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PRACTICE

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UNCERTAINTIES

What type of environmental assessment and modification prevents falls in community dwelling older people?

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What you need to know

- Evidence suggests that environmental interventions can prevent falls in older people at high risk of falls, but they have little or no benefit in people at low risk
- Offer environmental assessment and modification led by an occupational therapist to people over 65 who have had a fall in the past year, use a mobility aid, need assistance with any activities of daily living, take psychoactive medications, or are concerned about falling
- Environmental assessment and modification encompasses a comprehensive, validated functional assessment of the individual in their home environment, a joint problem solving approach, and follow-up as required

One third of people over the age of 65 experience a fall.[1] The health and social care costs of falls are increasing with longevity.[2 3] Falls are one of the leading causes of morbidity and death caused by injury in people over 75. Nearly a quarter of older people who fall are concerned about further falls, and some restrict activity. This can result in physical deconditioning, increased risk of future falls, institutionalisation, and reduced quality of life.[4]

Box 1 lists features that predispose older people to falls.[5]

Box 1: Risk factors for falls in community dwelling older people

Age (≥ 65)

History of falls in the past year

Use of mobility device, such as a walking aid

Requiring assistance for any activities of daily living

Use of psychoactive medications

Fear of falling

We categorise falls risk as

High falls risk— ≥65 years, have a history of falls, and also possess one or more of the other risk factors for falls

Moderate risk of falls— ≥65 years and possess one of the above additional risk factors

Low falls risk—Possess only one falls risk factor

Risk factors for falls can be categorised as

- Intrinsic (personal risk factors such as age and gender)
- Extrinsic (environmental risk factors/environmental hazards)
- Behavioural (activity related risk factors).[6 7]

Environmental hazards, such as trailing cables and poor lighting, are linked to 30-50% of falls in observational studies.[1 8] Guidelines in Australia,[9] the US,[10] and Britain[6 11] recommend interventions to reduce environmental hazards for older people at risk of falling. However, it remains uncertain whether environmental assessment and modification reduces falls in high risk older people, and which healthcare workers most effectively provide this intervention.

Box 2 gives examples of environmental interventions. Such interventions are typically provided by occupational therapists

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who specialise in environmental assessment and modification. However, in research studies, environmental interventions have been provided by healthcare support workers and healthcare professionals such as nurses and physiotherapists. The intensity of environmental assessment and modification ranges from hazard screening checklists, administered without the older person necessarily being present, to high intensity intervention comprising a comprehensive functional assessment of the older person in their home environment. Thus, the level of expertise of the healthcare worker and the intensity of the environmental intervention are likely to influence the outcome.

Box 2: Types of environmental intervention to reduce risk of falls

- Assessment and modification of the environment and tasks performed, including raising awareness of risks of falls and problem solving with the older person to find solutions
- Home modifications to improve task performance, independence and/or safety (eg, modifying a shower to improve access)
- Assistive technology to maintain or improve independence (eg, provision of mobility aids, grab rails, and personal alarms)

What is the evidence of uncertainty?

Search strategy

We searched the Cochrane Database of Systematic Reviews, Medline, Embase, and CINAHL (Cumulative Index to Nursing and Allied Health Literature) for studies published between 2010 and 2017. We applied English language and peer reviewed journal restrictions. We used the following terms for the literature search:

"accidental falls," "fall*," "frail elderly," "aged," "older*," "elder*," "senior*," "home N5 (assessment or intervention or design or hazard or modification or safety)," "home N3 hazard N3 reduction N3 visit*," "equipment," "adaptation*," "assistive technology," "enviro*," "N5 (assessment or design or hazard or modification or safety or risk)," "facility design and construction."

We found four systematic reviews of trials on environmental assessment and modification in community dwelling older people, including a Cochrane Review which included eight randomised controlled trials isolating the clinical effectiveness of environmental assessment and modification, and four clinical guidelines.

