
The effectiveness of hard shell hip protectors in the prevention of hip fractures in the older adult population residing in residential care is uncertain

Prepared by: Anne Leclerc, BScPT, UBC MResc student

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CLINICAL SCENARIO: Hip protectors have been advocated as a means to reduce the risk of sustaining a hip fracture. A hip fracture in the elderly frequently results from a fall on the hip. Hip fractures are a major threat to the health and well being of elderly residents because these fractures represent one of the most important causes of longstanding pain, functional impairment, disabilities and deaths in this population.

FOCUSSED CLINICAL QUESTION: Do hard shell hip protectors help prevent hip fractures in the ambulatory older adult population (65+) residing in residential care having been assessed as a falls risk?

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

- Five studies were found that met the inclusion and exclusion criteria: a recent systematic review, and four recent randomized controlled trials
- The systematic review included all four randomized control trials
- Three studies concluded that hip protectors are not effective in reducing hip fractures in residential setting.
- One study concluded that hip protectors may reduce the number of hip fractures
- The systematic review concluded that the effectiveness of hip protectors is uncertain
- Compliance with wearing hip protectors was found to be poor due to issues such as discomfort and irritation

CLINICAL BOTTOM LINE: On the basis of early reports of randomized trials, hip protectors were advocated. Accumulating evidence indicates that their effectiveness in an institutional setting is uncertain.

Limitation of this CAT: This critically appraised paper has not been peer-reviewed by one other independent person.

SEARCH STRATEGY:**Search Terms**

Client Group: older adults (65+)

Intervention: hard shell hip protectors

Setting: nursing or residential care homes

Outcomes: incidence of hip fractures

Databases and sites searched	Search Terms	Limits used
MEDLINE CINAHL Embase ISI Cochrane Library PEDro	"Hip protectors and hip fractures and residential care"	English language Abstracts Human only Age 65+ Published in last 10 years

INCLUSION and EXCLUSION CRITERIA

Inclusion: Systematic review with meta-analysis and randomized controlled trials only (high level of rigor)
 Studies conducted in residential care homes
 Studies conducted on hard shell hip protectors
 Studies conducted on older adults 65+
 Studies using incidence of hip fractures as outcome measure
 Most recent studies 2001-2006

Exclusion: Lower level of rigor, i.e. journal reviews
 Studies of community-dwelling subjects
 Studies of primarily compliance issues
 Studies of interim results only
 Studies of multifactorial approaches to falls management

RESULTS OF SEARCH

Five relevant publications found and categorized in table below (Table1)

Table 1: Summary of Study Designs of Articles retrieved

Study Design/ Methodology of Articles Retrieved	Level of evidence *	Author (Year)	Sources of evidence
Systematic review with meta-analysis	1a	Parker MJ, Gillespie WJ, Gillespie LD (2006)	Cochrane Library Medline CINAHL ISI Embase PEDro

Randomized controlled trial, clustered randomization	1b	O'Halloran PD, Cran GW, Beringer TRO, Kernohan G, O'Neill C, Orr J et al.(2004)	Medline Embase CINAHL PEDro
Randomized controlled trial, individual randomization	2b	Van Schoor NH, smit JH, Twisk JWR, Bouter LM, Kips P. (2003).	Embase PEDro
Randomized controlled trial, cluster randomization	2b	Meyer G, Warnke A, Bender R, Muhlhauser I. (2003)	Cross-referencing PEDro
Randomized controlled trial, individual randomization	2b	Cameron ID, Venman J, Kurrie SE, Lockwood K, Bicks C, cumming RG et al. (2001)	ISI PEDro

*The Oxford Centre for Evidence-based Medicine Levels of Evidence (Phillip, Ball, Sackett, et al. 1998)

BEST EVIDENCE

The following study was identified as the 'best' evidence and selected for critical appraisal. Reasons for selecting this study were:

- Highest level of evidence
- Most recent publication (2006)
- Contains all the randomized control trials in table 1

SUMMARY OF BEST EVIDENCE

Table 2: Summary and Appraisal of Paper by Parker et al.(2006)

Parker MJ, Gillespie WJ, Gillespie Ld. Effectiveness of hip protectors for preventing hip fractures in elderly people: systematic review. BMJ 2006 Mar 2;332(7541):571-574

Objective of the Systematic Review: To present the updated results of systematic review of the current evidence for the effectiveness of hip protectors from reports of completed randomized trials, and to explore the evolution of evidence

Study Design: systematic review with meta-analysis

Search Strategy: Cochrane Bone, Joint and Muscle Group trials register (January 2005), Cochrane central register of controlled trials (Cochrane library Issue 1, 2005) Medline (1966 to January 2005), Embase (1988 to January 2005), CINAHL (1982 to December 2004), other databases. Contacted trialists.

Sampling: 14 randomized or quasi randomized controlled trials reporting the incidence of hip fractures in hip protector users compared to control group (non-users)

Data Collection and analysis: Two reviewers independently searched databases and extracted data, two reviewers independently assessed each trial for methodological quality (using a scoring scale in 10 different areas).

Results: 14 trials contributed fracture outcome data to this updated review. Outcomes from 11 trials carried out in residential setting including 6 cluster randomized studies, showed evidence of marginally statistically significant reduction in incidence of hip fracture (relative risk (RR) 0.77, 95% confidence interval (CI) 0.62 to 0.97). This analysis showed significant statistical heterogeneity. Compliance with wearing the hip protectors was poor in the long term.

Conclusions: Accumulating evidence casts some doubt on the effectiveness of the provision of hip protectors in reducing the incidence of hip fracture in older people. Acceptance and adherence by users of the hip protectors remain poor due to discomfort and practicality.

Critical Appraisal:

Validity: highest level of rigor, recent update of review not rated by PEDro as it is a systemic review

Randomized controlled trials PEDro scores: O'Halloran 7/10, Van Schoor 5/10, Meyer 5/10, Cameron 6/10

Selection bias is a risk to consider in cluster randomized trials as admission to a particular residence may not have been a random event

Interpretation of Results: Earlier reports of the effectiveness of hip protectors may have been misleading owing to publication bias or flaws in the design, conduct and reporting of the early cluster randomized studies. More recent studies, including this systematic review, are able to carry out appropriate analyses using additional information from trialists.

Confidence intervals: Individually randomized studies showed no significant reduction in hip fracture and no significant heterogeneity ($P=0.68$, $I^2=1.6\%$); the cluster randomized group showed significant statistical heterogeneity ($P=0.03$, $I^2=59.4\%$). Sensitivity analyses were conducted and it was found to be accounted for by different outcomes of two large cluster randomized trials.

Summary/Conclusion: Recommendations made for future research in this area
Non compliance with the use of hip protectors remains a challenge in the analysis and interpretation of data.

IMPLICATIONS FOR PRACTICE, EDUCATION and FUTURE RESEARCH

- The practice of recommending specific hip protectors as a method of hip fracture prevention is questionable
- Manufacturing of hip protectors is largely unregulated and needs to be standardized and regulated
- There needs to be more randomized controlled trials of large samples in residential care and studies of the biomechanical advantage of the hip protectors
- Further research on hip protectors studying design modifications is recommended to improve acceptance and adherence

REFERENCES

Cameron ID, Venman J, Kurrie SE, Lockwood K, Bicks C, Cumming RG, et al.(2001) Hip protectors in aged-care facilities: a randomized trial of use by individual higher risk residents. *Age Ageing*;20:477-81

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