were without pain at 24 months versus 55% for the control. One RCT (26 patients after a recent stroke) found no difference in indirect assessment of pain (using range of motion) for FES compared with no FES. There were insufficient data to allow a direct assessment of the change in pain. One RCT (33 patients) found no difference for exercise versus control.
Authors' conclusions
No definite conclusions can be drawn about the most effective method of treatment because of the poor quality of the identified studies. However, FES and intra-articular triamcinolone acetonide injections seem to be the most promising treatment options.

CRD commentary
The aims were stated and the inclusion criteria were defined in terms of the participants and outcome. Eligible studies were not restricted by study design. Several relevant databases were searched and articles published in any of four languages were included. The methods used to select studies were not described, and the lack of an attempt to locate unpublished material raises the possibility of publication bias. Validity was assessed and scored using defined criteria. Methodological flaws were discussed in the text of the review and the methods used to assess validity were described. Relevant data were extracted and tabulated, but the methods used to extract the data were not described. A narrative synthesis was appropriate given the small number of methodologically flawed studies; attention was drawn to the methodological deficiencies in the narrative.

As the authors correctly state, the poor quality of the studies precludes any definite conclusions from this review.

Implications of the review for practice and research
Practice: The authors state that there is insufficient evidence to determine the best treatment for patients with hemiplegic shoulder pain.

Research: The authors state that further research is needed to find the best method of preventing hemiplegic shoulder pain and to find the most effective treatment for this problem. They state that all research should be high-quality and they recommend RCTs. They further suggest that the most promising treatments for further research are FES and intra-articular triamcinolone acetonide injections.

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Record Status
This is a critical abstract of a systematic review that meets the criteria for inclusion on DARE. Each critical abstract contains a brief summary of the review methods, results and conclusions followed by a detailed critical assessment on the reliability of the review and the conclusions drawn.