

Will elderly rest home residents wear hip protectors?

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Abstract

Background: hip fracture is a common cause of morbidity and mortality in elderly people, for whom osteoporosis, the risk of falling and direct trauma to the hip during the fall are the major risk factors. External hip protectors have been developed which reduce the risk of hip fracture after a fall. However, compliance with their use is uncertain. We addressed this issue in a sample of elderly Dorset rest home residents over a 3-month period.

Methods: 31 rest homes agreed to participate. Of the 288 female subjects approached, 141 gave their informed consent and 101 were allocated to the intervention arm of the study. Their ages ranged from 64 to 98 years, and 44% reported a fall during the preceding 12 months. Each subject was fitted with three pairs of protector pads (Sahvatex, Denmark) sewn into specially designed undergarments. Randomly timed fortnightly visits were made to each subject to assess compliance for 12 weeks.

Findings: 27 subjects were compliant for the whole study period; 54 wore the protector pads for less than a week, largely for reasons of poor fitting or discomfort; the remainder withdrew at varying intervals between 1 and 12 weeks. During the study period, there were nine recorded falls onto the hip, six of which occurred in women wearing protectors. None resulted in hip fracture.

Conclusion: approximately 50% of elderly rest home residents who are mentally able would wear hip protectors in order to prevent hip fractures. Long-term compliance drops to about 30%. Compliance could be increased substantially if the pads and undergarments were modified to enhance their fit and to reduce the discomfort associated with their use.

Keywords: compliance, epidemiology, hip fracture, hip protectors, prevention

Introduction

Hip fracture is a common problem in elderly people [1], occurring in around one in four women and one in eight men by the age of 90 years. It is an important cause of morbidity and mortality in old age, with approximately one-third dying within the first year after fracture, and one-third having continued disability as a result of their fracture. The main determinants of hip fracture are osteoporosis and falls [2]. Strategies to reduce hip fracture therefore include preventing bone fragility, avoidance of falls, and methods to attenuate the impact on the hip during a fall.

Experimental studies have shown that soft tissue covering the hip may influence energy absorption during a fall [3], which partly explains the reduced risk of hip fractures in overweight women [4]. External hip protectors, which are designed to divert a direct impact away from the greater trochanter during falls from

standing height, reduce the incidence of fracture [5]. The protector is made of an outer shield of polypropylene with an inner plastozote lining; the device is sewn into special underwear so that it fits snugly over the greater trochanter (Figure 1). At impact, the protector transmits released energy to the soft tissues and muscles anterior and posterior to the femoral bone.

A controlled trial of hip protectors in Danish nursing home residents showed that they considerably reduced the risk of hip fracture [5]. However, compliance in wearing the garments is uncertain. We addressed this issue in a feasibility study for a randomized controlled trial of the efficacy of hip protectors in elderly rest home residents in the UK.

Methods

Thirty-one Dorset rest homes were contacted and



Figure 1. An external hip protector in use. The protector is made of an outer shield of polypropylene with an inner plastozote lining and is sewn into special underwear so that it fits snugly over the greater trochanter.

invited to participate in the study. The study group consisted of the female residents of the rest homes. As this compliance study was performed to pilot a formal randomized controlled trial testing the efficacy of hip protectors, we excluded subjects if they were unable to give informed consent because of dementia or communication problems, if they reported having previous problems with pressure sores or if their general practitioner was not willing for them to take part in the study. Women who wore dress size 18–20 (extra-large) or above were excluded as there was no suitable undergarment. All others were approached and invited to participate. Subjects were randomized to either treatment or control groups on a two-to-one basis. Those in the treatment arm were provided with at least three pairs of hip protectors and asked to wear them every day for 12 weeks.

Compliance was monitored by randomly timed visits each fortnight by one of us (P.H.). Fall registers were set up in each rest home for the whole study group: the type of fall (including information on direct trauma to the hip), whether the person was wearing hip

protectors and the outcome were recorded. The registers were reinforced by questioning the study participants at each fortnightly visit.

Results

Six hundred and twenty-six female residents were identified from the 31 rest homes. Of these, 338 were not eligible (235 due to cognitive impairment, 53 due to poor physical health and 40 for other reasons). A further 147 women declined to participate—not because of any specific opposition to using the hip protectors but because they were reluctant to participate in a clinical research study. Of the remaining 141, 101 were allocated to the treatment group. The age range of the controls and the protector wearers were similar: 64–96 years in the treatment group and 72–98 years among the controls.

Among those allocated to wearing the hip protectors, only 27 managed to wear them for a full 12 weeks. Fifty-four did not even complete 1 week: their reasons for non-compliance are shown in Table 1. The most frequent reasons given were discomfort (37%) and poor fit (26%). Of the 20 women who wore protectors for at least 1 week but did not complete the full study period, seven had special reasons for their shorter use (two died, one moved away, one was admitted to hospital and three were unable to tolerate the undergarments during a heat wave but continued thereafter). These seven are classified as ‘censored’ observations in the Kaplan–Meier survival plot (Figure 2). The remainder gave up at a linear rate between 1 and 12 weeks, and Table 1 shows their reasons for discontinuing protector use. As with those who refused to wear the hip protectors for more than a week, most were non-compliant for reasons of discomfort.