Best evidence suggests a possible benefit of high intensity occupational therapist led environmental assessment and modification in reducing falls in high risk populations.[12-15] These led to a reduction in falls of 19-21% in all risk categories and around a 38-39% reduction in high risk groups.[12 13] Specialism in environmental assessment (eg, by occupational therapists) and participant risk profile are likely to influence effectiveness of the intervention. Falls prevention interventions have less effect when delivered by health workers other than occupational therapists or to low risk populations.[12]Figure 1 presents a summary of the systematic reviews (all data are in the supplementary files with this article). Of the trials that isolate environmental assessment and modification, five studies showed a statistically significant reduction in falls in high risk participants through high intensity, occupational therapist led environmental assessment and modification.[3 16-19] The remaining three trials found no effect on falls when low intensity interventions were provided by other professionals[20] or trained support workers to both high and low risk populations.[21 22]

Methodological weaknesses and the small sample sizes in studies mean that it is difficult to ascertain which interventions are effective. Most studies include people at low risk of falls and there is considerable variation in the expertise of the healthcare worker delivering the intervention and in the intensity of the intervention. Some studies incorporated a checklist/screen as opposed to a functional environmental assessment.

Is ongoing research likely to provide relevant evidence?

We searched the Cochrane Database of Systematic Reviews, ClinicalTrials.gov, the World Health Organization, and Australian New Zealand Clinical Trials Registry for research protocols on environmental assessment and modification; environmental interventions; occupational therapy; falls prevention; and community dwelling older people.

Ongoing research is likely to add to the evidence on the clinical effectiveness of environmental interventions delivered by occupational therapists for falls prevention. The question of whether trained home care support workers and other professionals can deliver environmental assessment and modification still needs to be addressed.

We found two ongoing studies: a small study (15 participants) in Chicago investigating an occupational therapist led falls prevention intervention to reduce fear of falling, and the Occupational Therapy Intervention Study (OTIS) which we are conducting. The OTIS trial aims to evaluate effectiveness of occupational therapist led environmental assessment and modification delivered to older people at moderate to high risk of falls.[23] To date, 1331 older people have been randomised to high intensity environmental assessment and modification or usual care control. The trial is in the follow-up phase, in which fall events are being recorded over one year. Follow-up is scheduled to be completed in late 2019. This trial will add to the evidence base on whether occupational therapist led environmental assessment and modification delivered to people at moderate to high risk is clinically effective in preventing falls.

Recommendations for future research

Large trials in community dwelling older people ≥65 at high risk of falls to evaluate whether:

- Occupational therapist led environmental assessment and modification is clinically effective compared with usual care controls
- High intensity environmental assessment and modification is as clinically effective in reducing falls if delivered by other trained professionals as compared with occupational therapists
- Intensive follow-up to implement recommendations, immediately after occupational therapist led environmental assessment and modification, produces a greater reduction in falls than no follow-up or a single follow-up visit. A nested project to identify the most effective level of follow-up would enable resources to be deployed efficiently
- Qualitative studies to understand what occupational therapists consider in their clinical reasoning when carrying out environmental assessment and modification. This would help determine what the important elements are and inform future staff training

What should we do in the light of the uncertainty?

We recommend that occupational therapist led environmental assessment and modification is only offered to older people at high risk of falls (box 1).[5 6 12 13] This appears pragmatic given the lack of evidence on benefit in moderate or low risk people, and considering the cost and resource implications of occupational therapists intervening with people in all risk categories.

In the United Kingdom, guidelines from the National Institute for Health and Care Excellence (NICE) and the College of Occupational Therapists recommend that occupational therapist led environmental assessment and modification is routinely provided for older people at risk of falling or who are admitted to hospital following a fall.[6 11] This has not routinely happened, however, as indicated by recent qualitative and implementation

research.[24 25] This could be due to a perceived lack of robust evidence, limited awareness of clinical guidelines, complexity of the intervention, and a perceived lack of practitioner skill and time to carry out the assessment.[24]

When referring older people at high risk of falls for occupational therapy intervention, explain to your patient that the occupational therapist will support them to identify hazards in the home and those activities which might increase the risk of falling, and that the therapist and patient will jointly consider solutions.[13] Active engagement of older people in environmental interventions is vital. The context, environment, use of environment, and a person's capacity are key features of environmental assessment and modification to reduce falls risk. Occupational therapy practice aims to enhance, restore, or create a balance between these elements. Interventions encompassing functional assessment of the individual will be more effective, rather than a checklist style hazard removal.

