

HOME SAFETY INTERVENTIONS TO PREVENT FALLS: A MINI-REVIEW

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Falls in people aged over 65 years living in the community are a major issue with one in three experiencing a fall each year [1]. In Australia, 75% of all injury-related hospitalisations in older people are as a result of a fall, incurring both economic and social costs [2]. In the community, approximately half of falls occur in and around the home, and falls are the main cause of unintentional injury for community-dwelling older people [1]. Maximising safety of the older person at home has therefore been identified as an important fall prevention strategy [3,4].

Environmental risk factors for falls

Environmental hazards are common in many homes and are often identified as the cause of a fall by the older person. These include slippery surfaces, loose rugs, poor lighting, clutter and other trip hazards [5,6]. The association between environmental hazards and falls has been examined by six case-control studies [7-12] and five prospective studies [13-17]. Only two of these reported differences in the prevalence of household hazards between fallers and non-fallers. Isberner and colleagues [9] reported that the absence of handrails and the presence of uneven floors were more common in the households of 45 older people who had fallen compared to age- and sex-matched controls. Similarly, in a study involving 2304 older people, Fletcher and Hirdes [12] found that those who had one or more environmental hazards in their homes were more likely to have reported falling in the past three months. The remaining four case-control and five prospective studies, however, found no differences in home hazards between the faller and non-faller groups.

A systematic review carried out by Letts and colleagues [18] attempted to identify which environmental factors were important in increasing the risk of falling. They did not find a correlation between the location of participant trips, slips and falls and the location of most hazards identified by the Occupational Therapist (i.e. most falls occurred in the bedroom yet most hazards were found in the bathroom). They concluded that although home hazards are commonly identified by Occupational Therapists, other factors such as the use of mobility assistive devices are more closely linked to an increased risk of falls [18].

While it is evident from the studies outlined above that environmental factors are not the major cause of the majority of falls, the interaction between an environmental hazard (or extrinsic factor) and the person's physical abilities (intrinsic factors) seems to play an important role in falls. That is, a person must have a high functional level to cope effectively in an environment with a high number of potential hazards, while a person with a low functional level may be able to cope with an environment with fewer potential hazards.

In line with this concept, Chandler et al. [19] conducted a prospective study of 159 older men. Using a performance-based assessment tool, each participant's level of mobility was evaluated within their home environment. Thus, the performance score reflects the number of environmental hazards in each home and the degree to which the individual can negotiate those hazards. For example, using this tool, the absence of grab rails would not be considered a hazard if the person has no difficulty with bathroom transfers. After six months of falls follow-up, and controlling for age, cognition and mobility, the performance score was found to be an independent predictor of falls, indicating that this approach may be addressing the interaction between the individual and their environment.

Efficacy of Home Safety Interventions

Home safety interventions are more complex than just identifying hazards for change. They also require a process that raises older people's awareness of their environment, and provides information for how they should negotiate it and the required problem solving skills [6, 20]. Occupational therapists examine the interaction between people and their environment and consider a range of factors such as fall history, how the person mobilises within their home, protective and risk taking behaviours, vision, physical and cognitive attributes that affect mobility and task performance and fall risk for specific situations such as reaching, climbing stairs and transferring [6]. They then use this information to make recommendations on modifications and education to enable the older person to better negotiate their home environment.

Home safety interventions have been conducted as single interventions and as part of multidisciplinary and multifactorial interventions to reduce falls in older people [21]. These interventions are usually delivered by occupational therapists and include the use of environmental audit tools to identify fall risk hazards and risky behaviours with subsequent recommendations [21, 22]. No trials or reviews, however, have identified which aspects of audits, home modifications or other intervention aspects reduce fall risk [23].

In the most recent Cochrane review, Gillespie and colleagues [22] found that home safety assessments and modification interventions were effective in reducing both the rate of falls (RaR 0.81, 95% CI 0.68 to 0.97; 6 trials; 4208 participants) and the risk of falling (RR 0.88, 95% CI 0.80 to 0.96; 7 trials; 4051 participants). They concluded that these interventions were most effective in people at higher risk of falling (such as those with a history of falls, recent hospitalisation or visual impairment) and when delivered by an occupational therapist.

In addition, a complementary meta-analysis of home interventions by Clemson and colleagues [21] of 6 RCTs (N= 3,298) demonstrated an overall 21% reduction in fall risk (RR = 0.79: 0.65 to 0.97). A subgroup analysis of participants at high risk of falls (i.e. having a visual impairment functional decline or a history of falling in the past year or having been recently hospitalised for a fall, (4 trials, N= 570) demonstrated a 39% reduction of falls (RR = 0.61, 0.47 to 0.69). Despite limitations relating to the small number of studies published, and some of the environmental interventions comprising just part of multifaceted interventions, the authors concluded there is sufficient evidence for targeting home interventions to higher risk people [21].

Uptake and adherence to home safety interventions

Currin and colleagues [24] undertook a nested cohort study in which participants received home visits by both physiotherapists and occupational therapists that carried out a home environmental audit and provided recommendations. They found that the uptake of home modifications at the 6 month follow up was 49%, and the main modifications carried out included installation of grab rails in bathrooms and toilets, non-slip bath mats, bed sticks (a support for getting in and out of bed) and stair rails. The least likely implemented recommendations were use of over toilet frames and shower chairs, removal of mats and clutter and changing floor surfaces. Factors associated with an increased uptake of modifications were the presence of comorbidities, whereas depression was associated with reduced uptake. The authors concluded that it is important to ensure older people feel in control of the choices they make about their home environment, and that providing them with options as well as relevant information and education enables them to make informed choices.

A recent RCT by Kamei and colleagues[25] used an innovative approach to teach older people to identify fall hazards in the home and undertake appropriate fall mitigation strategies. Intervention participants received education from a public health nurse researcher that included a residential mock up to provide home hazard awareness and education on how to modify and create a safe environment in addition to a multifactorial falls prevention program provided to both intervention and control group participants. This intervention led to an increased awareness of home hazards as well as a reduction in falls in those aged 75 years and older (indoor falls were reduced by 13.2%, and overall falls by 18.5% at 12 weeks) when compared to the control group [25].

Cost-effectiveness

Environmental interventions delivered by occupational therapists that included home hazard modifications have been found to be cost effective in older people considered to be at high risk of falling including those with visual impairment or a history of falling and those who have been recently been discharged from hospital [26, 27].

Summary

In summary, home safety assessments and interventions delivered by occupational therapists should be offered as stand-alone interventions or as part of a multifactorial falls prevention initiatives in older community dwelling people at increased risk of falling (i.e. those with visual and balance impairments or recent hospitalisations). The main limitation of this intervention strategy was older people's uptake and implementation of recommendations; these factors could be improved by empowering older people to identify and appreciate fall hazards in their homes and address these with appropriate problem solving strategies.

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