Does place of residence influence hospital rehabilitation and assessment of falls and osteoporosis risk following admission with hip fracture?

SIR—Hip fractures account for approximately 80,000 hospital admissions per annum in the United Kingdom [1] with numbers predicted to rise steeply in the coming years [2–5]. Nursing home residents contribute to around a quarter of these, reflecting this population’s increased level of frailty [1].

The Scottish Hip Fracture Audit (SHFA) Rehabilitation Report 2007 has shown that median length of hospital stay for patients admitted from care homes was 10 days compared with 27 days for patients admitted from their own homes [6]. This difference may represent easier discharge processes for those returning to a care home compared with patients who have to wait for the arrangement of increased community social services. It may also reflect the considered opinion of the multi-disciplinary team that individual care home patients have limited rehabilitation potential and therefore merit speedy hospital discharge. However, it also raises the possibility that care home residents have less access to the normal pathways of rehabilitation post hip fracture compared with patients admitted from their own homes.

The aim of this analysis was to use the latest SHFA data to determine whether place of residence is associated with a difference in access to comprehensive rehabilitation, including falls and osteoporosis risk assessment, in patients admitted with a hip fracture. We also wanted to see if there is any difference in mobility between groups.

Methods
This was a time-limited ‘sprint audit’ using the SHFA methodology (please see Appendix 1 in the supplementary data on the journal website http://www.ageing.oupjournals.org/). All patients with a hip fracture who were admitted to 20 of the 21 Scottish mainland hip fracture operating hospitals between 1st April and 30th September 2008 were included. Information regarding patient mobility at the 120-day follow-up, was available for a subgroup, namely those admitted from April to July in 17 hospitals. A full report on the sprint audit was published in 2009 [7].

References

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Mean age (years) 78 85 Mann–χ
Female 74 80
Dementia history 12 80
Treated conservatively 1 4
Documented previous fragility fracture\(^a\) 35 43
On previous bone medications 22 31
Surgery authorised with adults with incapacity 13 83
Delirium in acute orthopaedics wards 17 7
Delirium in rehabilitation wards\(^a\) 12 6
Geriatrician’s review in acute orthopaedics wards 47 40
Geriatrician’s review in rehabilitation wards\(^a\) 80 80
Other physician’s review in acute orthopaedics wards 24 15
Other physician’s review in rehabilitation wards\(^a\) 20 16
Discharged via a rehabilitation unit 55 18

\(^{a}\)Excludes 128 patients admitted from their own homes and 100 patients from care homes whose history of previous fragility fractures was unclear.

\(^{\ast}\)n = 801 for own home patients and n = 70 for care home patients as not all patients followed through to rehabilitation settings.

Analysis

Proportions were compared using \(\chi^2\)-tests with continuity correction throughout. \(P\)-values <0.05 were considered statistically significant. Analyses were performed using SPSS version 17.0.

Results

Data from acute orthopaedic care were received for 2,708 patients; 70% were living in their own home, 19% in care homes and 11% in other locations (for example another hospital unit). This represented 97% of all hip fractures presenting to the 20 hospitals during the 6-month audit period. Of the 1,225 (45%) patients whom were subsequently transferred to a rehabilitation environment, data collection was less complete (1,012 patients, 83% of those transferred) resulting in a small underestimation of overall care in the analyses that follow.

Deaths were excluded (7.8% care homes, 6.1% own homes) from further analyses because they may not have received full treatments as intended prior to death.

Rehabilitation and functional outcomes

Care home residents were less likely to be discharged through rehabilitation services, that is to say they usually returned directly to their care home from the acute orthopaedic wards (Table 1).

Comparing functional outcomes at 120 days post hip fracture, overall 56% (334/594) of own home patients who walked unaccompanied with no aids prior to fracture returned to this mobility at 120 days compared with only 22% (18/83) of care home residents (logistic regression controlling for age, sex and American Society Anaesthesiologists (ASA) co-morbidity grade, odds ratio = 0.34 95%; CI = 0.19–0.61, model improvement \(\chi^2 = 14.6\) with 1 df, \(P < 0.001\). In those patients that walked unaccompanied with two sticks or a frame prior to fracture, 63% (93/148) of own home patients and 28% (10/36) of care home patients returned to this level of mobility at 120 days post fracture (logistic regression controlling for age, sex and ASA comorbidity grade, odds ratio = 0.21, 95% CI = 0.09–0.49, model improvement \(\chi^2 = 14.3\) with 1 df, \(P < 0.001\)).

