The effectiveness of constraint-induced therapy as a stroke intervention: a meta-analysis

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CRD summary
The authors concluded that constraint-induced therapy may be an effective treatment for patients with hemiparesis due to stroke. The authors' conclusions appear to be supported by the review, but it is difficult to assess their reliability given the poor reporting of review methods and the lack of a quality assessment of the included studies.

Authors' objectives
To evaluate the effects of constraint-induced therapy (CIT) on motor function of the upper extremity in patients with hemiparesis after stroke.

Searching
CINAHL (1983 to 2003), the Cochrane Controlled Trials Register (1800 to 2004), PubMed (1950 to 2004) and Science Direct (1823 to 2004) were searched using the search terms reported. In addition, reference lists of retrieved articles were screened.

Study selection
Study designs of evaluations included in the review
Studies with four or more participants that used some form of control (whether another group of patients or patients used as their own control) were eligible for inclusion. The review included randomised controlled trials (RCTs) and pre-test post-test studies.

Specific interventions included in the review
Studies evaluating CIT in which the unaffected upper limb was restrained and the affected limb was treated with intensive therapy were eligible for inclusion. In the included studies, the unaffected limb was constrained using one or more of a padded mitt, hand splint or sling. The interventions evaluated included at least one of the following: CIT circuit training, occupational therapy (OT), behavioural training, shaping, repetitive tasks, physiotherapy (PT), structured therapy, intensive force use and task-orientated therapy. The control interventions, where these existed, included the following, alone or in various combinations: traditional OT, PT, bilateral circuit training, standard care, less intensive therapy and no intervention. The duration of CIT interventions ranged from 12 days to 10 weeks.

Participants included in the review
Studies of adults (aged over 18 years) with a diagnosis of ischaemic or haemorrhagic stroke resulting in hemiparesis were eligible for inclusion. Studies were included regardless of the severity of stroke or the length of time since stroke onset. Overall, 63% of the patients were male, the age ranged from 33 to 83 years, the time since stroke onset ranged from 2 days to 17 years (representing acute, sub-acute and chronic stroke) and, where reported, 71% had a right-sided hemiparesis.

Outcomes assessed in the review
Studies that assessed the following functional outcomes were eligible for inclusion: Action Research Arm Test, Fugl-Meyer Assessment of Motor Recovery, Motor Assessment Log (MAL), Wolf Motor Function Test, Functional Independence Measure, Barthel Index, Actual Amount of Use Test, Arm Motor Ability Test and Functional Test of the Hemiparetic Upper Extremity. Studies had to report sufficient data to enable the calculation of an effect size (d).

How were decisions on the relevance of primary studies made?
Two researched independently selected studies and resolved any disagreements by discussion.

Assessment of study quality
The authors did not state that they assessed validity.

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

For each study, mean values, standard deviations, results of statistical tests and/or effect sizes were extracted for each outcome measure. One primary effect size was calculated for each study by averaging all relevant effect sizes. For pre-test post-test studies, baseline data were extracted for the time period closest to the start of the intervention and post-treatment data were extracted closest to the completion of treatment.

**Methods of synthesis**
How were the studies combined?
Studies were weighted by the sample size and pooled effect sizes (d) and 95% confidence intervals (CIs) were calculated.

How were differences between studies investigated?
A subgroup analysis was used to examine the influence of study design (pre-test post test versus RCTs) and outcome measure (MAL versus all other outcome measures).

**Results of the review**
Eleven studies (n=179) were included. The numbers of studies of each design were unclear.

The effect size (d) for all studies combined was 1.203 (95% CI: 0.932, 1.474). Effect sizes ranged from 0.328 to 5.905.

The effect size (d) for RCTs only was 1.086 (95% CI: 0.769, 1.403).

The effect size (d) for studies that measured MAL was 1.202 (95% CI: 0.834, 1.570). The effect size (d) for studies using other measures was 1.055 (95% CI: 0.852, 1.258).

**Authors' conclusions**
CIT may be an effective treatment for patients with hemiparesis due to stroke.

**CRD commentary**
The review addressed a clear question that was defined in terms of the participants, intervention, outcomes and study design. Several relevant sources were searched, but no attempts to minimise either publication or language bias were reported. Study validity was not assessed, so the results from these studies and any synthesis may not be reliable. Methods were used to minimise reviewer errors and bias in the selection of studies, but it was unclear whether similar steps were taken in the data extraction. The study designs of the included studies were not always clearly reported. Studies of differing design were combined statistically but RCTs were also analysed separately. The authors' conclusions appear to be supported by the review, but incomplete reporting of review methods and the lack of an assessment of the quality of the included studies make it difficult to assess their reliability.

**Implications of the review for practice and research**
Practice: The authors did not state any implications for practice. Research: The authors stated the need to investigate mechanisms underlying the effects of CIT and to evaluate client-centered occupational-based activities using CIT and to compare different CIT approaches.
Bibliographic details

Indexing Status
Subject indexing assigned by CRD

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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.