Interventions for the prevention of falls in older adults: systematic review and meta-analysis of randomised clinical trials


CRD summary
This meta-analysis aimed to determine the effectiveness of interventions for the prevention of falls in older adults. The authors' conclusion, that interventions for the prevention of falls in older persons reduce the risk of falling, seems appropriate.

Authors' objectives
To assess the relative effectiveness of several interventions to prevent falls among older adults.

Searching
MEDLINE, AgeLine, EMBASE, CINAHL, and PsycINFO were searched from 1992 to 2002; the Cochrane Library was also searched (2002). The search terms were reported and there was no restriction on language of publication. The reference lists from relevant reviews and articles were also checked. In addition, the authors contacted relevant experts and associations.

Study selection
Study designs of evaluations included in the review
Randomised controlled trials (RCTs) were eligible for inclusion.

Specific interventions included in the review
Interventions that focused on fall prevention were eligible for inclusion. Four intervention component categories were included: multifactorial falls risk assessment and management programmes, exercise programmes, environmental modification programmes, and educational interventions. The interventions were compared with usual care or a control group. Studies containing more than one intervention group were eligible for inclusion, as were interventions containing more than one component.

Participants included in the review
Participants were aged 60 years or older.

Outcomes assessed in the review
Two outcomes were considered: falling at least once during a specified follow-up period (ranging from 6 to 18 months) and the monthly rate of falls.

How were decisions on the relevance of primary studies made?
Two reviewers independently assessed the primary studies, and any disagreements were resolved by consensus. Reviewers received only the 'Methods' section for each article, retyped with no identifiers.

Assessment of study quality
The Jadad scale, which evaluates randomisation, blinding and withdrawals, was used to assess the methodological quality of the primary studies. Two reviewers independently rated the methodological quality of the selected studies, and any disagreements were resolved by consensus.

Data extraction
Two reviewers independently extracted the data, and any disagreements were resolved by consensus. Where data were
available, risk ratios (RRs) and their 95% confidence intervals (CIs) were calculated for falling at least once during a specified follow-up and for the rate of monthly falls. If more than two components were described in any intervention then each investigator selected the two components judged to contribute most to the effectiveness of the intervention.

Methods of synthesis
How were the studies combined?
Pooled RRs and incidence rate ratios for the two outcomes (risk of falling and rate of monthly falls), along with 95% CIs, were estimated using the DerSimonian and Laird random-effects model.

How were differences between studies investigated?
Heterogeneity was assessed statistically, using chi-squared tests and the I-squared statistic. In addition, meta-regression analyses were conducted to examine the effect of the individual intervention components, and to examine the effect of different exercise components on the two outcome measures. A number of sensitivity analyses were also performed.

Results of the review
Forty RCTs (n=14,598) were included in the review.

Risk of falling at least once (based on 26 intervention groups in 22 studies).

A reduction in the risk of falling (RR 0.88, 95% CI: 0.82, 0.95) was demonstrated in favour of the intervention groups compared with the controls. The proportion of variance not explained by chance (I-squared statistic) was 31% (95% CI: 0, 61).

Rate of monthly falls (based on 30 intervention groups in 27 studies).

A reduction in the number of monthly falls (RR 0.80, 95% CI: 0.72, 0.88) was demonstrated in favour of the intervention groups compared with the controls. The I-squared statistic was 81% (95% CI: 74, 86).

Meta-regression analyses.

Multifactorial falls risk assessment and management programmes demonstrated a statistically significant, beneficial effect on both the risk of falling (adjusted RR 0.82, 95% CI: 0.72, 0.94) and the monthly rate of falling (adjusted RR 0.63, 95% CI: 0.49, 0.83). Exercise programmes were also shown to have had a statistically significantly beneficial effect on the risk of falling (adjusted RR 0.86, 95% CI: 0.75, 0.99), but not on the monthly rate of falls. No significant effect on the risk of falling or monthly rate of falls was shown for either environmental modifications or educational programmes. No statistically significant differences were found between the type of exercise on the outcome measures. The sensitivity analyses did not demonstrate a statistically significant change to the estimates from the meta-regression.

Publication bias.

Visual inspection of funnel plots did not indicate any publication bias, nor did an adjusted rank correlation test. However, the regression asymmetry test did suggest some bias for the outcome ‘falling at least once’.

Authors’ conclusions
Interventions to prevent falls in older persons were effective in reducing the risk of falling and the monthly rate of falls. The authors stated that the most effective intervention was a multifactorial falls risk assessment and management programme.

CRD commentary
The review question was supported by inclusion criteria relating to the study design, intervention, participants and outcomes. The strategy used to search for relevant literature was adequate, with no restrictions on language of publication, which reduces the possibility of language bias. Selection decisions, quality assessment and the data...
extraction were based on consensus between two independent reviewers; this minimises the likelihood of reviewer bias or error.

Insufficient details on the individual primary studies were provided, which makes it more difficult to assess whether the results and conclusions were consistent with the included studies. Statistical heterogeneity was assessed and further examined by sensitivity analyses. While substantial heterogeneity was indicated for the outcome 'rate of monthly falls', the authors attempted to explore this through the meta-regression. The authors acknowledged a number of potential limitations, including: the indirect head-to-head evaluation of the intervention effect through the use of meta-regression analysis; and the outcome of monthly falls was susceptible to correlation within patients.

Overall, this was a well-conducted review. The authors’ conclusion, that interventions to prevent falls in older persons reduce the risk of falling, appears to follow from the results. The authors noted in their discussion that six additional RCTs had been published since the completion of their review.

Implications of the review for practice and research
Practice: The authors suggested two approaches to the prevention of falls. One was the implementation of a multifactorial falls risk assessment and management programme in people with a history of falls; the other was the implementation of exercise programmes in a general population of older adults.

Research: The authors recommended that future studies focus on the cost-effectiveness of interventions to prevent falls in older persons. They suggested that researchers should assess which components of a multifactorial falls risk assessment and which characteristics of exercise programmes were essential, including level of supervision and intensity.

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