



EVIDENCE CENTRE CRITICAL APPRAISAL

What evidence exists for the effectiveness of fall prevention strategies for older patients in institutionalised settings?

Elizabeth Burrows

Centre for Clinical Effectiveness
Monash Medical Centre
Locked Bag 29
Clayton VIC 3168
Australia

Telephone: +61 3 9594 2726
Fax: +61 3 9594 6970
Email: elizabeth.burrows@med.monash.edu.au
URL: <http://www.med.monash.edu.au/publichealth/cce/>

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SUMMARY STATEMENT:

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REQUEST:

What risk management strategies are available or have been trialled for reducing falls in institutionalised settings?

REQUESTED BY:

Anthony Black, Nursing Project Officer, Aged Care, Kingston Centre.

METHODOLOGY

Search Strategy

The Centre for Clinical Effectiveness defines the 'best available evidence' as that research we can identify that is least susceptible to bias. We determine this according to pre-defined NHMRC criteria (see Appendix).

First we search for systematic reviews, evidence-based clinical practice guidelines or health technology assessments, and randomised controlled trials. If we identify sound, relevant, material of this type the search stops. Otherwise, our search strategy broadens to include studies that are more prone to bias, less generalisable, or have other methodological difficulties. We include case-control and longitudinal cohort studies in our critical appraisal reports. While we cite observational and case series studies, and narrative reviews and consensus statements, in our reports we do not critically appraise them. Such studies can produce accurate results but they are generally too prone to bias to allow determination of their validity beyond their immediate setting.

Details Of Evidence Request

Patients	people aged >65 years in institutionalised settings
Interventions	fall prevention
Comparisons	usual care, other interventions
Outcomes	incidence of falls, injuries from falls

Search terms

Fall prevention, fall risk, accidental falls (fall\$)

Adults >65 years (older, aged, elderly, senior)

Resources Searched

Cochrane Library CD-ROM

OVID Medline

CINAHL

Refinements, Searching & Reporting Constraints

We have included only English language articles published since 1995. Our electronic searching was performed on 1 February 2000.

RESULTS:

We identified 4 articles for critical appraisal which are categorised as follows:

Systematic reviews or meta-analyses	4
Evidence-based clinical practice guidelines	0
Randomised controlled trials	NS
Controlled trials, cohort or case-control analytic studies	NS
Descriptive case series	NS
Narrative reviews	NS

NS = not searched for (see Research Methodology above)

The systematic reviews identified include patients who are in institutionalised settings and also living in the community. We are reasonably confident these articles represent the most important findings published to date based on our refinements, searching and reporting constraints.

EVIDENCE SUMMARIES

Format

Evidence summaries are in the form of spreadsheets reproduced at the end of this report. Each spreadsheet contains the article citation, the study design with level of evidence available according to NHMRC guidelines (1998), patient description, scientific validity of the article, results and pertinent remarks from the authors and Centre for Clinical Effectiveness reviewer.

ARTICLES CRITICALLY APPRAISED FOR THIS REPORT

Evans D, Hodgkinson B, Lambert L, Wood J. Fall prevention: a systematic review. (1999) *Clinical Effectiveness in Nursing* 3; 106-111.

Gillespie LD, Gillespie WJ, Cumming R, Lamb SE, Rowe BH. Interventions for preventing falls in the elderly. (1997) In: *The Cochrane Library Issue 4, 1999, Oxford Update Software*. Last substantive amendment, 26 August 1997

University of York. NHS Centre for Reviews and Dissemination; University of Leeds. Nuffield Institute of Health (1996). Preventing falls and subsequent injury in older people. *Effective Health Care* 2(4).

Parker MJ, Gillespie LD, Gillespie WJ. (1999) Hip protectors for preventing hip fractures in the elderly. In: *The Cochrane Library Issue 4, 1999, Oxford Update Software*. Last substantive amendment, 1 May 1999

Recent references (with abstracts) not included in the systematic reviews

Hanger, H. C., Ball, M. C. and Wood, L. A. (1999) An analysis of falls in the hospital: can we do without bedrails? [see comments], *J Am Geriatr Soc*, **47**, 529-31.

