

There is strong evidence (level 1a) that a home hazard assessment and modifications can reduce the number of falls at home in older people with a history of falling but not in those without a history of falls

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CLINICAL SCENARIO: Home visits are seen as core business for occupational therapists and are usually conducted as part of the hospital discharge planning process. Home visits for older people are usually performed to reduce the likelihood of a fall by identifying hazards in the home and providing modifications or a follow up intervention. But do occupational therapists reduce the likelihood of falls in older people as a result of conducting a home hazard assessment and arrange home modifications?

FOCUSSED CLINICAL QUESTION: Do home modifications reduce the incidence of falls at home in older adults?

SUMMARY of Search, 'Best' Evidence' appraised, and Key Findings:

- 58 citations were located that met the inclusion/exclusion criteria.
- 6 guidelines were located but not appraised.
- 10 systematic reviews were located and their abstracts reviewed to determine trial quality.
- 1 systematic review by Gillespie et al (2003) deemed to be the highest level of evidence and was appraised.
- The systematic review reported that a home hazard assessment and modifications reduced the incidence of falls in older people with a history of falling (RR 0.66; CI 0.57-0.88). A home hazard assessment and modifications were not found to reduce the incidence of falls in older people who did not have a history of falling (RR 1.43; CI 0.76-1.44).

CLINICAL BOTTOM LINE: A home hazard assessment followed by home modifications can significantly reduce the incidence of falls at home for older people with a history of falls but not in those without a history of falls.

Limitation of this CAT:

- This critically appraised paper has been individually prepared as part of a university subject, reviewed and marked by a lecturer, but has not been externally peer-reviewed.

SEARCH STRATEGY:

Using the levels of evidence as defined by the Oxford Centre for Evidence-Based Medicine (Phillips, Ball, Sackett, et al., 2001), the search strategy aimed to locate the following study designs:

- Systematic reviews and meta-analyses of randomised controlled trials (level 1a);
- Systematic reviews and meta-analyses of randomised and non-randomised controlled trials (level 2a);
- Randomised controlled trials – RCTs (level 1b or 2b);
- Controlled trials, cohort (level 2b)

A search was also conducted for clinical practice guidelines these guidelines were not appraised.

Terms used to guide search strategy:

- **P**atient/Client: older adult, people aged >65 years
- **I**ntervention: home modifications or home hazard assessment
- **C**omparison: no home modifications or home hazard assessment
- **O**utcome(s): incidence of falls, injuries from falls

Table 1: Summary of Search

Databases and sites searched	Search Terms	Limits used
National Health and Medical Research Council	elderly or elderliness or elder or elders and or and falls or fall or falling or fallen or faller	None
New Zealand Guidelines Group	falls or fallers and or elderly or older adult	Published from January 1990 to May 2004
UK Guidelines: National Electronic Library for Health, Clinical Guidelines Database	fall prevention, fall risk, accidental falls (fall\$) Adults >65 years (older, aged, elderly, senior)	None
National Guidelines Clearinghouse	falls and or older adult and or home assessment	Aged 65 to 79 years
Scottish Intercollegiate Guidelines Network (SIGN)	fall prevention, fall risk, accidental falls (fall\$) Adults >65 years (older, aged, elderly, senior)	Guidelines Orthopaedics
The National Institute for Clinical Effectiveness	falls	None
Cochrane Library	falls	None
Database of Abstracts of Reviewers of Effectiveness (DARE)	falls and or older adult	None
PEDro	falls prevention	Sub discipline: Gerontology
OT Seeker	falls prevention	Diagnosis/Sub discipline: Gerontology
Joanna Briggs Institute,	falls	None

Adelaide, SA		
Centre for Clinical Effectiveness (Monash University) – Evidence Reports	fall prevention, fall risk, accidental falls (fall\$) Adults >65 years (older, aged, elderly, senior)	None
PubMed	#1 122669 fall* #2 2409247 older adult or aged or senior or elderly or >65 years. #3 28494 #1 AND #2 #4 359 home hazard assessment or home modification #5 39 #3 AND #4	None
CINAHL – Pre CINAHL	fall* or accident* (descriptor) or fall* (title) or fall* (abstract)	Language: English; Age Groups: Aged, 65+ years; Interest: Home Health Care Limit by population: human;
Medline – Pre Medline	falls or older adult	Limit by population: human; Limit by publication type: clinical trial
EMBASE	fall* (title) or fall* (abstract)	None
GOOGLE	elderly or elderliness or elder or elders and or and falls or fall or falling or fallen or faller	None
Reference lists from articles.		

INCLUSION and EXCLUSION CRITERIA

- Inclusion:
 - Studies published in English
 - RCTs including participants who were elderly (classified >65 years of age)
 - Studies investigating home hazard assessments or home modifications to prevent falls
 - RCTs that reported falls as an outcome measure
- Exclusion:
 - RCTs which did not report number of fallers or rate of falls were excluded
 - Second publication of a study

RESULTS OF SEARCH

A total of 58 relevant studies were located and categorised (see Table 2)

Table 2: Summary of Articles retrieved

Level of Evidence	Study Design/ Methodology of Articles Retrieved	Number Located	Source(s)
N/A	Evidence-Based Guidelines	6	Citations appeared in National Guidelines Clearinghouse (2,3, 6) PEDro (2,3,6,7) NICE (4)
1a	Systematic reviews and meta-analyses of randomised controlled trials	9	Citations appeared in Cochrane Library (11,13) PEDro (9,11,12,14,15,16) OT Seeker (10,12, 15) Joanna Briggs Institute (10) PubMed (8,11) Medline (8,11,15,16)
2a	Systematic reviews and meta-analyses of randomised and non-randomised controlled trials	1	Citations appeared in DARE (17) PEDro (17)
1b	Randomised controlled trials (Score 6/10 PEDro, OT Seeker)	9	Citations appeared in OT Seeker (18,19, 20,21,22,23,24,25, 26) PEDro (18,21,26)
2b	Randomised controlled trials, Controlled trials, cohort studies (Score <6/10 PEDro, OT Seeker)	10	Citations appeared in PubMed (27,33, 35,36) OT Seeker (28,29,30, 31,32,33,34,35) PEDro (29,30,33) Reference list 11 (27,28)

