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Hip fractures after falls in hospital: A retrospective observational cohort study

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ABSTRACT

Objectives: To compare the prevalence and characteristics of hip fractures sustained after inpatient falls (hospital subgroup) to those presenting with a fall in the community (control group).
Design: Retrospective observational cohort study.
Setting: University teaching hospital.
Participants: 5879 hip fractures occurred over an 8-year period, 327 of these took place after a fall as a hospital inpatient.
Outcome measures: Comparison of 30-day and 1 year mortality, co-morbidities, length of post-fracture hospital stay, specific complication rates and cognitive function between the hospital and control group. Other specific data on those falling in hospital was also collected.
Results: There were significantly higher rates ($p < 0.001$) of cerebrovascular, chronic obstructive airways and renal disease, diabetes, malignancy and polypharmacy in patients suffering falls in hospital. Mini-mental test scores (MTS) were also significantly reduced in this subgroup ($p < 0.001$). 30-day and 1 year mortality rates were 9% and 26%, respectively in the control group and almost double this in the hospital subgroup, being 18% and 47%, respectively (30 days, 95% CI 2.00 (1.54–2.60): $p < 0.001$; 1 year, 95% CI 2.04 (1.73–2.40): $p < 0.001$). There was no statistical difference between post-operative complications or length of stay post-fracture. 55% of falls in hospital took place on medical/geriatric wards with an additional 14% occurring on psychiatric units.
Discussion: Patients suffering hip fractures after falls in hospital are frailer with impaired cognitive function and have more co-morbidities than those suffering a fracture in the community. These patients have increased mortality, with almost 50% dead within 1 year of the fall. The majority of hip fractures after falls occur in medical or geriatric wards, but the highest risk group appears to be elderly patients on psychiatric wards. Therefore, falls risk assessment and falls prevention schemes in hospital elderly patients are of paramount importance.

Introduction

Falls in hospital occur frequently, with over 200,000 falls being reported to the National Patient Safety Agency (NPSA) in a 12-month period from September 2005 to August 2006. This resulted in direct healthcare cost to the NHS of approximately £15 million per annum.[3]

These falls may cause considerable physical harm, including fractures, soft tissue injuries, haematomas, lacerations and pressure sores due to subsequent immobility; as well as psychological distress such as fear of falling and humiliation.[8] In addition, such events also have a significant emotional impact on relatives and this may lead to problems such as complaints and occasionally litigation.

The elderly are at risk of hip fracture after a simple fall and the NPSA estimates that 530 patients suffer hip fractures each year following falls in hospital.[3] However, they do not provide precise figures and there is no data on the outcome of this injury.

Hip fractures are a very common occurrence in the ageing population, with an annual incidence of 86 per 100,000 in the UK.[10] It is a serious event in an elderly patient with a 30-day mortality of 11.7% and a 1-year mortality of 30%.[2] To our knowledge, there have been no studies that specifically look at the subgroup of patients who suffer hip fracture following a fall in hospital in the UK. We can find only one small study, from Australia, that has considered this group of patients.[5]

The aim of this study is to ascertain the cause of falls in hospital that result in hip fracture and evaluate the outcome in this group of patients.

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Methods

The setting of the study was the Queens Medical Centre (University Hospital), Nottingham, serving a catchment area of approximately 750,000 patients. All patients who suffered hip fractures between 1st May 1999 and 30th April 2007 were entered prospectively into an audit database. Information on these patients was collected at time of admission by independent audit clerks with a standard proforma to record various details, such as patient demographic factors, prior co-morbidities, length of post-fracture stay and post-operative complications.[9] Database management ensured patient anonymity and confidentiality and fully complied with Caldicott principles.[1]

During the 8-year study period, 5879 patients over 65 years of age suffered a hip fracture and of these, 357 were initially identified as suffering hip fractures in hospital. However, 25 patients were admitted to medical/geriatric wards with an occult fracture that was identified later and 5 of these patients were excluded, as they were visitors, not patients. Thus, the total number was 327 (5.6% of total hip fractures).

Each of these patients' medical and nursing notes were reviewed to ascertain additional information, including the reason for admission, type of hospital and ward, circumstances of fall, if they were supervised whilst falling and if they had been passed safe to mobilise independently.

Other factors reviewed in these patients were medications taken prior to fall (antihypertensives and sedatives using drug charts), evidence of previous falls and documented fragility fractures (wrist/hip/vertebral) in the past.

Subsequently, a multivariate analysis of outcomes was carried out comparing patients suffering hip fracture whilst in hospital with those suffering hip fracture after falls in the community. Outcomes measured were 30-day and 1 year mortality, length of post-fracture hospital stay and specific complication rates. Mortality rates were ascertained by cross-referencing data with the Office of National Statistics to identify all patients who died following discharge. Cognitive function, measured using the mini-mental test score (MTS), was also compared between the two groups.