OBJECTIVES: To determine the effects of introduction of a bedrail policy, and an educational program, on patient falls and fall-related injuries. DESIGN: A prospective "Before and After" design. PARTICIPANTS AND SETTING: All patients admitted during 1 calendar year in an assessment, treatment, and rehabilitation unit for older people. INTERVENTION: A policy change for the use of bedrails (restricting their use) and an educational program about their effects. MEASUREMENTS: Patient fall rates -- all falls and around the bed falls -- and patient and staff injuries. RESULTS: There was a significant reduction in the number of beds with bedrails attached after the policy introduction (mean of 40/135 vs 18.5/135, respectively, $P = .02$), but the fall rate (either total or around the bed) did not change significantly. Serious injuries were significantly less common after the bedrail policy was introduced ($P = .008$), with fewer head injuries. CONCLUSIONS: Reducing the use of bedrails did not alter patient fall rates significantly, but it was associated with a reduction in serious injuries. Unless it can be shown that bedrails are beneficial, their continued use in older patients must be seriously questioned.

Neufeld, R. R., Libow, L. S., Foley, W. J., Dunbar, J. M., Cohen, C. and Breuer, B. (1999) Restraint reduction reduces serious injuries among nursing home residents, *J Am Geriatr Soc*, **47**, 1202-7. OBJECTIVES: To describe how removing physical restraints affected injuries in nursing home settings. DESIGN: A 2-year prospective study of an educational intervention for physical restraint reduction. SETTING: Sixteen diverse nursing homes with 2075 beds in California, Michigan, New York, and North Carolina. PARTICIPANTS: Study A: 859 residents who were physically restrained at the onset of the intervention on October 1, 1991. Study B: all residents who occupied the 2075 beds in the 16 facilities 3 months before the intervention and 3 months after its completion. INTERVENTION: Educational program for nursing home staff followed by quarterly site consultations to participating nursing homes. MAIN OUTCOME MEASURES: Rate of physical restraint use and injuries. RESULTS: Study A: Serious injuries declined significantly among the 859 residents restrained initially when restraint orders were discontinued ($X^2 = 6.2$, $P = .013$). Study B: During the intervention period, physical restraint use among the 2075 residents decreased from

41% to 4%, a 90% reduction. The decrease in the percentage of injuries of moderate to serious severity was significant (i.e., 7.5% vs 4.4%, P2-tail = .0004) as was the rate of moderate and serious injuries combined (Rate Ratio = 1.580, P2-tail = .0033). CONCLUSIONS: A substantial decrease in restraint use occurred without an increase in serious injuries. Although minor injuries and falls increased, restraint-free care is safe when a comprehensive assessment is done and restraint alternatives are used.

Uden, G., Ehnfors, M. and Sjostrom, K. (1999) Use of initial risk assessment and recording as the main nursing intervention in identifying risk of falls, *J Adv Nurs*, **29**, 145-52.

The consequences of falls among hospital patients are a great problem, for the patient, the family and society, and cost billions of dollars. In Sweden, almost one-third of all hip fractures occur in the hospital population. Despite this, very few prevention strategies have been developed and tested. In this study, a risk assessment and recording programme in relation to the risk of falling among patients in a geriatric department at a Swedish hospital was implemented. The records of all patients admitted to a geriatric unit during one year, and a stratified random sample of patient records, constituting the control group from the year before, were reviewed. No recording of assessments regarding the patients' risk of falling, and no preventive nursing interventions, were found in the records of the control group. The study group, however, increased the recording of risk assessment to 96%. Only implemented nursing interventions were found in the patients' records, despite the fact that Swedish law makes it obligatory for the registered nurse to record both the planning and implementation of nursing care. In the study group there were explicit descriptions of problems of concern for nursing regarding the patients' risk of falling in less than one-third of the records, the nursing care plans were rare, and the evaluations were not satisfactory. Nursing interventions consisted mostly of information or education, promotion of patient participation, and structuring of the environment. There was no agreement on any standard-care plan. Recording of falls was found more often in the study group than in the control group (probably due to more careful recording), but the proportion of injuries in relation to falls was higher in the control group. The results of this study may be used as a baseline for developing a nursing strategy and documentation relating to falls.