BEST EVIDENCE

The Cochran systematic review by Gillespie et al., (2003) was identified as the 'best' evidence and selected for critical appraisal. Reasons for selecting this study were:

- Clinical Guidelines 2,3,6 based their recommendations on the findings of the systematic review findings.
- This study had the most comprehensive search strategy, review of included trials and statistical analysis.
- Studies included in the review answered the clinical question and had appropriate study designs.

SUMMARY OF BEST EVIDENCE

Table 3: Description and appraisal of systematic review by Gillespie et al., (2003)*Aim of the Study*

To determine the effects of interventions designed to reduce the incidence of falls in elderly people (living in the community, institutional or hospital care).

Intervention investigated

- 1) Exercise/ physical therapy interventions
- 2) **Home hazard modification** (only results of this intervention will be appraised)
- 3) Cognitive/ behavioural interventions
- 4) Medication withdrawal/ adjustment
- 5) Nutritional/ vitamin supplementation
- 6) Hormonal and other pharmacological therapies
- 7) Referral for correction of visual deficiency
- 8) Cardiac pacemaker insertion for syncope-associated falls
- 9) Exercise, visual correction and home safety intervention
- 10) Multidisciplinary, multifactorial, health environmental risk factor screening and intervention
- 11) System modifications to prevent falls in high risk hospital patients
- 12) Multifaceted intervention in nursing home residents

Methodology

Data Sources – Cochrane Musculoskeletal Injuries Group, Cochrane Central Register of Controlled trials, MEDLINE, EMBASE, CINAHL, The National Research Register, PsychLIT, Social Science Index, Current Controlled trials. Reference list of articles and personal contact with experts in the field. Hand searching of relevant journals and abstract books.

Design of studies included – RCTs designed to minimise the effect of exposure to risk factors for falling in elderly people.

Study Inclusion/ Exclusion criteria – Studies, stating number of falls as their outcome. Non-RCTs were excluded.

Number of studies screened vs excepted (Home Modifications section)– Number of studies screened = 9; Number of studies accepted = 4.

Patient population – Elderly individuals, either sex, living in the community or institutions included. People with stroke were excluded.

Data extraction – Number of falls in older adults pre-post intervention. Data pooled using the fixed effect model.

Follow up (Home Modifications section) – Follow up in the four RCTs varied from 12 months Day et al., (2002), Cumming, (1999) & Pardessus et al., (2002) to 18 months Nikolaus et al., (2002).

Outcome Measures

Primary outcome: Number of falls/ fallers (fall defined as unintentionally coming to rest on the ground, floor or other lower level; excluded coming to rest against furniture, wall or other structure)

Secondary outcome: Severity of falls, (defined as number of falls resulting in injury, fracture or need of medical attention).

Results (Home hazard modifications)

- Among those participants with a history of falls in the year prior to randomisation, there was a significant reduction in the number of participants sustaining two or more falls during the study period (3 RCTs, 374 participants, RR 0.66, 95%CI 0.54 to 0.81). (Statically significant).
- In those without a history of falls in the previous year there was no evidence for the effectiveness of home hazard modification (1 RCT, 530 participants, RR 1.03, 95%CI 0.75 to 1.41). (Not statistically significant).
- Overall analysis including all four RCTs showed a significant, but smaller, effect (4 RCTs, 904 participants RR 0.85, 95%CI 0.74 to 0.96). (Statistically significant).

Abbreviations:

RR = Risk ratio; CI = confidence interval

Original Authors' Conclusions

Home hazard assessment and modifications can reduce the incidence of falls in older people with a history of falling. However, home hazard modifications are unlikely to reduce the incidence of falls of older people without a history of falling.

Critical Appraisal of Systematic Review:

Validity (*Methodology, rigour, selection, bias*)

- The reviewer addressed my focused clinical question.
- Comprehensive search conducted by two independent reviewers.
- Assessment of included trials conducted by two independent reviewers, using pre-determined scoring system which was standardised
- Results, interventions and participants were similar in all four RCTs included in the systematic review.
- Potential recall bias in all four RCTs, as data was collected retrospectively through monthly falls calendar and telephone calls.

Results (*Favourable or unfavourable, specific outcomes of interest, size of treatment effect, statistical and clinical significance; minimal clinically important difference*)

- Results were pooled and reported in terms of risk ratio and confidence intervals. However no raw data or statistical analysis was provided. Potential biases in the method of measurement employed.
- Home hazard modifications deemed to be cost effective.
- Mean cost of falls prevented \$3980 Australian.

IMPLICATIONS FOR PRACTICE/ APPLICABILITY

As part of hospital discharge planning a health care professional should offer older people following a fall a home hazard assessment followed by modifications when necessary. While this systematic review supports the use of interventions aimed at reducing home hazards through home modifications, it is not clear which component has the most impact on preventing further falls for example home modifications verses risk awareness or advice. Therefore, a combination of advice, education interventions aimed at increasing confidence and risk awareness and home modifications are effective and should be used.

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Article critically appraised:

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Related Articles (not individually appraised)

Clinical Practice Guidelines

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Level 1a Evidence

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Level 2a Evidence

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Level 1b Evidence

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Level 2b Evidence

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