Timely delivery of hip fracture care, a Middlemore Hospital audit

C Ushan De Silva, Hla S Tha, Delwyn Armstrong, Kathy Walker

Abstract

Introduction New Zealand (NZ) hospitals lack a centralised audit process to evaluate hip fracture care whereas UK hospitals audit hip fracture care in relation to best practice guidelines. This study sought to evaluate multiple factors in hip fracture care at Middlemore Hospital (MMH). Comparisons were made with an audit from MMH in 2008 and a multicentre UK audit.

Method A retrospective audit of patients with hip fractures was carried out at MMH between January and June 2012.

Results 120 patient charts were reviewed. In 2012, 14.2% of patients were admitted from ED within the guideline recommended period of four hours compared to 5.6% of patients in 2008. 72.5% received operative management within the guideline suggested period of 48 hours in comparison to 51% in 2008. Lack of available theatre space accounted for 51% of delays in 2008.

Conclusion There have been considerable improvements to timely delivery of hip fracture care at MMH between 2008 and 2012. However, there are ongoing delays to ward admission and operative management at our institution resulting in care that falls beyond the times recommended by international guidelines. The lack of available theatre space remains a major cause of delayed surgery. We advocate the development of a multicentre audit in NZ hospitals.

Hip fracture is the most common reason for an orthogeriatric admission, and is associated with significant morbidity, mortality and functional impairment in the elderly. Incidence of hip fracture in New Zealand is estimated at 3000-4000 cases per year and incidence worldwide is projected rise with ageing populations.

The significant disease burden of hip fractures has been well recognised internationally which has lead to the development of a number of guidelines of best practice.

The “Blue book”, published jointly by the British Orthopaedic Association and British Geriatric Society, outlines six key standards of hip fracture management (Table 1). Two of the key standards involve timely delivery of definitive treatment to hip fracture patients.

Firstly, all patients with a hip fracture should be admitted to an acute orthopaedic ward within 4 hours of presentation. Secondly, all patients with a hip fracture who are medically fit should have surgery within 48 hours of admission, and during normal working hours.

The National Hip Fracture Database (NHFD) audits hip fracture care at UK hospitals in relation to the six key standards. Currently, hospitals in New Zealand lack such a
centralised audit process, however efforts are underway to create an Australian and New Zealand hip fracture registry.

Middlemore Hospital (MMH) is a large hospital in the Auckland region which treats elderly patients with hip fractures and offers an Orthogeriatric service. However, performance of the service at our institution against international standards of best practice is unclear.

The aims of this study were to evaluate a number of factors in hip fracture care at MMH in relation to the Blue Book guidelines. We sought to compare data collected in audits performed at MMH in 2012 and 2008. We then sought to compare our figures with local data from Auckland City Hospital (ACH) published by Fergus et al and data published in the NHFD National Report 2012.

Table 1. Blue book. Six key standards of hip fracture care

<table>
<thead>
<tr>
<th></th>
<th>All patients with hip fracture should be admitted to an acute orthopaedic ward within Four hours of presentation.</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>All patients with hip fracture who are medically fit should have surgery within 48 hours of admission, and during normal working hours.</td>
</tr>
<tr>
<td>3</td>
<td>All patients with hip fracture should be assessed and cared for with a view to minimising their risk of developing a pressure ulcer.</td>
</tr>
<tr>
<td>4</td>
<td>All patients presenting with a fragility fracture should be managed on an orthopaedic ward with routine access to acute orthogeriatric medical support from the time of admission.</td>
</tr>
<tr>
<td>5</td>
<td>All patients presenting with fragility fracture should be assessed to determine their need for antiresorptive therapy to prevent future osteoporotic fractures.</td>
</tr>
<tr>
<td>6</td>
<td>All patients presenting with a fragility fracture following a fall should be offered multidisciplinary assessment and intervention to prevent future falls.</td>
</tr>
</tbody>
</table>

Method

A retrospective case review was undertaken of patients aged 65 years and over who were admitted to MMH with non-pathological hip fractures over a six month period between January and June 2012. Data was collected on age, sex, time from ED presentation to ward admission, time from admission to operation, fracture type, length of inpatient stay, and inpatient mortality. Data was collected via review of clinical notes and electronic records and entered into a purpose designed MS Access electronic database.

Comparisons were made with a previous audit performed at MMH in 2008. Local comparisons were made with a study published by Fergus et al (2011) from Auckland City Hospital (ACH) and international comparisons were made with data published in the 2012 NHFD report.

All analyses excluded patients who died prior to surgical intervention apart from mortality analysis. The study was approved by the regional ethics committee.
Results:

A total of 120 patients aged 65 and over were admitted to MMH with a hip fracture from January to June 2012. In 2012, two patients were treated non-operatively therefore were excluded from time to theatre analysis, however were included in all other analyses.

During the same 6-month period in 2008, 112 patients were admitted with hip fracture. Three patients were excluded from all analyses in the 2008 group due to pathological fractures. Two patients died prior to surgery. Therefore 107 patient charts were reviewed in the 2008 group. As shown in Figure 2, baseline patient characteristics of the 2012 and 2008 study populations were similar.