Of the 101 women allocated to wearing hip protectors, eight suffered falls on the hip, two of which occurred when the hip protectors were not being worn. In the control group one fall on the hip was recorded. None of the falls resulted in a hip fracture. The frequency of falls among excluded subjects was not measured.

Table 1. Reasons given for not wearing hip protectors

Reason	No. (and %) of responses	
	Never users	Ever users
Discomfort	20 (37%)	8 (62%)
Poor fit	14 (26%)	1 (8%)
Physical difficulties	7 (13%)	2 (15%)
Changed mind	7 (13%)	0
Illness	4 (7%)	2 (15%)
Forgetfulness	2 (4%)	0
Total	54	13

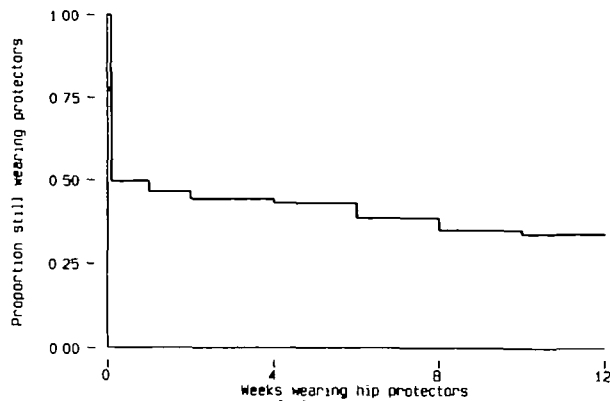


Figure 2. Kaplan-Meier survival plot for use of hip protectors among 101 elderly institutionalized women.

Discussion

This study demonstrates that approximately 30% of elderly rest home residents who agree to wear hip protectors comply over 3 months. However, another 43% are willing to wear the device but give up due to problems in fitting and discomfort. The remainder change their minds when presented with the garments or forget to wear them. Some of these problems could be overcome by appropriate modification of the pad and undergarment.

The previous controlled trial also pointed to difficulties with compliance. Lauritzen *et al.* [5] only achieved a compliance rate of 24% as assessed by the proportion of subjects in the treatment arm who were wearing their hip protectors when they had a fall. Despite this, the incidence of hip fracture was reduced by approximately 50%, suggesting that those at greatest risk (i.e. recurrent fallers) are most likely to wear the protectors. Compliance may be improved by targeting those subjects who are at greatest risk of hip fracture, such as those who have already had a hip fracture, or those with risk factors for recurrent falls. An ongoing North American study is examining compliance with the use of hip protectors in such high-risk groups [6]. However, our data suggest that these subjects may be least able to tolerate the intervention.

This compliance study was performed as part of a pilot study for a randomized controlled trial testing the efficacy of hip protectors. As we felt that informed consent was a necessary pre-requisite for such a trial, we excluded subjects who were mentally unable to provide such consent. This led to exclusion of approximately 50% of potential study subjects. These mentally and physically infirm elderly women would be expected to have a greater incidence of hip fracture than their fitter counterparts and therefore to benefit to a greater extent from the use of hip protectors. Once the efficacy of hip protectors has been established, compliance among frail elderly subjects may be greater than among more healthy old people.

The study was not large enough to examine the effectiveness of the hip protectors and was not designed as such. Eight falls on the greater trochanter occurred in the treatment arm and one in the control group. The incidence of hip fracture following a fall is only around 1% and therefore one would not necessarily have expected one of these falls to result in fracture. Nevertheless it is encouraging that no fractures were seen.

In summary, this study has demonstrated that around 50% of elderly rest home residents would agree to a trial of hip protectors in order to prevent hip fracture and that one-third of women agreeing to do so and fitted with the protectors (19% overall) would continue to use them for a period of 3 months. As hip protectors constitute a primary preventive device, such a low level of use must cast doubt on their usefulness at population or programme level. However, concordance might be doubled by modification of the pad and undergarment to improve their fitting and reduce the discomfort associated with the protector. Hip protectors, if worn, represent a relatively inexpensive, immediate and safe means of reducing hip fracture incidence in elderly people. Modifications to the undergarment and protector have already been initiated and further research into the efficacy of the new devices is urgently required.

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Key points

- External hip protectors have been developed which reduce the risk of hip fracture following a fall.
- The compliance with these protectors has been examined in a sample of elderly rest home residents.
- Three-month compliance with these devices is 30%.
- Compliance could be substantially increased if the pads and undergarments were modified to enhance their fit and reduce the discomfort associated with their use.

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