Efficacy of physiotherapy interventions late after stroke: a meta-analysis
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CRD summary
This review found that a range of physiotherapy interventions initiated at least six months after a clinically-diagnosed stroke could improve mobility and functional outcomes in affected patients. Some caution is required when interpreting the review results and judging the reliability of the authors’ conclusions due to potential biases in the review process and the small size of the included trials.

Authors’ objectives
To evaluate the efficacy of physiotherapy interventions on motor and functional outcomes late (six months or later) after stroke.

Searching
MEDLINE, EMBASE, PEDro, CINAHL, the Cochrane Database of Systematic Reviews, the Cochrane Central Register of Controlled Trials (CENTRAL), and Web of Science were searched to January 2010 for relevant published studies in English or Italian; search terms were reported. Reference lists of retrieved articles were checked to identify additional references. Major journals were handsearched.

Study selection
Randomised controlled trials (RCTs) of patients who had suffered a stroke at least six months previously, where standard practice active physiotherapy interventions (defined in the paper) were compared with control or placebo treatment, were eligible for inclusion. Trials had to enroll at least five patients in each treatment group. Trials in which active treatment focussed on the upper extremities were excluded, as were trials that used techniques that were highly innovative or poorly used in most community-based rehabilitation services.

The primary outcomes were mobility and independence with activities of daily living, measured with previously validated tools.

The mean age of included patients was 70.3 years; 59% were men. The proportion of the body side affected was comparable between treatment groups. There was wide variation in baseline functional activity of the patients. Treatments included neuromuscular interventions, the practice of functional activities, muscle strengthening, and application of assistive equipment. The comparators were no treatment (where reported) and the use of a passive range of motion activities (such as the usual activities of daily living, sham home exercise programmes, social and educational sessions, and seated upper extremity exercises). The interventions were delivered at home, in out-patient clinics, and mixed outpatient and home settings. The duration of single treatments ranged from 10 minutes and two hours; the duration of the interventions ranged from four to 26 weeks. Most trials varied in terms of duration and type of off-protocol treatments. The outcomes reported were mobility as measured by short-distance walking (time to cover 10 metres), long-distance walking (distance achieved in six-minutes of walking), and attainment of independence with activities of daily living.

Two reviewers performed the study selection: any disagreements were resolved by consensus.

Assessment of study quality
Methodological quality was assessed using the PEDro 10-point scale. The quality criteria evaluated were randomisation, allocation concealment, between-group comparability, blinding, adequacy of follow-up assessment, use of intention-to-treat analyses, and the use of between group comparisons point estimates and variability. A PEDro score of 6 points or more was indicative of a high quality study.

It was unclear how many reviewers assessed methodological quality.
Data extraction
Data were extracted as reported in the trials. Where there was missing data, the reviewers contacted the authors where necessary to obtain this. Due to the variability of outcome measures, standardised effect sizes (ES) and 95% confidence intervals (CIs) were calculated using Cohen's d-statistic for the differences between the intervention and control groups in post-test values. Other outcomes for which data were extracted were measures of independence when performing activities of daily living. Weighted mean differences and corresponding 95% confidence intervals were calculated for the outcomes of short-distance and long-distance walking.

The authors did not state how many reviewers performed the data extraction.

Methods of synthesis
Pooled effect sizes and weighted mean differences were calculated using a DerSimonian and Laird random-effects model. Statistical heterogeneity was evaluated using the Cochran's Q-statistic and $I^2$. 

Results of the review
Fifteen RCTs (n=730 patients) were included in the review. The sample sizes across the trials ranged from 13 to 170 patients. Methodological quality scores ranged from 3 to 8 PEDro criteria points. Seven trials reported concealment of randomisation; outcome assessors were blinded in 13 trials. Intention-to-treat analyses were performed in six trials. Baseline data by randomised group was reported in 14 trials.

There significant benefits were found across all the trials with active physiotherapy interventions for all outcomes (ES 0.29, 95% CI 0.14 to 0.45; $I^2=0%$;15 RCTs). Additional significant benefits of active physiotherapy were found in short-distance walk performance (WMD 0.05 metres per second, 95% CI 0.01 to 0.09; $I^2=37.5%$; 11 RCTs) and long-distance walk performance (WMD 19.8 metres, 95% CI 3.60 to 35.97; $I^2=21.5%$; seven RCTs).

There was a non-statistically significant trend towards greater independence in performance of activities of daily living (ES 0.08, 95% CI -0.21 to 0.37; $I^2=25.5%$; four RCTs).

There was no statistically significant heterogeneity reported across the trials for all the pooled outcomes.

Authors’ conclusions
A range of physiotherapy interventions initiated at least six months after a clinically-diagnosed stroke could improve mobility and functional outcomes in affected patients. These findings challenged concepts suggestive of a plateau in the recovery of post-stroke patients and should be considered in the planning of rehabilitation services.

CRD commentary
The review addressed a question that was broad in scope. Criteria for the inclusion of studies were stipulated. Appropriate databases were searched, but there was some potential for publication and language biases because of the restriction of the review to published studies in two languages. Steps were reported to minimise errors and bias for study selection, but not for the assessment of methodological quality and data extraction.

The assessment of methodological quality was conducted using an appropriate tool for the measurement of quality outcomes in physiotherapy research. There was no heterogeneity observed across the results for the outcomes examined, although there was substantial clinical variation in the interventions used and the baseline functional status of the patients. The authors acknowledged that the improvements observed in the results were below what would be considered clinically meaningful and reported some of the limitations of their review.

The authors’ conclusion reflected the evidence presented; the included trials appeared to be of reasonable quality. However, some caution is warranted when judging the reliability of this review based on small-sized studies and with potential for biases in the search and review process.

Implications of the review for practice and research
**Practice:** The authors stated that significant functional recovery can be achieved later than is usually believed. Although the improvements were small and below what is regarded as clinically meaningful, the results may challenge the idea that there is a plateau in recovery after stroke.

**Research:** The authors stated that further studies are required to corroborate the findings of this review and to answer questions whether the delivery of higher doses of treatment or more accurate targeting of patients would lead to larger improvements in functional outcomes. Cost effectiveness analyses were also recommended for future research.

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