Falls and osteoporosis risk assessment

Using the data available, we have analysed some aspects of what would constitute a comprehensive falls assessment [1]. Two thousand and one hundred and thirty-two (94%) of the total 2,274 patients had documentation of a fall of which only 564 (26%) were attributed to medical causes by the clinical team caring for the patient. Care home residents were significantly less likely to have the place or activity of fall documented; this difference was more marked in the acute orthopaedics case notes compared with rehabilitation (Table 1).

Cognition and postural blood pressures were infrequently measured, especially in care home residents and in acute orthopaedics wards. Other parameters including electrocardiogram (ECG) were more widely performed. However, care home residents were significantly less likely to be seen by physiotherapists or occupational therapists in both acute orthopaedics and rehabilitation settings, or have nursing care plans and nutritional assessments performed (Table 2).

More care home residents had a previous fracture history (care home 43% versus 35% own home; \(\chi^2, P = 0.004\). On discharge, they were less likely to have newly prescribed bone health medications (Table 2).
Discussion

In this study, the proportion of hip fracture patients accessing rehabilitation units, receiving falls and osteoporosis risk assessment, and returning to previous levels of mobility was different depending on place of residence. Care home residents had a shorter length of stay and were more likely to be discharged directly from the acute orthopaedic wards rather than move to a rehabilitation setting. This may reflect their limited rehabilitation potential given the high prevalence of dementia in this group (80%). For patients who were mobile pre-fracture, care home residents were also less likely to return to this functional level at 120 days after adjustment for case mix. This raises the concern that many have not fulfilled their rehabilitation potential before discharge. The timing of discharge may be appropriate but depends on access to early discharge support services and ongoing multi-disciplinary health professional involvement in the community, both of which have been shown to improve outcomes post hip fracture [8–10].

Care home patients were less likely than those living at home to have a comprehensive falls assessment. Nevertheless, differences between groups were modest for some parameters. Cognition was measured in around a third of all patients in the orthopaedic wards which may have led to an under recognition of delirium and dementia, both common in hip fracture patients [1]. Hip fracture patients achieve only half their recommended daily energy, protein, vitamins and minerals) may reduce the risk of death or complications [12]. Yet a nutritional assessment was omitted in 41% and 27% of care home and own home patients, respectively. Whilst nearly everyone received a physiotherapy review, occupational therapy (OT) assessment was most different between groups (25% of care home versus 91% of own home). There is no current evidence demonstrating fracture reduction following OT intervention although environmental modification has been a

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Table 2. Falls and fracture assessments

<table>
<thead>
<tr>
<th>Patient variables</th>
<th>Own home (%)</th>
<th>Care home (%)</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Place of fall documented:</td>
<td>On acute orthopaedics wards</td>
<td>95</td>
<td>89</td>
</tr>
<tr>
<td>Activity of fall documented:</td>
<td>On acute orthopaedics wards</td>
<td>85</td>
<td>79</td>
</tr>
<tr>
<td>Electrocardiogram (ECG):</td>
<td>On acute orthopaedics wards</td>
<td>100</td>
<td>99</td>
</tr>
<tr>
<td>Nursing or Allied Health Professional falls assessment documented:</td>
<td>On acute orthopaedics wards</td>
<td>43</td>
<td>34</td>
</tr>
<tr>
<td>Cognition measured:</td>
<td>On acute orthopaedics wards</td>
<td>34</td>
<td>33</td>
</tr>
<tr>
<td>Nutritional assessment:</td>
<td>On acute orthopaedics wards</td>
<td>60</td>
<td>54</td>
</tr>
<tr>
<td>Lying/standing blood pressures measured:</td>
<td>On acute orthopaedics wards</td>
<td>8</td>
<td>2</td>
</tr>
<tr>
<td>Physiotherapy review:</td>
<td>On acute orthopaedics wards</td>
<td>99</td>
<td>94</td>
</tr>
<tr>
<td>Occupational Therapy review:</td>
<td>On acute orthopaedics wards</td>
<td>78</td>
<td>19</td>
</tr>
<tr>
<td>Environmental visit:</td>
<td>In acute orthopaedics wards</td>
<td>13</td>
<td>1</td>
</tr>
<tr>
<td>Home visit (with patient):</td>
<td>In acute orthopaedics wards</td>
<td>9</td>
<td>3</td>
</tr>
<tr>
<td>Prescribed new bone medications:</td>
<td>In acute orthopaedics wards</td>
<td>31</td>
<td>27</td>
</tr>
</tbody>
</table>

*Patients already awaiting a DEXA prior to their admission to acute orthopaedic care.
Joint orthopaedics and geriatrics medicine working would seem inappropriate to accept that early discharge of hip fracture patients to a nursing home without attempting to review falls risk is adequate care.

