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Research letters

What predicts compliance rates with hip protectors in older hospital in-patients?

SIR—In England, over 200,000 patients fall in hospital each year, of whom over 530 are likely to suffer a hip fracture [1]. Evidence suggests a role for hip protectors in reducing hip fracture rates in institutions, specifically in care homes [2]. There is no evidence on whether hip protectors are effective in reducing hip fracture rates in hospitals.

Compliance problems have been widely reported in the literature, with discomfort frequently identified [3–6]. In care-home studies, where good compliance has been demonstrated, researchers have suggested that key factors include dependence on nursing staff [7] use of a structured teaching programme [8] and staff motivation [9]. Lack of standardisation in measuring compliance has complicated comparison between studies [6]. Compliance rates in care-home studies of 24% [10, 11], 28% [5], 50.3% [12] and 80% [8, 9, 13], have been reported.

Little research on compliance has been carried out in a hospital environment. A recent study by Haines et al. [14] reported that approximately half of the patients at high risk of falls wore hip protectors for at least 12 h per day. However they also found that hip protectors reduced patient independence in toilet use.
Research letters

Aims

To identify the compliance rate that can be achieved in hospitals and to explore the factors that have an impact on uptake and compliance with hip protectors.

Subjects and setting

The study was carried out on six rehabilitation wards for older people, at King’s College Hospital, London. All subjects were from the intervention arm of a randomised controlled trial looking at the use of hip protectors in hospital. Subjects were selected from older in-patients who were judged with the help of the STRATIFY tool to be at risk of falling in hospitals [15].

Method

Patients were excluded if their size was outside the usual size range of hip protectors, or when they were immobile, or had uncontrolled incontinence, bilateral prosthetic hips or wounds over the greater trochanter.

Patients received standard falls prevention advice plus two Safehip hip protectors, an individually tailored education programme and encouragement to wear hip protectors, which were delivered by the project nurse. They were asked to wear their hip protectors day and night. The project nurse also provided staff-training sessions.

Compliance was measured by a tick chart completed daily, by the patient or by the nurse. The project nurse also visited them up to four times per week to provide encouragement and to assist with the compliance monitoring. Overall compliance was defined as: Number of sessions where hip protectors were actually worn divided by the total number of sessions that hip protectors were prescribed to be worn (1 session = morning, afternoon or night).

Additional data were collected: cognitive function Abbreviated Mental Test (AMT) [16], physical function Barthel score) [17] and final discharge destination. The project nurse assessed the patient’s ability to fit their hip protector garments, and recorded the amount of teaching input that each patient received. On completion of the intervention, patients were interviewed about any reasons for not wearing their hip protectors. They took their hip protectors home and were offered a follow-up appointment for not wearing their hip protectors. They took their hip protectors home and were offered a follow-up appointment for not wearing their hip protectors.

Data were entered on the SPSS software and statistical analysis was carried out using descriptive statistics, linear and logistic regression.

Ethical approval

The King’s College Hospital Research Ethics Committee approved the study.

Results

Seventy-six patients completed the intervention. Their characteristics and outcomes are shown in Table 1. During the study, 24% of all hip protectors that were issued to patients were lost in hospital. Eleven patients lost both hip protector garments, and 14 patients lost one garment.

Univariate analysis of the data (Table 2) identified four factors as significant predictors of compliance with hip protectors: independence in fitting hip protectors; female gender; shorter length of time in the study (i.e. issued with hip protectors for a shorter period of time); discharge destination home rather than to institutional care.

On multivariate analysis, female gender (B 16.82, t 2.12, P<0.05) and independence in fitting hip protectors (B 23.47, t 3.49, P = 0.001) remained significant.

Patients most frequently cited discomfort (37%), lost hip protectors (22%), and laundry problems (25%) as reasons for not wearing their hip protectors in hospital.

### Table 1. Characteristics and outcomes of subjects

<table>
<thead>
<tr>
<th>Variable</th>
<th>98</th>
<th>11</th>
<th>11</th>
</tr>
</thead>
<tbody>
<tr>
<td>Allocated to intervention</td>
<td>1.09</td>
<td>0.09</td>
<td>0.09</td>
</tr>
<tr>
<td>Withdrew consent</td>
<td>1.09</td>
<td>0.09</td>
<td>0.09</td>
</tr>
<tr>
<td>Died/discontinued by project nurse</td>
<td>1.09</td>
<td>0.09</td>
<td>0.09</td>
</tr>
<tr>
<td>Completed intervention</td>
<td>1.09</td>
<td>0.09</td>
<td>0.09</td>
</tr>
<tr>
<td>Age–mean (73–101, SD 7.6)</td>
<td>1.09</td>
<td>0.09</td>
<td>0.09</td>
</tr>
<tr>
<td>Male</td>
<td>1.09</td>
<td>0.09</td>
<td>0.09</td>
</tr>
<tr>
<td>Female</td>
<td>1.09</td>
<td>0.09</td>
<td>0.09</td>
</tr>
<tr>
<td>Length of stay–mean</td>
<td>1.09</td>
<td>0.09</td>
<td>0.09</td>
</tr>
<tr>
<td>Barthel score on admission–mean</td>
<td>1.09</td>
<td>0.09</td>
<td>0.09</td>
</tr>
<tr>
<td>AMT 6 (1–10, SD 3.0)</td>
<td>1.09</td>
<td>0.09</td>
<td>0.09</td>
</tr>
<tr>
<td>Compliance rates:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Overall average compliance rate</td>
<td>1.09</td>
<td>0.09</td>
<td>0.09</td>
</tr>
<tr>
<td>Daytime compliance</td>
<td>1.09</td>
<td>0.09</td>
<td>0.09</td>
</tr>
<tr>
<td>Night-time compliance</td>
<td>1.09</td>
<td>0.09</td>
<td>0.09</td>
</tr>
<tr>
<td>58% (range 0–100, SD 32)</td>
<td>1.09</td>
<td>0.09</td>
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<td>58% (range 0–100, SD 32)</td>
<td>1.09</td>
<td>0.09</td>
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</tr>
<tr>
<td>23% (range 0–100, SD 33)</td>
<td>1.09</td>
<td>0.09</td>
<td>0.09</td>
</tr>
</tbody>
</table>

