The Constraint Induced Movement Therapy: a systematic review of randomised controlled trials on the adult stroke patients

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CRD summary
This review reported that definitive conclusions about the effectiveness of constraint-induced movement therapy for adult stroke patients could not be drawn, even though overall positive effects were reported in the included studies. Despite concerns about the review methodology, the authors’ limited conclusions are justified given the reported differences between the studies and the poor quality of the study data.

Authors’ objectives
To determine the effectiveness of constraint-induced movement therapy (CIMT) in adult stroke patients.

Searching
MEDLINE, EMBASE, CINAHL and the Cochrane Library were searched from 1966 to July 2005. The search terms were reported and no language restrictions were applied. Only full-length published studies were eligible for inclusion.

Study selection
Randomised controlled trials (RCTs) comparing impairment and/or disability levels in adult stroke patients receiving CIMT or conventional rehabilitation (control group) were eligible for inclusion. Eligible studies had to report separate general disability scores for the affected arm.

The studies included in the review used different versions of CIMT, although the forced use of the hemiparetic limb was a key element in all of the treatment interventions. The interventions were compared with conventional rehabilitation and/or no treatment controls. The control groups also varied and could have sessions of the same or different durations to those of the treatment group. In the majority of included studies, CIMT lasted 2 weeks and the training lasted for 6 hours/day. In the remaining studies, treatments lasted 10 weeks and used a modified CIMT intervention (limb restraint for 5 hours/day for 5 days/week), which also included 30 minutes of physical therapy and 30 minutes of occupational therapy, twice a week. The majority of included studies recruited chronic stroke patients; the remainder recruited sub-acute or acute stroke patients. All of the studies required patients to have the ability to extend their arm at least 10° at the metacarpo-phalangeal and interphalangeal joints and 20° at the wrist; to have disability in activities of daily living when using the affected arm; and to have no excessive spasticity, problems with balance, severe cognitive defects or uncontrolled medical disorders. The duration of follow-up ranged from 2 weeks to 2 years. Reported outcome measures varied and included the Action Research Arm Test (ARA), the Motor Activity Log (MAL), the Fugl Meyer Assessment (FMA) and the Wolf Motor Function Test.

The authors did not state how the papers were selected for the review, or how many reviewers performed the selection.

Assessment of study quality
The quality of the studies was assessed using the 19 criteria reported by Tulder et al. Each study was awarded a score of between 0 and 19 points.

Two reviewers independently performed the quality assessment, with any disagreements resolved through discussion.

Data extraction
Study characteristics were summarised as either ‘+’ (positive for the intervention group) or ‘0’ (no difference between the treatment and control groups). Pre- and post-test mean outcome scores (with standard deviation) were reported for both the intervention and control groups. The difference between the pre- and post-test scores for the treatment and control groups was reported as a percentage and the minimal clinically important difference (MCID) was defined as 10%.
The authors did not state how the data were extracted for the review, or how many reviewers performed the data extraction.

**Methods of synthesis**
Differences between the studies, as well as insufficient data, precluded a statistical synthesis. The data were therefore summarised in a narrative, with accompanying tables presented.

**Results of the review**
Nine RCTs (243 patients: 113 CIMT and 130 control) were reported in the review. The sample sizes ranged from 6 to 69 participants.

The quality scores ranged from 5 to 10 points out of a possible maximum of 19; all but two studies scored either 6 or 7 points and only one scored 10 points. All of the studies specified inclusion criteria and randomisation methods, but only one study used short- and long-term follow-up.

All of the studies were reported as showing positive results in favour of CIMT. Five (three sub-acute stroke, one acute and one chronic stroke) of the seven studies reporting ARA scores achieved differences in favour of CIMT which were within the MCID range (i.e. 10% or more). All four studies (two sub-acute and two chronic stroke) reporting FMA scores achieved differences in favour of CIMT which were within the MCID range. One (sub-acute stroke) of the three studies reporting MAL scores achieved differences in favour of CIMT which were within the MCID range. All of the studies achieving the MCID had small sample sizes.

**Authors' conclusions**
Despite all of the included studies reporting positive results for CIMT, differences between the studies, small sample sizes and inadequacies in the data prevented any definitive conclusions from being drawn.

**CRD commentary**
This review answered a clear research question and searched a number of relevant electronic databases. However, relevant data might have been missed through the inclusion of only full reports of studies published in English, which suggests that the review may be subject to publication and language bias. Some attempts were made to reduce the risk of reviewer error and bias when assessing the quality of the studies, but it is unclear whether similar precautions were taken when selecting the studies and extracting the data. The quality of the studies was assessed using a published scale and inadequacies in the data were discussed. The authors reported a number of problems with the data, which suggests that they may not be reliable. In addition, differences between the studies in terms of the interventions, controls and outcome measures also hampered the analysis. Despite concerns about the review methodology, the authors' limited conclusions are justified given the reported differences between the studies and the poor quality of the study data.

**Implications of the review for practice and research**
Practice: The authors did not state any implications for practice.

Research: The authors stated that further multicentre RCTs of sufficient size, carried out in different independent research centres and using more robust outcome measures in post-stroke sensory and motor disorders, are required to investigate the effectiveness of CIMT in adult stroke patients. Such trials should also report patient compliance levels and describe any withdrawals.

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