Education into practice

- How would you assess whether an older person is at high risk of falls?
- What would you include in a comprehensive environmental assessment, who would provide it, and which patients would you offer it to?
- Of the frail older patients that you treated in the last year following a fall, how many received an environmental assessment and functional assessment in their home with follow-up?

How patients were involved in the creation of this article

A member of the OTIS Consumer Reference Group reviewed the manuscript and provided feedback. We thank her for her input. As a result, we changed the article in the following ways:

- We clarified the term "community dwelling"
- We specified that only some, not all, of those who are fearful of falling subsequently restrict their activity
- We provided more information on factors causing escalation in the cost of falls

What patients need to know

- If you are 65 or over and live in the community, your risk of falls in the future is higher if you have had a fall in the past year, use a mobility aid, need assistance with any activities of daily living, take psychoactive medications, or are concerned about falling
- It is likely that environmental assessment and modification, provided by an occupational therapist, would reduce your risk of future falls
- An occupational therapist visits your home to assess and recommend modifications to the environment and tasks that you perform. This may reduce falls hazards and improve your independence and/or safety. The therapist would also consider whether assistive technology might help to maintain or improve your independence
- Occupational therapists typically ask you to identify what you think puts you at risk of falling and you jointly problem solve and agree on solutions.

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Further details of BMJ policy on financial interests is here: https://www.bmj.com/about-bmj/resources-authors/forms-policies-and-checklists/declaration-competing-interests

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Figure

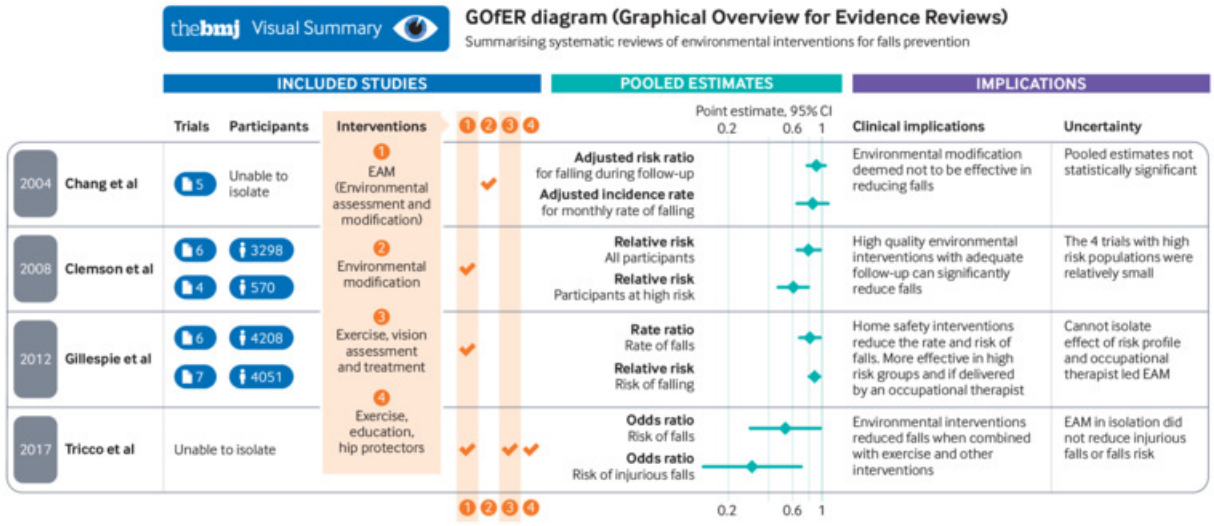

Fig 1 Summary of systematic reviews of environmental management for falls prevention