Authors' objectives
To assess the effectiveness of manual therapy on pain, function and patient satisfaction in adults with mechanical neck disorder.

Searching
The following databases were searched from inception: MEDLINE (to July 1997), MANTIS (to September 1997), EMBASE (to November 1997), CINAHL (to December 1997), and the Cochrane Controlled Trials Register (December 1997). The authors' personal files were also searched (to December 1998). Studies published in any language were eligible.

Study selection
Study designs of evaluations included in the review
Randomised controlled trials (RCTs) and quasi-RCTs were eligible for inclusion.

Specific interventions included in the review
Studies of manual therapy were eligible for inclusion. Studies of multimodal interventions that included manual therapy were eligible, whereas studies of non-touch treatments were excluded. The included studies used: manipulation alone; mobilisation alone; manipulation plus mobilisation; manipulation plus mobilisation or massage plus other modalities; manipulation plus exercise; and multimodal interventions. Studies of multimodal interventions often used analgesia or anti-inflammatory drugs as cointerventions.

Participants included in the review
Studies of adults (age older than 18 years) with the following mechanical neck disorders were eligible for inclusion: neck disorder with headache arising from the cervical region; mechanical neck disorder with or without radicular signs and symptoms; and neck disorder associated with whiplash injury or degenerative changes. Studies were excluded if they were in patients with the following conditions: neck disorders accompanied by definite or possible long tract signs; neck pain due to other pathology; headache not arising from the cervical region; headache accompanying neck pain if the neck pain was not the main feature, or the headache was not provoked by neck movements or sustained neck position; or a mixture of headache types.

Outcomes assessed in the review
Studies that reported pain, function or patient satisfaction were eligible for inclusion. In the review, the outcomes were classified as clinically important if there was a 20% difference between the treatments. The review also assessed adverse effects.

How were decisions on the relevance of primary studies made?
Two reviewers independently selected the studies for inclusion. Agreement between reviewers was assessed using the chi-squared test.

Assessment of study quality
Validity was assessed and scored using the 5-point Jadad scale, which considers randomisation, blinding and the handling of withdrawals and drop-outs. Three reviewers independently assessed validity. Agreement between the reviewers was assessed using the chi-squared test.

Data extraction
Two reviewers independently extracted the data. Agreement between the reviewers was assessed using the chi-squared
Data on the type of neck disorder, interventions compared and results were extracted. For studies reporting non significant findings, the review authors conducted power analyses. Adequate power was defined as the ability of the study to detect a 20% difference with 80% power, assuming an alpha level of 0.05. Outcomes reported as medians were converted to standardised mean differences (SMDs), with 95% confidence intervals (CIs), or to relative risks (RR) and 95% CIs (the methods used were described). SMDs and RRs were converted to the number-needed-to-treat (NNT) for a clinically important reduction in pain (details given). The percentage treatment advantage for pain was also calculated.

Methods of synthesis
How were the studies combined?
The studies were grouped according to the interventions and a narrative synthesis was undertaken. The interventions were classified as showing the following level of results: 'evidence of benefit' for meta-analyses or trials large enough to be positive with a small risk of false-negative conclusions; 'evidence of no benefit' for meta-analyses or trials large enough to be negative with a small risk of false-negative conclusions; 'unclear evidence' if trial had inconsistent results; and 'evidence of adverse effect' for trials with lasting negative changes.

How were differences between studies investigated?
Differences between the studies were not discussed.

Results of the review
Twenty RCTs (n=1,387) were included.
The Jadad scores ranged from 0 to the maximum of 5 points (mean 2.4, standard deviation 1.04). Methodological flaws included a lack of description of randomisation (53% of the studies) and a lack of effective methods of blinding (91% of the studies).

Multimodal treatments that included mobilisation or massage, or manipulation plus exercise alone, or exercise plus thermal treatments, education and rare use of a collar, were more effective than manipulation alone, specified physical treatments, and continuous use of a collar in reducing pain, and increasing return to work and patient satisfaction. The studies all showed the treatments were effective in the short term. Most studies showed the benefit was also present in the long term.

For pain, the NNT ranged from 2 to 4 across placebo-controlled trials and from 4 to 11 compared with other treatments. The corresponding treatment advantage ranged from 6 to 41%.

The studies assessing disability or function showed a similar but smaller effect.

The results were similar for acute or subacute disorders (treatments varied from 10 sessions over 2 weeks to 18 sessions over 8 weeks) and for subacute or chronic disorders (treatments up to 20 sessions over 11 weeks).

Other studies found that multimodal interventions reduced the number of sick days: 187 sick days for the intervention compared with 330 days for the control group (1 study), and an estimated 143 sick days were saved in another study. In addition, they reduced time to return to work (16 days difference in one study).

For manipulation alone, mobilisation alone and manipulation plus mobilisation, the studies showed no short-term differences between these interventions (administered in up to 8 sessions over 3 weeks) when compared with a control, waiting period or placebo. Studies showed no difference in pain between manipulation alone and mobilisation alone. The studies showed that manipulation was less effective than high-technology exercise or manipulation plus low-technology exercise in the longer term (20 sessions over 11 weeks).

The studies showed lower long-term satisfaction rates with manipulation alone compared with other treatments.

Adverse events were reported inconsistently. Those studies reporting adverse events described them as benign and
Transient. None of the studies reported serious (either reversible or irreversible) complications.

**Cost information**
The review identified one study that found that a multimodal intervention reduced the costs of direct care. The treatment costs were estimated to be 155 DEM (US$78) compared with 113 DEM (US$57) for the comparison treatment.

**Authors’ conclusions**
The authors concluded that there was insufficient evidence to draw definitive conclusions. The evidence suggested that manual therapies plus exercise are the most effective treatments for improving pain and satisfaction in patients with mechanical neck disorder, with or without neck pain. Manipulation alone, mobilisation alone and both treatments combined appeared to be less effective.

**CRD commentary**
The review question was clear in terms of the study design, intervention, participants and outcomes. Several relevant sources were searched and no language restrictions were applied. However, details of the search strategy were not reported. At least two reviewers independently selected the studies, assessed validity and extracted the data, thus reducing the potential for bias and errors. Validity was assessed using specified established criteria and the results of the assessment were reported.

Some relevant information on the included studies was tabulated. The narrative synthesis was appropriate given the small number of studies. However, although the authors stated early in the paper that the absence of a statistical difference between treatments in underpowered studies does not equate with no evidence, this concept was not incorporated into the 'Results' or 'Discussion' sections. The evidence presented appears to support the authors’ conclusion that there was insufficient evidence to draw definitive conclusions.

**Implications of the review for practice and research**
Practice: The authors stated that the strongest evidence was for multimodal interventions (mobilisation or manipulation and exercise). However, that authors cautioned that there was insufficient evidence to estimate the frequency of adverse effects.

Research: The authors stated that research into the effectiveness of combinations of treatments (including mobilisation/massage and manipulation, exercise, thermal agents, education and drug therapies) is required. They also stated that using studies of factorial design would allow the individual therapies and the interactions between therapies to be assessed.

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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.