Table 2. Baseline characteristics

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>2012 (n=120)</th>
<th>2008 (n=107)</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (Mean)</td>
<td>81.8 yrs</td>
<td>82.1 yrs</td>
<td>0.844</td>
</tr>
<tr>
<td>Females (%)</td>
<td>78</td>
<td>72.9</td>
<td>0.394</td>
</tr>
</tbody>
</table>

Clinical characteristics—Clinical characteristics were comparable between the 2012 and 2008 groups. In 2012, 54% of patients suffered intracapsular fractures, whereas in 2008, 54% suffered extracapsular fractures (Table 3).

Table 3. Clinical Characteristics

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>2012 (n=120)</th>
<th>2008 (n=107)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fracture type (%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Subcapital</td>
<td>41.6</td>
<td>41</td>
</tr>
<tr>
<td>Midcervical</td>
<td>2.5</td>
<td>2.8</td>
</tr>
<tr>
<td>Intracapsular unspecified</td>
<td>7.5</td>
<td>1.9</td>
</tr>
<tr>
<td>Basicervical</td>
<td>2.5</td>
<td>0</td>
</tr>
<tr>
<td>Intertrochanteric</td>
<td>41.6</td>
<td>48.6</td>
</tr>
<tr>
<td>Subtrochanteric</td>
<td>4.2</td>
<td>5.6</td>
</tr>
</tbody>
</table>

Processes of care—The average time from presentation at the Emergency Department to ward admission in the 2012 group was 6 hours and 24 minutes with 14.2% being admitted within 4 hours. This was vast improvement from 2008 where the mean time to admission was 8 hours and 42 minutes and only 5.6% of patients were admitted within 4 hours. In the 2012 group, two patients were treated non-operatively due to significant comorbidities, resulting in 118 patients being offered operative management.

The median time from admission to theatre in the 2012 group was 27 hours with 72.5% of patients being operated within 48 hours. This is a significant improvement from 2008 where the median time from admission to theatre was 46.4 hours with only 51% of patients receiving operative management within 48 hours (Table 4).
In 2008, the lack of available operating theatre space was the primary reason for delays of more than 48 hours, accounting for 51% of delayed cases.

Table 4. Processes of care

<table>
<thead>
<tr>
<th>Measure</th>
<th>2012 (n=118)</th>
<th>2008 (n=107)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ED to ward time (Mean)</td>
<td>6 hours 24 minutes</td>
<td>8 hours 42 minutes</td>
</tr>
<tr>
<td>Admitted ≤4 hours (%)</td>
<td>14.2%</td>
<td>5.6%</td>
</tr>
<tr>
<td>Time to theatre (Median)</td>
<td>27 hours</td>
<td>46.4 hours</td>
</tr>
<tr>
<td>Operation ≤48 hours (%)</td>
<td>72.5%</td>
<td>51%</td>
</tr>
</tbody>
</table>

In 2012, the average length of stay in both the acute and rehab wards was approximately one day shorter than in 2008. However the findings were not statistically significant and there was no overall difference in total inpatient length of stay between the 2012 and 2008 groups (22.4 days vs. 22.5 days, p = 0.958).

A higher proportion of patients were admitted to AT and R (Assessment, Treatment and Rehabilitation unit) in 2012 than in 2008 (70.8% versus 61%, p=0.123). Again the findings were not statistically significant (Table 5).

Table 5. Length of Stay and AT&R Admission

<table>
<thead>
<tr>
<th>Measure</th>
<th>2012 (n=120)</th>
<th>2008 (n=107)</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean length of stay (days)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Acute episode</td>
<td>9.8</td>
<td>10.8</td>
<td>0.212</td>
</tr>
<tr>
<td>Rehab episode</td>
<td>17.8</td>
<td>19.1</td>
<td>0.528</td>
</tr>
<tr>
<td>Total</td>
<td><strong>22.4</strong></td>
<td><strong>22.5</strong></td>
<td><strong>0.958</strong></td>
</tr>
<tr>
<td>AT&amp;R admission (%)</td>
<td>70.8</td>
<td>61</td>
<td>0.123</td>
</tr>
</tbody>
</table>

Outcomes of care—In the 2012 group only one patient died as an inpatient, in comparison five patients died whilst being an inpatient in the 2008 group. Two patients in 2008 died prior to surgical intervention (Table 6).

Table 6. Mortality

<table>
<thead>
<tr>
<th>Mortality Measure</th>
<th>2012 group (n=120)</th>
<th>2008 group (n=107)</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inpatient mortality (%)</td>
<td>0.83</td>
<td>4.67</td>
<td>0.1025</td>
</tr>
</tbody>
</table>

Discussion

This audit has highlighted considerable improvement in the timely delivery of care to elderly patients with hip fractures between 2008 and 2012 at our institution.
The average time taken from ED presentation to ward admission in 2012 was 6 hours and 24 minutes, over two hours fewer than in 2008. 14.2% of patients were admitted within the Blue book guideline recommended period of four hours, an improvement from 5.6% in 2008.

