Inter-hospital variations in length of hospital stay following hip fracture

MARTYN J. PARKER, CHRIS J. TODD¹, CHRIS R. PALMER¹, CORINNE CAMILLERI-FERRANTE², CAROL J. FREEMAN², CLAIRE E. LAXTON², BRIAN V. PAYNE³, NEIL RUSHTON⁴

Department of Orthopaedic Surgery, Peterborough District Hospital, Peterborough PE3 6DA, UK
¹Health Services Research Group, Department of Community Medicine and ⁴Addenbrookes Hospital Department of Orthopaedic Surgery, University of Cambridge, Cambridge, UK
²Directorate of Public Health Medicine, Anglia and Oxford Regional Health Authority, Cambridge, UK
³Department of Medicine for the Elderly, West Norwich Health Authority, Norwich, UK

Address correspondence to: M. Parker Fax: (+44) 1733 874001. E-mail: mjparker@globalnet.co.uk

Abstract

Objective: to investigate differences in length of hospital stay after hip fracture.
Design: prospective survey of a consecutive series of patients admitted with an acute hip fracture and followed-up for 90 days after admission.
Setting: eight hospitals in the East Anglian region.
Subjects: 580 patients admitted with a hip fracture.
Main outcome measures: mortality, length of hospital stay, place of discharge and transfer of patients between hospitals.
Results: there was a significant difference in the median lengths of hospital stay between centres (range 13 - 28 days). A prolonged hospital stay was associated with increased age, decreased activities of daily living score and delay from surgery to mobilization. Hospitals which had a policy of transferring patients to other wards prior to discharge tended to have a longer length of hospital stay.
Conclusions: large differences in the duration of inpatient stay exist between hospitals. Centres which transferred a high proportion of patients before discharge had a longer length of stay.

Keywords: audit, hip fracture, hospital stay

Introduction

A hip fracture is the commonest reason for an acute admission to an orthopaedic ward, with a reported annual incidence of 58,970 in England for the year 1993/94 [1]. The financial burden to the health service has been estimated to be £288 million for hospital costs alone [2]. The length of hospital stay is an important and modifiable determinant of treatment costs. Previous reports have shown considerable variation (between 1 and 2 months) in length of total hospital stay [3 - 5]. We have investigated length of hospital stay and outcome for this group of patients in eight different hospitals in the East Anglian region.

Patients and methods

We audited hip fracture treatment in all orthopaedic departments in the East Anglian region to which hip fracture patients are admitted. Details for some 80 consecutive patients admitted with hip fracture to each hospital were recorded except for one hospital (number 2) where only 24 patients were admitted within the study period. The sample size of 80 per hospital was determined to allow both within- and between-hospital comparisons across important variables. Length of stay on the orthopaedic ward and any other wards before discharge was recorded for all patients. Additional details of the study methodology and results for mortality have been published previously [6, 7].

At 90 days from injury, all surviving patients were contacted and their residential status determined. For this study a patient living 'at home' included those living in a family member's house or in warden-aided accommodation. Receiving institutional care was defined as living in a residential or nursing home or already receiving long-term hospital care. Patients
who sustained the hip fracture whilst a hospital inpatient had a length of stay recorded only for that time spent on the orthopaedic ward. Patients still in hospital at the end of the follow-up period had a length of stay adjudged as 90 days and were treated as censored observations in the statistical analysis.

Statistical evaluation was conducted using SPSS for Windows 6.1. Techniques included Kruskal–Wallis one-way analysis of variance, Mann–Whitney U test and Cox's proportional hazards regression analysis [8]. The assumptions of proportional hazards were checked by noting reasonable parallelism in complementary log survival plots.

Results

The average age of patients was 80.3 years (standard deviation 10.4); 80% were female. Seventy-five percent were admitted from their own home and 25% from institutional care, 6% sustaining their fracture whilst a hospital inpatient. Of the fractures, 58% were intracapsular. There were no significant differences between the eight hospitals in the patients' mean ages, pre-injury residential status, pre-injury activities of daily living scores or number of concomitant illnesses. Treatment of 97% of patients was surgical: 56% (range between hospital 31–76%) of these operations were performed with 24 h of admission and 80% (range 47–92%) within 48 h. The average time between surgery and mobilization was 2 days (between-hospital range 1–3 days).

Table 1 details the number of patients studied and their whereabouts at the end of the 90-day follow-up period. The significant difference in mortality between centres has been previously reported [6]. The differences between centres in number of patients not discharged at 90 days (3–10%) and percentage admitted from their own homes but in residential care at 90 days (3–14%) was not significant.

Table 2 details the number and percentage of patients who were transferred from the admission ward before discharge. Figures given exclude those patients who died in the initial admission ward. The table also gives the median and mean length of hospital stay on the orthopaedic wards and the total length of hospital stay until discharge. Total hospital stay includes the days spent on any other hospital ward (including geriatric) until discharge home or to long-term institutional care. In order to demonstrate the total use of hospital inpatient days, the 13% of patients who died in hospital without being discharged and within 90 days of injury are included in the results. Figure 1 demonstrates the difference in discharge rates between the different centres.

