Authors' objectives
The objectives were three-fold:

to critically review controlled studies evaluating effects of different intensities of stroke rehabilitation;

to trace variables that may influence rehabilitation outcome in terms of disabilities and impairments; and

to quantify patterns by calculating summary effect sizes.

Searching
MEDLINE was searched from 1966 to 1995 using the following keywords: 'stroke', 'cerebrovascular disorder's, 'dose-response relationship', 'effectiveness', 'cost-effectiveness', 'rehabilitation therapy', 'physical therapy', 'physiotherapy', 'occupational therapy', and 'exercise therapy'. Reference lists and conference abstracts were also examined. The investigators of the studies were contacted if more information about the trial was needed.

Study selection
Study designs of evaluations included in the review
Randomised controlled trials (RCTs) and quasi-randomised controlled trials. Only published trials were included.

Specific interventions included in the review
Different intensities of physical therapy or occupational therapy. The duration of the therapy ranged from 24 days to 6 months. The intensity of the therapy varied from 5 minutes per day to 106 minutes per day for physical therapy, and from 18 minutes per day to 98 minutes per day for occupational therapy.

Participants included in the review
Stroke patients were included. The mean age of all the participants was 66.2 years.

Outcomes assessed in the review
Activities of daily living (ADL), and functional and neuromuscular outcome parameters were assessed.

How were decisions on the relevance of primary studies made?
The authors do not state how the papers were selected for the review, or how many of the authors performed the selection.

Assessment of study quality
A methodological quality score was developed to evaluate the following items: randomisation or matching procedures; blinding; description of drop-outs and intention to treat analysis; reliability and validity of assessment instruments; control for cointerventions; comparability of baseline patient characteristics; control for amount of therapy. Two reviewers independently assessed the methodological quality of each study. The name of the author(s), institution(s) and journals were masked. Reviewers tried to resolve any differences in scoring, and any persistent disagreements were referred to a third reviewer.

Data extraction
The authors do not state how the data were extracted for the review, or how many of the authors performed the data extraction.
Methods of synthesis

How were the studies combined?
Since Hedge’s effect sizes (ESs) tend to overestimate the population ES in small studies, the ESs for each study were corrected to obtain an unbiased estimator. The ESs (the unbiased estimator) of each individual study were averaged, resulting in a weighted summary ES.

How were differences between studies investigated?
The homogeneity (or heterogeneity) test statistic (Q statistic) of each series of ESs was examined. Initially, a fixed-effect model was used to decide whether a summary ES was significant. If significant heterogeneity was found, a random-effects model was applied. Post hoc analyses were performed for the organisational setting, the amount of rehabilitation, and the effects of blinding. Sensitivity analyses were performed on the amount of rehabilitation.

Results of the review

Nine studies with a total of 1,051 patients were included. All studies assessed ADL, whilst 5 studies assessed neuromuscular outcomes and 4 studies assessed functional outcomes.

ADL.
The unbiased overall summary ES was 0.28 (95% confidence interval, CI: 0.16, 0.41, p<0.001). Lower summary ESs were found for studies in which experimental and control groups were treated in the same setting (summary ES 0.19, 95% CI: 0.02, 0.36, p<0.05), compared with studies in which the two groups of patients were treated in different settings (summary ES 0.40, 95% CI: 0.21, 0.58, p<0.001). No significant heterogeneity was found either within, or between, any of the above groups.

Functional and neuromuscular outcome parameters.
The variables defined on a neuromuscular level showed a larger unbiased summary ES (0.37, 95% CI: 0.13, 0.62, p<0.01) than those defined on a functional level (0.10, 95% CI: -0.10, +0.30).

Authors’ conclusions

A small but statistically-significant intensity-effect relationship was found in the rehabilitation of stroke patients. The major confounding factors were: the insufficient contrast in the amount of rehabilitation between the experimental and control conditions; the organisational setting of rehabilitation management; the lack of blinding procedures; and the heterogeneity of the patients' characteristics.

CRD commentary

This was a clearly written and presented review. The inclusion criteria were stated, and details of the studies were provided. In addition, the validity of the studies was assessed and reported, and the results were illustrated graphically. One limitation, however, was that unpublished studies were excluded from the review and the search was limited to MEDLINE, which may mean that some non-English language publications have been excluded.

Implications of the review for practice and research

The authors suggest that further research on the effects of the intensity of physical and occupational therapy is necessary. These studies should control for the following:
sufficient contrast in the amount of therapy given;
the organisational setting of rehabilitation management; and
the specification of patient characteristics, such as type and localisation of stroke, the number of previous strokes, and the initial ADL scores.
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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.