We already know that fracture incidence is the highest in care homes [1, 15, 16] and that following first fracture; nursing home residents have a significantly greater risk of second fracture [17]. It was particularly concerning that although 43% of care home individuals had reported a previous fracture, only 31% were on bone health medication on admission to hospital. There is good evidence including a recent Cochrane review [18] as to the efficacy of bisphosphonates in secondary prevention of fractures. However, oral bisphosphonates are often poorly tolerated or contraindicated in older persons particularly with cognitive impairment. Recent studies have shown that intravenous bisphosphonates offer a viable alternative [19]. In our study many patients in both groups were discharged to their discharge destination without initiation of new bone health medication, although this may have been addressed through outpatient fracture liaison services.

The recent guidance issued by the British Orthopaedic Association and British Geriatrics Society—the ‘Blue Book’, reports the current evidence base for a coordinated approach to surgical care, falls assessment, bone health services and rehabilitation of patients from admission through discharge following a hip fracture [1]. Such an approach would ensure that even the frailest care home patients would receive a specialist geriatrician review on the acute surgical wards and is supported by a variety of other published guidelines [8, 20–22].

Our data showed that many of the observed differences in practice were more marked in orthopaedics versus rehabilitation wards. Earlier involvement of geriatricians may ensure all patients receive a comprehensive assessment of risk and rehabilitation potential, but needs further evaluation.

**Key points**

- Nursing home residents admitted to hospital with hip fracture were less likely to receive a comprehensive assessment of falls and osteoporosis risk compared with those admitted from their own homes.
- Rehabilitation opportunities were also fewer for nursing home patients.
- Previously mobile care home patients were less likely to return to pre-admission levels of function at 120 days post fracture (after adjustment for case mix).
- Joint orthopaedics and geriatrics medicine working would improve care of older hip fracture patients in hospital.

**Supplementary data**

Supplementary data mentioned in the text is available to subscribers in *Age and Ageing* online.

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**Conflicts of interest**

None declared.

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**References**

Postural sway velocity predicts osteoporotic fracture in community-dwelling elderly Japanese women: the Muramatsu Study

SIR—Impaired balance is an independent risk factor for falls. Studies have shown that tests of postural sway identify elderly people who recurrently fall [1–4]. Thapa et al. [2] demonstrated that falls are more frequent with increasing postural sway in ambulatory nursing home residents. Furthermore, Melzer et al. [3] proved higher measures of postural sway in fallers than non-fallers in community-dwelling elderly populations. In contrast, less evidence exists on whether a test of postural sway can usefully predict fractures in the elderly. Some epidemiologic studies have addressed this issue [5–7]; however, these studies either did not conduct sufficient statistical adjustment for potential confounders or did not evaluate postural sway velocity in a precise manner. For these reasons, more evidence is needed to establish such an association. This study aimed to clarify the association between postural sway and incident fractures in community-dwelling elderly women.

Subjects and methods

Participants

A total of 769 women aged 69 years and over, living in Muramatsu, Japan, participated in this study. All participants were ambulatory and non-institutionalised. Of the 769 subjects, 767 were followed for up to 6 years and comprised the Muramatsu cohort. Written informed consent was obtained from all subjects. This study was approved by the Ethics Committee of Niigata University School of Medicine.

Measurements

The baseline study, conducted between May and June 2003, included assessment of postural sway, bone mineral density (BMD), biochemical measurements and an interview. Standing postural sway was evaluated by measuring gravity-centre sway. Subjects stood in the Romberg position [8] on a gravicorder (GS-10, Anima, Inc., Tokyo, Japan) [9]. Subjects stood for 30 s while looking at a round mark (3 cm in diameter) placed 2 m in front of their eyes. Researchers ensured that the subjects looked at the mark during all measurements. The velocity of locus of gravity-centre sway (postural sway) was recorded. Grip strength was measured with a digital hand dynamometer (T.K. K.5401, Takei Scientific Instruments Co., Ltd, Niigata, Japan), once each for both hands, and an average value was calculated. Body mass index (BMI) was calculated by

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