Prevention of falls and fall-related injuries in older people

As people get older, they may fall more often for a variety of reasons including problems with balance, poor vision, and dementia. About a third of community-dwelling people over 65 years old fall each year, and the incidence of falls, and fall-related injuries, increases with age.[1] Although less than 10% of falls in community-living older people result in a fracture, these are a significant source of morbidity[1] and mortality.[2] More commonly, falls result in minor injuries such as bruising and lacerations. They can also result in fear of falling and loss of confidence, and admission to a nursing home.

Many risk factors appear to interact in older people who suffer fractures,[3] and it is possible that fall-prevention strategies have limited effect on falls that result in injuries, or are ineffective in populations at a higher risk of injury.[4] Interventions designed to reduce falls would require large effects to have an impact on the incidence of fractures. In the past, fall-prevention trials have not been adequately powered to detect effect on injury outcomes, and variation in the definition of these outcomes has hindered meta-analysis.[5] The Prevention of Falls Network Europe (ProFaNE) consensus document recommending that fall-related fractures should be the injury outcome of choice should help to address this.[4]

The Cochrane Bone, Joint and Muscle Trauma Group has supported the production of the review ''Interventions for preventing falls in elderly people'', since it was first published in 1997.[5] This review, which has been withdrawn from the *Cochrane Database of Systematic Reviews*, has been replaced by a review of interventions for preventing falls in community-dwelling older people, summarised below,[6] and a second review of fall-prevention interventions in nursing care facilities and hospitals, which is nearing completion.

INTERVENTIONS FOR PREVENTING FALLS IN OLDER PEOPLE LIVING IN THE COMMUNITY

This review contains 111 randomised controlled trials, involving more than 55 000 participants. The findings are relevant to a wide range of people living in the community, but they may not be applicable to people with dementia as they were specifically excluded from participating in the majority of the studies.

The review authors grouped interventions using the fall prevention classification system developed by ProFaNE.[7] For most interventions they reported two outcomes: rate of falls (RaR) (based on number of falls per person year), and risk of falling (RR) (based on the number of people who fell one or more times during the trial). These, and fall-related fractures for the injury outcome, are the consensus outcomes for fall-prevention trials recommended by ProFaNE.[4] Adverse effects and economic outcomes are also reported.

Exercise is the largest category of interventions in the review, with 43 randomised controlled trials. Group exercise containing multiple components, for example strength and balance training, reduced falls in older people in general, and in people known to be at higher risk of falling. Tai chi and individually prescribed multiple-component home-based exercise were also effective. Fall-related fractures were reported in just five trials testing different exercise interventions; overall, they achieved a significant reduction in fracture risk.

It has been suggested that vitamin D might reduce falls by increasing muscle strength. However, evidence from 13 trials with 23 112 participants suggests that vitamin D is not effective in reducing falls in older people, with the possible exception of those who have vitamin D insufficiency. Seven trials reported fracture outcomes. These showed no significant reduction in fracture risk, but this is a small subset of trials that contain both falls and fracture outcomes. A recently updated review of vitamin D for preventing post-menopausal fractures contains evidence from 45 trials with 84 585 participants.[8]

Some medications increase risk of falling. Gradual withdrawal of psychotropic medication, and a comprehensive prescribing modification programme for primary care physicians, both significantly reduced falls.

Surgical interventions were tested in a few trials. The review authors found that pacemakers for people with carotid sinus hypersensitivity, and cataract surgery for the first affected eye, both reduced rate of falls.

Ten trials of home safety interventions showed that, overall, these do not reduce falls, but these interventions may be effective in participants who are at higher risk of falling. In one study an anti-slip shoe device reduced falls in icy conditions.

The review contains 31 trials evaluating multifactorial interventions in which people receive different combinations of interventions based on an individual assessment, usually carried out by a multi-professional team. The review authors found that, overall, assessment and multifactorial interventions were effective in reducing rate of falls, but not risk of falling.

Multifactorial interventions targeting known risk factors make intuitive sense, but they are highly complex and do not constitute a homogeneous group of trials. The applicability of any particular approach may be highly dependent, not only on its target population and individual components, but also on the healthcare setting.

This is a summary of some of the main results. The results of other interventions, effective and otherwise, are reported in the full review. A personal or institutional subscription to *The Cochrane Library* provides access to the full text, and pdf versions (standard or full) can be downloaded free of charge. Many countries have a national agreement which allows access to all residents (not just health professionals). A list of these countries, and further information about subscribing or using pay-per-view to obtain temporary full access is available at http://www.cochrane.org/reviews/clibaccess.htm.

The reviews highlighted in this article are registered with the Cochrane Bone, Joint and Muscle Trauma Group (www.bjmtg.cochrane.org). The work of this Group involves preparing, maintaining and promoting the accessibility of systematic reviews on different aspects of the prevention, treatment and rehabilitation of musculoskeletal injuries. Anyone interested in contributing to this work can contact Lindsey Elstub, the Managing Editor, at lindsey.elstub@manchester.ac.uk.

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REFERENCES

1. **Sattin RW.** Falls among older persons: a public health perspective. *Annu Rev Public Health* 1992;**13**:489–508.
2. **Keene GS,** Parker MJ, Pryor GA. Mortality and morbidity after hip fractures. *BMJ* 1993;**307**:1248–50.
3. **Cummings SR,** Nevitt MC, Browner WS, *et al*. Risk factors for hip fracture in white women. Study of Osteoporotic Fractures Research Group. *N Engl J Med* 1995;**332**:767–73.
4. **Lamb SE,** Jorstad-Stein EC, Hauer K, *et al*. Development of a common outcome data set for fall injury prevention trials: the Prevention of Falls Network Europe Consensus. *J Am Geriatr Soc* 2005;**53**:1618–22.
5. **Gillespie LD,** Gillespie WJ, Robertson MC, *et al*. Interventions for preventing falls in elderly people. *Cochrane Database Syst Rev* 2009;(2):CD000340.
6. **Gillespie LD,** Robertson MC, Gillespie WJ, *et al*. Interventions for preventing falls in older people living in the community. *Cochrane Database Syst Rev* 2009;(2):CD007146.
7. **Lamb SE,** Hauer K, Becker C. Manual for the fall prevention classification system. www.profane.eu.org/profane_documents/Falls_Taxonomy.pdf (accessed 29 April 2009).
8. **Avenell A,** Gillespie WJ, Gillespie LD, *et al*. Vitamin D and vitamin D analogues for preventing fractures associated with involutional and post-menopausal osteoporosis. *Cochrane Database Syst Rev* 2009;(2):CD000227.