The improvement in admission times may be attributed to a nationwide campaign to reduce ED waiting times, which aims to have all patients admitted or discharged from ED within 6 hours of presentation. Despite the improvement demonstrated, our institution still lags significantly behind figures reported from UK hospitals. The 2012 NHFD report quoted a figure of 51% of patients being admitted within 4 hours.

Ideally, all patients, if medically fit should be operated within 48 hours. In 2012, the median time to surgery at our institution was 27 hours. 72.5% of patients received surgery within the guideline recommended period of 48 hours. This is a significant improvement from 2008 where the median time to surgery was 46.4 hours and only 51% of patients received operative management within 48 hours.

The figures from our institution compare well other local data from a study published in 2011 by Fergus et al from Auckland City Hospital (ACH). The ACH study reported 59% of patients had received operative management within 48 hours.

Despite our institution performing well by local standards, we fall short of the figure of 81% published by the NHFD for patients receiving operative management within 48 hours.

There is evidence to show that delays to surgery are associated with increased risk of pressure sores and early surgery minimises the risk of complications such as UTI and chest infections and reduces hospital length of stay.4,7 There is however mixed evidence in the literature regarding the timing of surgery and effect on mortality.

The audit shows that delays to theatre at our institution are primarily caused by organisational factors with over half of all delays in 2008 due to a lack of available theatre space. MMH is a large hospital that houses a busy surgical service with a high demand for theatre space. Therefore hip fracture operations are often postponed to accommodate more urgent operations.

The postponement of hip fracture surgery due to theatre constraints is a common issue faced by many centres. Establishment of an operating theatre dedicated to hip fracture surgery has been proposed as a potential solution to the problem;7 however resource constraints and the erratic nature of hip fracture presentations have dampened interest in the proposal for a dedicated hip fracture theatre at MMH.

Between 2008 and 2012, there was an approximate increase of 10% in the proportion of hip fracture patients being admitted to AT and R (70.8% versus 61%). Although this increase was not statistically significant, it shows there is a growing demand for AT and R services.

The length of stay in the acute and rehab wards in 2012 were 9.8 days and 17.8 days respectively. This was similar to the figures from 2008. The average total inpatient length of stay was 22.4 days in 2012, which compares well with the figure of 28.1 days published by Fergus et al at ACH.
Secondary prevention of osteoporotic fractures is a key part of hip fracture management. Prescription of bisphosphonates was not directly measured in 2012 however data from 2008 showed that 88% of patients were discharged on bisphosphonates.

We expect similar high rates of bisphosphonate prescription in 2012 as there is an ongoing culture of regularly prescribing bisphosphonates to hip fracture patients among the clinicians in the Ortho-Geriatric Service at MMH. Our data for bisphosphonate use is comparable to local figures of 93% at ACH. Our figure compares well to data from the NHFD, which reports a bisphosphonate prescription rate of 69%. From data gathered in 2008, only a minority of patients (19.6%) who presented with hip fractures were taking bisphosphonates prior to admission.

Although data regarding previous fractures was not obtained in this audit, other studies have shown that up to 45% of patients who suffer hip fractures have had previous “signal” fractures. All elderly patients who present to hospital with fragility fractures should be assessed for anti-resportive therapy. Unfortunately many of these “signal” fractures present to services other than inpatient Orthopaedics (For example, Emergency department and fracture clinics) where the opportunity for intervention is often missed. The appointment of a fracture liaison may improve rates of secondary prevention of fragility fracture.

Although not directly measured in 2012, data from 2008 suggests that complication rates are at an acceptably low level at our institution. In 2008, there was a pressure ulcer rate of 11.2%.

In comparison, the NHFD reported a pressure sore rate of only 3.7%. However rates of other important complications such as wound infection (2.8%), re-operation (1.9%) and thromboembolism (0.0%) were low. Inpatient mortality in the 2012 group was 0.83% compared to 4.67% in 2008. The figures are comparable to local figures from ACH, which reported inpatient mortality at 5%.

There are several limitations of this study. Not all of the variables measured in the 2008 study were measured in 2012, for example bisphosphonate prescription and complications. Therefore accurate comparisons for these factors could not be made.

**Conclusion**

The audit highlights improvement at our institution in a number of facets in the care of elderly patients with hip fractures between 2008 and 2012. There has been an improvement in ED presentation to admission times, which may be a reflection of the nationwide six-hour campaign.

There has been particular improvement in waiting times for operative management. The waiting times compare well with local data however continue to lag behind guidelines of best practice and audit data from hospitals in the UK. The primary determining factor for delays to surgery is the lack of available theatre space.

Whilst marked improvements have been made since 2008, further organisational changes are required to provide timely delivery of hip fracture care at our institution.

A thorough regular audit process must be established to keep up with evolving clinical practice and organisational changes. The lack of a standardised audit makes
local and international comparisons difficult, however the launch of a trans-Tasman hip fracture registry will help to overcome this issue.

Competing interests: None identified.

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References: