What works in falls prevention after stroke? A systematic review and meta-analysis

Batchelor F, Hill K, Mackintosh S, Said C

CRD summary
The authors concluded that one study suggested low-dose vitamin D may reduce falls in female stroke survivors in an institutional setting. No significant effects were found in other studies. The authors’ conclusions reflected the evidence presented, but potential for language and publication bias and differences between studies should be borne in mind.

Authors' objectives
To evaluate the effectiveness of interventions aimed at reducing falls in people who have experienced stroke.

Searching
EMBASE, MEDLINE, PsycINFO, CINAHL, ProFaNE, PEDro, Ageline, NICE, Allied and Complementary Medicine and The Cochrane Library were searched to March 2009 for studies published in English; search terms were reported. Reference lists of key studies and systematic reviews were scanned to identify additional studies. Abstracts were excluded.

Study selection
Randomised controlled trials that evaluated interventions aimed at fall prevention in adult stroke patients (aged 18 years and over) at any stage after stroke and in any setting were eligible for inclusion. Only studies that included at least 80% of patients diagnosed with stroke and where data on patients with stroke were reported separately were eligible for inclusion. Included studies had to report fall-related outcomes. Studies of laboratory-induced falls were excluded.

Interventions reported in the studies included physical activity interventions, models of stroke care (including rehabilitation) and medication aimed at influencing bone mineral density; no studies reported on multifactorial falls prevention interventions. Trial settings varied and included acute care, rehabilitation, community and residential or institutional care. Definition and measurement of outcomes varied between studies. Where reported, time since stroke ranged from less than 24 hours to more than two years. Duration of intervention ranged from 14 days to two years. Participant populations varied widely between studies with differing levels of mobility.

The authors did not state how many reviewers performed the selection of studies.

Assessment of study quality
Validity was assessed using the PEDro scale (maximum score of 10 points). Studies that scored four or more points were considered high quality; studies that scored three points or less were considered lower quality.

Two reviewers independently assessed validity; disagreements were resolved through discussion or through adjudication with a third reviewer.

Data extraction
Data on the rate of falls and number of fallers were extracted or calculated from published or unpublished data and used to calculate rate ratio (falls) and risk ratios (fallers), together with corresponding 95% confidence intervals (CIs). Where necessary, primary study authors were contacted for additional information.

Two reviewers independently extracted data; differences were resolved through discussion.

Methods of synthesis
Data were combined for similar interventions with comparable outcomes and where possible pooled using a random-effects model (where there was evidence of heterogeneity). Statistical heterogeneity was assessed using the I² statistic. Data that were not included in the meta-analysis were reported narratively.
Results of the review
Thirteen studies (n=1,473, range 39 to 374) were included in the review. Four of the included studies used the same population, but reported different periods of follow-up. Validity scores ranged from 4 to 10 points. The authors reported the main biases as lack of blinding of therapists and participants, lack of allocation concealment and lack of intention-to-treat analysis.

There were no significant differences between exercise and usual care on both fall rates (rate ratio 1.22, 95% CI 0.76 to 1.98; two RCTs) and proportion of fallers (risk ratio 0.77, 95% CI 0.24 to 2.43; two RCTs). There were no significant differences between bisphosphonate and placebo for proportion of fallers (risk ratio 0.95, 95% CI 0.73 to 1.22; two studies). There were not enough data to enable pooling of other outcomes.

For the analysis of individual studies, only one RCT reported a significant reduction in fall rate (p=0.0002) and proportion of fallers (p=0.004) for vitamin D compared with placebo for female stroke survivors. There were no other significant differences between interventions and control in the remaining RCTs.

Authors’ conclusions
One study suggested that low-dose vitamin D may reduce falls in female stroke survivors in an institutional setting. No significant effects were found in the other studies either individually or for pooled results.

CRD commentary
The review question was clear with appropriate inclusion criteria. Several relevant sources were searched. The restriction to published studies in English risked language and publication biases. Validity was assessed using appropriate criteria, but few details of the assessment were reported. Appropriate methods were used to reduce reviewer error and bias in the assessment of validity and extraction of data; it was unclear whether similar methods were used for study selection. Only a few studies could be combined in a meta-analysis due to differences in interventions and outcomes. It was unclear which methods were used and results of the assessment of heterogeneity were not reported. Most of the studies had small sample sizes. The authors appropriately discussed limitations with the evidence.

The authors’ conclusions reflected the evidence presented, but potential for language and publication bias and differences between studies should be borne in mind.

Implications of the review for practice and research
Practice: The authors stated that current evidence suggested that low-dose vitamin D may reduce falls in female stroke survivors in an institutional setting. The applicability of the intervention to all stroke survivors or at earlier post-stroke stages was yet to be determined.

Research: The authors stated further RCTs to evaluate interventions aimed at reducing falls in patients with stroke were required. Future studies should evaluate multifactorial interventions including strength and balance training, vitamin D supplementation and strategies that targeted risk factors of falls. Consistency of definition, measurement, reporting and analysis of falls was needed to enable comparisons across studies.

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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.