APPENDIX

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Levels Of Evidence

As Defined By "A Guide To The Development, Implementation And Evaluation Of Clinical Practice Guidelines" (National Health & Medical Research Council, Canberra, 1998):

Level I		Evidence obtained from a systematic review or meta-analysis of all relevant randomised controlled trials.
Level II		Evidence obtained from at least one properly designed randomised controlled trials.
Level III	-1	Evidence obtained from well-designed pseudo-randomised controlled trials (alternate allocation or some other method).
	-2	Evidence obtained from comparative studies with concurrent controls and allocation not randomised (cohort studies), case control studies or interrupted time series with a control group.
	-3	Evidence obtained from comparative studies with historical control, two or more single-arm studies or interrupted time series without a parallel control group.
Level IV		Evidence obtained from case series (either post-test or pre-test and post-test), opinions of respected authorities (narrative reviews), descriptive studies, reports of expert (i.e. consensus) committees, case studies.

<h2 style="text-align: center;">Evidence Summary Systematic Review</h2> <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p style="text-align: center;">Fall prevention strategies in institutionalised settings</p> </div>	<p>Evans D, Hodgkinson B, Lambert L, Wood J. Fall prevention: a systematic review. (1999) <i>Clinical Effectiveness in Nursing</i> 3; 106-111.</p>	<p>Parker MJ, Gillespie LD, Gillespie WJ. Hip protectors for preventing hip fractures in the elderly. In: <i>The Cochrane Library Issue 4, 1999, Oxford Update Software. Last substantive amendment, 1 May 1999.</i></p>	<p>Gillespie LD, Gillespie WJ, Cumming R, Lamb SE, Rowe BH. Interventions for preventing falls in the elderly. In: <i>The Cochrane Library Issue 4, 1999, Oxford Update Software. Last substantive amendment, 26 August 1997.</i></p>
STUDY DESIGN & NHMRC LEVELS OF EVIDENCE	Level I (systematic review)	Level I (systematic review)	Level I (systematic review)
DESCRIPTION: Subjects, Interventions, Comparisons, Outcomes, Inclusion & Exclusion Criteria	<p>Settings: acute care hospitals Patients: Adult patients Intervention: any intervention aimed a preventing patient falls Comparison: various Outcomes: number of falls Exclusion criteria: Studies involving residents of long-term care facilities. Studies focusing on other outcomes (reduction in injury, improvement in balance or muscle strength).</p>	<p>Settings: nursing homes or residential care Patients: Elderly patients Intervention: wearing hip protectors Comparison: not wearing hip protectors Outcomes: hip fracture Exclusion criteria: non randomised or quasi-randomised studies</p>	<p>Settings: community or institutional Patients: Elderly individuals Intervention: any intervention or group of interventions to minimise the effect of or prevent exposure to any risk factor for falling. Comparison: usual care, another intervention Outcomes: number of falls, severity of falls. Exclusion criteria: non-randomised studies, studies measuring outcomes other than those listed above (e.g. improved balance).</p>
VALIDITY: Methodology, rigour, selection, opportunity for bias	<p>Search strategy: Search included published and unpublished studies. Databases: CINAHL, MEDLINE, PsycLIT, Current Contents, Cochrane Library, EMBASE. Unpublished papers searched for in Dissertation Abstracts International and Proceedings. Checked bibliographies of retrieved articles. Assessed validity: Not stated. Consistent results: No Potential for bias: Trials considered are low to moderate quality.</p>	<p>Search strategy: Hand searching of orthopaedic journals and abstract books of orthopaedic conferences. Computer databases: MEDLINE, EMBASE, CINAHL, CENTRAL, Current Contents Assessed validity: Yes Consistent results: Yes for preventing hip fractures, no for preventing other fractures Potential for bias: Trials included are low to moderate quality</p>	<p>Search strategy: Hand searching relevant journals and abstract books. Computerised databases (MEDLINE, EMBASE, CINAHL, Current Contents, PsycLIT, Social Science Citation Index, Dissertation Abstracts, Index to UK Theses and Cochrane Register of Controlled Trials. Assessed validity: Yes Consistent results: Yes, (for most) Potential for bias: Included trials of moderate quality</p>
RESULTS: Generally favourable or unfavourable, specific outcomes of interest, estimate of experimental effect and precision if appropriate	<p><u>Fall prevention</u> Alarm systems: no rigorous evidence for effectiveness Identification bracelets: No evidence on the effectiveness of bracelets as interventions on their own. Multiple interventions: no RCTs evaluated effectiveness. Restraints and bedrails: evidence that these devices do not provide complete protection from falling.</p>	<p><u>Incidence of hip fractures:</u> With hip protectors 2.1% Without hip protectors: 6.2% This difference did not reach statistical significance due to methodology of 2 studies (cluster randomisation).</p>	<p><u>Prevention of falls:</u> Exercise alone: OR: 1.05, 95% CI: 0.74 -1.48, not significant) Exercise with health education classes: OR =1.72, 95% CI: 0.78-3.75, not significant) Health education classes: OR = 1.25, 95% CI: 0.51-3.03. Interventions targeting multiple risk factors: OR 0.77, 95%CI: 0.64-0.91 (significant) Behavioural interventions targeting a particular environmental hazard: OR 0.81; 95%CI:0.71-0.93 (significant) Interventions targeting multiple risk factors: OR 0.77; 95% CI: 0.64-0.91 (significant)</p>