SD = standard deviation

### Table 2. Univariate analysis of determinants of compliance

<table>
<thead>
<tr>
<th>Variable</th>
<th>Adjusted R²</th>
<th>B</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Independence in fitting hip protectors</td>
<td>0.14</td>
<td>23.81</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>Female versus male</td>
<td>0.05</td>
<td>18.43</td>
<td>&lt;0.03</td>
</tr>
<tr>
<td>Length of time in project (log)</td>
<td>0.04</td>
<td>6.82</td>
<td>&lt;0.05</td>
</tr>
<tr>
<td>Discharge destination (home versus care home)</td>
<td>0.08</td>
<td>20.62</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>Number of teaching sessions</td>
<td>−0.01</td>
<td>−0.59</td>
<td>NS</td>
</tr>
<tr>
<td>Total duration of teaching sessions</td>
<td>0.03</td>
<td>0.92</td>
<td>NS</td>
</tr>
<tr>
<td>AMT</td>
<td>0.03</td>
<td>2.33</td>
<td>NS</td>
</tr>
<tr>
<td>Age</td>
<td>−0.01</td>
<td>−0.17</td>
<td>NS</td>
</tr>
<tr>
<td>Barthel on admission</td>
<td>−0.02</td>
<td>0.72</td>
<td>NS</td>
</tr>
<tr>
<td>Length of stay (log)</td>
<td>0.02</td>
<td>−0.16</td>
<td>NS</td>
</tr>
</tbody>
</table>

Adjusted R² = adjusted coefficient of determination, B = regression coefficient, P = P-value
cited reasons included being unwell (6%), body image (1.2%), lack of assistance (3.6%) or confusion (2.4%).

Two weeks after their discharge, 27 patients (35%) attended a clinical follow-up. Of these patients, 11 were wearing their hip protectors.

Discussion

This study found that while hip protectors were worn on an average of 58% during the daytime, there was poor compliance at night. Our patients frequently complained of discomfort caused by the protective shells that form the hip protection. This is a similar finding to Haines’ study [14] although a different method of calculation of compliance was used.

Patient independence in fitting their hip protectors was a key factor in achieving compliance. These patients were likely to be motivated and engaged with rehabilitation, and less reliant on the staff for prompting and for assistance with toilet access. They were also more likely to be discharged home, which would account for the statistical effect of discharge destination in the univariate analysis. This finding reflects a key difference from the more passive compliance of a dependent care-home population, that has been suggested by O’Halloran’s study [7].

Women were more likely to comply than men. We suggest that this may be partly explained by the design of the male garment. Hip protector design requires the garment to be close fitting in order to keep the pads or shells correctly positioned over the greater trochanter. Some of the frail male patients had difficulty coping with the use of urinal bottles because of this.

We found an inverse relationship between the length of time in the study and compliance, which was a similar finding to some care-home studies [5, 8]. This might be due to motivational factors associated with longer length of stay, but lost garments were also likely to contribute to this trend in hospital as they could not always be replaced for financial reasons.

Although the study was not powered to analyse whether hospital hip protector use predicts use after discharge, our observation confirmed that at least 11 patients (14.5%) were still wearing them at 2 weeks post-discharge.

The hospital as an institutional setting presented numerous barriers to compliance. Laundry was a problematic issue throughout as many of the hip protectors that were sent for the general laundry were not returned. Use of a washing machine on the ward still resulted in difficulty in achieving a fast enough turn-around of garments. Locker space for patients to store clean or soiled hip protectors was limited. There was also a major organisational change during the study period, with relocation of the wards in which the study was based, and in the dispersal of staff who had been trained in the use of hip protectors.

This study highlights the enormity of the challenge in trying to achieve compliance with the use of hip protectors in the hospital setting. Compliance rates of 58% compare favourably with other studies but this rate was highly dependent on the involvement of the project nurse. Lower rates of compliance are likely without the project nurse’s involvement unless the intervention is driven from within the ward and perceived to be a priority for staff and patients alike.

Key points

• This study demonstrates a compliance rate with hip protectors comparable to other trials in residential and hospital facilities.
• It identifies two significant predictors of compliance (female gender, and independence with using hip protectors).
• Control of institutional factors such as laundry use, storage and tracking of hip protector garments is necessary to avoid wastage due to loss and improve compliance.

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Conflicts of interest

None.

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References

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