Statistical analysis of the results was undertaken to compare outcomes of both groups of patients using Microsoft® Access and Statistical Package for the Social Sciences (SPSS) version 14.0.

We also estimated the economic impact of these fractures based on previous financial work carried out in the same hospital and department.[4]

Results

The results demonstrated significantly higher rates of cardiovascular, cerebrovascular, chronic obstructive pulmonary and renal disease, malignancy and polypharmacy (more than four medications) in patients sustaining hip fractures after falls in hospital (Table 1).

There was no significant difference in post-operative complication rates between the two groups (Table 2).

Cognitive function, measured using the MTS, was significantly lower in the hospital falls group (72% with MTS ≥ 7) than the control group (58% with MTS ≥ 7; $p < 0.001$).

In terms of length of hospital stay post-fracture, there was no statistical difference between the two groups, with average length of stay 23 days in the inpatient fallers and 24 days in the control group.

Mortality rates were significantly increased in those falling in hospital. At 30 days, 18% of this subgroup were dead, but only 9% of the control group had passed away (95% CI 1.538–2.596; $p < 0.001$, Fig. 1). Similarly, at 1 year, 47% of inpatient fallers were dead, compared to 26% of those in the control group (95% CI 1.731–2.399; $p < 0.001$, Fig. 2).

Of patients falling in hospital suffering hip fracture, 55% ($n = 181$) were inpatients on medical/geriatric wards and 14% ($n = 47$) had been admitted on psychiatric units. 14% ($n = 47$) of falls occurred on rehabilitation wards, 12% ($n = 39$) on surgical wards and the remaining 4% ($n = 13$) on palliative care wards (Fig. 3). Also 86% ($n = 280$) of hip fractures occurred in acute hospitals with 14% ($n = 47$) in rehabilitation hospitals.

Table 1
Co-morbidities on admission.

	% Hospital group	% Control group	χ^2	p
CVD	45.2	37.7	7.952	0.005
CVA	22.8	13.7	22.282	<0.001
COAD	25.3	16.5	18.455	<0.001
Renal disease	8.1	3.6	18.516	<0.001
Diabetes	19.4	10.0	30.869	<0.001
Rheumatoid	3.4	3.9	0.214	0.643
Parkinsons	5.3	3.2	5.036	0.025
Malignancy	21.1	10.1	41.846	<0.001
Pagets	1.1	0.6	1.787	0.181
Smoking	14.0	11.2	2.632	0.105
Steroids	4.2	2.5	3.880	0.049
Warfarin	3.1	2.6	0.383	0.536
4+ Meds	43.0	31.6	19.957	<0.001

CVD, cardiovascular disease; CVA, cerebrovascular accident; COAD, chronic obstructive airways disease.

Table 2
Post-operative complications.

	% Hospital group	% Control group	χ^2	p
Chest infection	11.8	10.0	1.223	0.269
Cardiac failure	4.5	3.0	2.471	0.116
DVT	0.8	0.7	0.065	0.799
PE	1.1	1.0	0.073	0.787
SWI	2.5	1.6	1.631	0.202
Deep infection	0.6	0.9	0.412	0.521
Haematoma	0.3	1.6	3.864	0.049
UTI	3.4	4.7	1.354	0.245
GI bleed	0.0	0.8	2.792	0.095
MI	0.8	1.5	0.967	0.325
CVA	1.7	1.1	1.253	0.263
Periprosthetic fracture	0.3	04	0.089	0.766
Dislocation	0.3	0.2	0.274	0.601

DVT, deep vein thrombosis; PE, pulmonary embolism; SWI, superficial wound infection; UTI, urinary tract infection; MI, myocardial infarction.

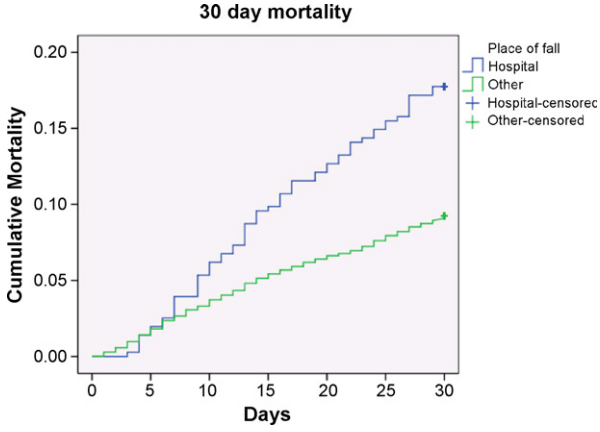

Fig. 1. 30-day mortality rates.