<p>AUTHORS COMMENTS: Risk/benefit, limitations</p>	<p>Despite the importance of patient falls in hospitals... there is currently little evidence on which to base clinical practice.</p>	<p>The generalisability of the results is unknown beyond high risk populations.</p>	<p>"Health care...providers contemplating fall prevention programmes should consider health screening of at risk elderly people, followed by interventions which are targeted at ... risk factors...". There is inadequate evidence for the effectiveness of a single intervention... for the prevention of falls".</p>
<p>REVIEWER'S COMMENTS: Risk/benefit, methodology, conclusions</p>	<p>Recent evaluation of studies of fall prevention with outcomes measuring incidence of patient falls (excludes studies evaluating interventions that reduce injury).</p>	<p>Results from 6 ongoing studies assessing hip protectors may clarify effectiveness.</p>	

<p>Evidence Summary Systematic Review</p> <p>Fall prevention strategies in institutionalised settings</p>	<p>University of York. NHS Centre for Reviews and Dissemination; University of Leeds. Nuffield Institute of Health (1996). Preventing falls and subsequent injury in older people. <i>Effective Health Care</i> 2(4).</p>
<p>STUDY DESIGN & NHMRC LEVELS OF EVIDENCE</p>	<p>Level I (systematic review)</p>
<p>DESCRIPTION: Subjects, Interventions, Comparisons, Outcomes, Inclusion & Exclusion Criteria</p>	<p>Settings: hospital and community Patients: Adults aged >60 (approx) Intervention: exercise, home assessment, type of shoe, interventions in institutionalised settings, interventions to reduce likelihood of injury from a fall (nutritional supplements, hip protectors) Comparison: various Outcomes: number of falls, fall related injury, change in risk factor for falls. Exclusion criteria: non-randomised studies, studies measuring outcomes other than those listed above.</p>
<p>VALIDITY: Methodology, rigour, selection, opportunity for bias</p>	<p>Search strategy: Computerised databases (Social Science Citation Index (BIDS), PsycLIT, EMBASE, RCN, AMED, UNCOVER), citation in identified papers and previous reviews, contributions from peer reviewers and other experts in the field. Assessed validity: Yes Consistent results: No Potential for bias: Trials included are low to moderate quality.</p>
<p>RESULTS: Generally favourable or unfavourable, specific outcomes of interest, estimate of experimental effect and precision if appropriate</p>	<p><u>Reducing risk of falling:</u> <i>Exercise:</i> adj IR= 0.9, 95% CI: 0.81 -0.99, p=0.04) (Note: IR=incidence ratio) <i>Balance training:</i> IR = 0.75 p=0.01); Tai Chi: IR=0.63, 95%CI:0.44,0.89) <i>Home Assessment:</i> mixed outcomes <i>Shoes:</i> no rigorous evaluation <u>Interventions in institutionalised settings:</u> <u>Reducing risk of falling</u> <i>Nutritional supplement:</i> no significant benefit <i>Bed alarm:</i> no significant benefit <i>ID bracelets</i> for patients at high risk: increased risk of falls. <u>Reducing injury from falls</u> <i>Dietary interventions:</i> Vitamin D: 20% decrease (p<0.02) <i>Calcium supplementation:</i> OR=0.27, 95%CI: 0.4, 0.97 (significant). <i>Hip protectors:</i> age adj. RR: 0.4, 95% CI: 0.18-0.82 (significant)</p>
<p>AUTHORS COMMENTS: Risk/benefit, limitations</p>	<p>Limited evidence for any single intervention. Specific exercises (balancing, strengthening) show benefit. Hip protectors significantly reduce injury due to falls.</p>
<p>REVIEWER'S COMMENTS: Risk/benefit, methodology, conclusions</p>	<p>Document provides a comprehensive assessment of various strategies prior to 1996.</p>