The differences between hospitals for both median orthopaedic ward stay ($\chi^2$ 69.8, 7 d.f., $P < 0.0001$) and median total hospital stay ($\chi^2$ 44.5, $P = 0.0001$) were statistically significant. Cox's proportional hazard regression analysis of survival in hospital showed that a prolonged hospital stay was associated with increased age ($P = 0.0063$), poor pre-existing activities of daily living score ($P = 0.0002$) and delay from surgery to mobilization ($P = 0.0215$). Decreased stay was associated with admission to one of the hospitals (centre 6; $P < 0.0001$) and when the surgery involved multiple screw fixation ($P < 0.0001$). There was no association between prolonged hospital stay and whether the fracture was intracapsular or extracapsular, sex, type of anaesthesia or delay from admission to operation.

There was an association between a prolonged hospital stay and transfer of the patient to another ward before discharge ($P < 0.0002$, Mann–Whitney U). The median length of hospital stay was 23 days for centres 3, 4, 5 and 8, which transferred more than 40% of patients to other wards or departments before discharge. Centres 1, 2, 6 and 7 discharged a much higher proportion of patients directly from the orthopaedic ward and had a median length of hospital stay of 17 days.

Discussion

Studies that have previously reported mean length of hospital stay after hip fracture have produced conflicting results. Much of the difference is a result of not allowing for those patients not discharged from hospital or considering only the length of stay on the orthopaedic ward. In this study the mean total hospital stay was 29 days, but this will represent an under-estimation of the true figure as 7% of patients had not been discharged from hospital at the end of the follow-up period and their length of hospital stay was judged to be only 90 days. Quoting a median length of hospital stay overcomes the problem of the occasional patient with a prolonged hospital stay, but this figure cannot be used to determine the total use of hospital beds for hip fractures.

Many factors may contribute to the large variations in length of hospital stay demonstrated in this study. Grimley Evans and colleagues [9] compared the outcome for hip fracture patients admitted to two hospitals. There was a significant difference in mortality between the two centres, which was thought to be due to a combination of differences in the characteristics of the patients admitted and the standard of care received. Our analysis of admission characteristics did not find any significant differences for the patients admitted to each hospital for any of the variables studied. Differences in mortality and length of hospital stay in this study are more likely therefore to be due to differences in patterns of care.

Since the advent of surgical treatment for hip fracture, the length of hospital stay of these patients
Table 1. Number of patients studied at each centre and their outcome at 90 days

<table>
<thead>
<tr>
<th>No. (and %) of patients, by hospital</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
</tr>
<tr>
<td>---</td>
</tr>
<tr>
<td>Total</td>
</tr>
</tbody>
</table>

Outcome at 90 days

- **Dead**: 19 (24) 5 (21) 16 (20) 19 (24) 12 (15) 4 (5) 14 (18) 15 (19) 104 (18)
- **Not discharged**: 7 (9) 1 (4) 7 (9) 5 (6) 8 (10) 2 (3) 2 (3) 7 (9) 39 (7)
- **Discharged but readmitted**: 0 0 0 2 (3) 2 (3) 3 (4) 2 (3) 4 (5) 13 (2)
- **Discharged to same level of care**: 47 (60) 15 (63) 54 (68) 47 (59) 51 (64) 61 (75) 59 (75) 46 (59) 380 (63)
- **Discharged to residential care**: 6 (8) 3 (13) 2 (3) 7 (9) 7 (9) 11 (14) 2 (3) 6 (8) 44 (8)

*Admitted from own home

Table 2. Number of patients transferred at each hospital and median (inter-quartile range) and mean length of hospital stay

<table>
<thead>
<tr>
<th>Hospital no.</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>All</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. (and %) transferred</td>
<td>17 (25)</td>
<td>4 (19)</td>
<td>33 (47)</td>
<td>34 (52)</td>
<td>47 (61)</td>
<td>11 (14)</td>
<td>13 (18)</td>
<td>31 (46)</td>
<td>190 (37)</td>
</tr>
</tbody>
</table>

- **Time on orthopaedic ward, days (and standard deviation)**
  - **Median**: 19 (17) 16 (13) 19 (14) 15 (12) 12 (6) 12 (10) 18 (11) 14 (10) 15 (13)
  - **Mean**: 25 (17) 19 (14) 23 (13) 20 (16) 13 (6) 15 (9) 23 (17) 19 (17) 19 (15)

- **Total hospital stay, days (and standard deviation)**
  - **Median**: 24 (27) 16 (13) 28 (28) 22 (33) 23 (22) 13 (10) 20 (20) 17 (31) 20 (23)
  - **Mean**: 31 (24) 21 (20) 35 (23) 34 (26) 31 (25) 18 (17) 27 (21) 30 (26) 29 (24)
has reduced progressively [10, 11]. An average length
of stay of 2–3 weeks is now tenable. A recent survey of
616 orthopaedic surgeons' opinions found that most
preferred to transfer hip fracture patients to a geriatric
or rehabilitation ward after surgery [12]. This clinical
study however suggests that transferring patients to a
different ward may delay discharge, as time may be lost
awaiting transfer and organizing assessments and
discharge arrangements. The large difference in the
length of hospital stay between centres means that
there will be also be large differences in the cost of
treatment, since length of hospital stay is a major
determinant of this [2]. Continued audit of hip fracture
treatment should be undertaken to enable the optimum
method of treatment and rehabilitation.

Acknowledgements
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Harry Holmes, age 99, born 1897, Sheffield: “I volunteered in 1915 to an Army recruiting wagon. I was in the West Riding Regiment and was at Ypres until I was hit by a trench mortar”. © Ian Beasley.