Unilateral versus bilateral upper limb exercise therapy after stroke: a systematic review
van Delden AE, Peper CE, Beek PJ, Kwakkel G

CRD summary
Unilateral and bilateral training were similarly effective. Intervention success may depend on severity of upper limb paresis and time of intervention post-stroke. Despite limitations in the quality and size of the evidence base, the conclusions of the review reflected the evidence presented and are likely to be reliable.

Authors’ objectives
To compare the effects of unilateral and bilateral training on upper limb function after stroke based on severity of upper limb paresis and time of intervention post-stroke.

Searching
PubMed, EMBASE, Cochrane Central Register of Controlled Trials (CENTRAL), CINAHL, PEDro, SPORTDiscus and OTseeker were searched up to June 2011 for studies in English. Bibliographies of retrieved articles, review articles, empirical articles and abstracts published in proceedings of conferences were consulted. Search terms were reported.

Study selection
Randomised controlled trials (RCTs) that compared the effects of unilateral and bilateral training on upper limb function after stroke were eligible for inclusion. Active exercise had to be the single focus of the intervention (robot- or electrical-assisted interventions were excluded). Interventions of any intensity and duration were eligible.

Most patients were male and recruited in the chronic phase (six months or more) post-stroke. Most patients had mild upper limb paresis. Where reported, therapy was delivered over a period of between one and eight weeks, between 20 minutes and six hours per day and at a frequency of between three and six days per week. Outcome measurement methods varied widely.

Two reviewers independently selected the studies.

Assessment of study quality
Two reviewers independently assessed the quality of the studies using the 10-point PEDro scale, covering internal and external validity.

Data extraction
Outcomes data were extracted to calculate mean differences (MD) and standard deviations (SD).

Two reviewers independently extracted data.

Methods of synthesis
Mean differences and standardised mean differences (SMD) were pooled using a fixed-effect meta-analysis. Heterogeneity was explored using $\chi^2$ and $I^2$. Analyses were stratified by severity of paresis and time of intervention post-stroke.

Results of the review
Nine RCTs (452 patients) were included. Follow-up ranged from one day to one year after intervention. Overall quality scores ranged from 5 to 8 out of 10. All studies used randomisation but only three reported allocation concealment methods. Intention-to-treat analysis was used in only four trials. Eight studies blinded assessors. The nature of the interventions precluded blinding of participants and therapists.

In chronic patients with a mild upper limb paresis, marginally significant differences favouring unilateral training were found for upper limb activity performance (SMD 0.34, 95% CI 0.04 to 0.63; four RCTs), perceived upper limb activity performance (amount of use MD 0.42, 95% CI 0.09 to 0.76; three RCTs) and quality of movement (MD 0.45, 95% CI 0.12 to 0.78; three RCTs).
No statistically significant differences were found with another upper limb activity scale (motor assessment scale). No statistically significant results were found for patient in the acute phase post-stroke. There was no evidence of significant heterogeneity in any of the analyses.

Authors’ conclusions
Unilateral and bilateral training were similarly effective. Intervention success may depend on severity of upper limb paresis and time of intervention post-stroke.

CRD commentary
The review question and selection criteria were clear. Although language restrictions were applied to the searches, a large number of sources were consulted. Appropriate steps to minimise the risk of reviewer bias and error were taken throughout the stages of the review. Results of the quality assessment indicated some methodological limitations in the included trials. Studies were small and few trials were included in the analyses. The methods of synthesis appeared appropriate and there was no evidence of significant heterogeneity. The clinical significance of the results was interpreted appropriately.

The conclusions of the review reflected the evidence presented and are likely to be reliable.

Implications of the review for practice and research

Practice: The authors did not state any implications for practice.

Research: The authors stated that measuring changes in outcomes of impairment, activity performance and activities of daily living were not sufficient and measures of kinematics, timing and neural reorganisation should be incorporated. They stated that all types of training in RCTs should be provided dose-matched (with equal intensity or number of repetitions applied in the control group compared with the training protocol used in the experimental group) and ensure that there were equal possibilities to practice distal control.

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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.