IMPROVING OUTCOMES FOR PATIENTS WITH PROXIMAL FEMORAL FRACTURES

Dipal Shah and colleagues describe a set of simple changes that have led to significant benefits for patient care.

Abstract

A peri-operative bay was created to treat all patients with proximal femoral fractures admitted to one trauma ward at the Queen’s Medical Centre, Nottingham. All patients had urinary catheterisation and their fluid intake and output was recorded; patients had daily blood tests and were cared for on pressure-relieving mattresses. In addition, a study day was provided for all nursing staff on the management of patients with proximal femoral fractures. These measures resulted in a significant decrease in the incidence of acute kidney injury, reduced the length of hospital stay for patients on this ward and reduced the numbers of falls and pressure-related injuries for these patients.

Keywords

Proximal femoral fracture, neck of femur, acute bay, acute kidney injury, length of stay, pressure-related injury, nursing satisfaction

IMPROVEMENTS IN patient care often need new research, surgical techniques or drugs, but sometimes there is a more obvious answer. Making better use of available resources can help improve patient outcomes without the added costs of new treatments. This study examines how changing the organisation of a ward and increasing the awareness of nursing staff can improve patient care.

In the UK, proximal femoral fractures are a common problem. Between March 2012 and February 2013 there were nearly 61,000 proximal femoral fractures with nearly 75% of these occurring in patients over 65 years old (Health and Social Care Information Centre 2013). These patients often have a number of comorbidities, such as ischaemic heart disease, hypertension, chronic kidney disease, dementia, diabetes, which can complicate their care. Proximal femoral fractures are associated with significant mortality (10% in one month; 33.3% in 12 months), probably due to the associated comorbidities as opposed to the fracture itself (National Institute for Health and Care Excellence 2011).

An acute kidney injury (AKI) increases the length of hospital stay and increases morbidity and mortality in all surgical patients (Abelha et al 2009). Up to one third of patients presenting to hospital with a proximal femoral fracture have a degree of renal impairment (White et al 2009) and in these patients, pre-existing renal disease is the most significant factor affecting mortality (Roche et al 2005).

With the approval of the hospital management, one of the three acute trauma and orthopaedic wards in the Queen’s Medical Centre, Nottingham, was reorganised to concentrate resources on hip fracture patients in the acute peri-operative period. These wards receive adult patients with a variety of fractures, including proximal femoral fractures. The reorganised ward has 28 beds comprising four six-bed bays and four side rooms, as have the other two wards. Usually only female patients are admitted to this ward.

From February 2013, all new proximal femoral fracture patients admitted to this ward from the...
These simple changes have reduced the numbers of patient complications and help reduce length of overall hospital stay

emergency department were initially admitted to the reorganised ward. This bay was closest to the nurses’ station and a minimum of one staff nurse and one assistant were available to nurse patients 24 hours every day.

All patients underwent urinary catheterisation on admission and their fluid balances were closely monitored pre- and post-operatively.

Each patient stayed in the acute bay for 48 hours post-operatively. Then, the catheter was removed and the patient was moved to another bay on the ward. However, patients with ongoing acute medical issues stayed in the acute bay. Previously, new patients were admitted to any of the four bays as a bed became available and would stay on the same bed until discharge.

In a given bay there would be a mix of patients, including the newly admitted patients and those awaiting discharge. Other changes implemented included the use of pressure-relieving mattresses for all proximal femoral fracture patients on admission, and use of pre-operative carbohydrate drinks the evening before surgery (4 x 200ml) and (2 x 200ml) up to two hours before surgery.

To reinforce these organisational changes, a study day was provided for all nursing staff to discuss AKI, fluid balance and the management of patients with acute proximal femoral fractures. Other aspects of care remained unchanged, such as the number of doctors based on the ward, input from orthogeriatrics, and the adherence to the Department of Health (DH) best practice guidelines on hip fracture care and blood testing on patients (DH 2011, Royal College of Physicians 2010).

Table 1 Comparison of average Nottingham Hip Fracture Score and presence of chronic kidney disease on admission between the control and intervention groups

<table>
<thead>
<tr>
<th>On admission</th>
<th>Control group (n=99)</th>
<th>Intervention group (n=104)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average Nottingham Hip Fracture Score</td>
<td>10%</td>
<td>10%</td>
</tr>
<tr>
<td>Presence of chronic kidney disease (stage 3 or worse)</td>
<td>57%</td>
<td>54%</td>
</tr>
</tbody>
</table>

Method

A retrospective study was conducted that examined the outcomes of all patients with proximal femur fractures admitted to ward C5, Queen’s Medical Centre, Nottingham, during a five-month period from March to July 2013 (Table 1). Serial creatinine values were obtained from the hospital pathology electronic database for all patients between admission and discharge. These values were used to calculate incidence rates and levels of AKI, defined according to the Acute Kidney Injury Network criteria (Mehta et al 2007).

For baseline creatinine values, previous baseline creatinine values, or if there was no such record, admission creatinine values were used. Chronic kidney disease (CKD) was defined using a cut off value of the estimated glomerular filtration rate of less than 60ml/min/1.73m2 for CKD stage 3 or worse (Renal Association 2013). Other outcomes examined were length of stay in the acute hospital ward, mortality at 30 days from admission with the fracture and the incidence of hospital-acquired urinary tract infections.

We also evaluated the incidence of falls, pressure ulcers reported for the entire ward during this period and conducted a staff satisfaction survey to assess the impact on the ward as a whole. The Nottingham Hip Fracture Score (Wiles et al 2011) at the time of admission was used as a marker of frailty.

The control group comprised all patients with proximal femoral fractures who had been admitted to this ward during the same period the previous year (March to July 2012) to avoid biases due to the seasonal variation of proximal femoral fracture admissions and the variation in the training levels of the junior doctors (which is comparable between similar months year to year). The incidence of hospital-acquired culture-confirmed urinary tract infections between these two groups was compared.

An anonymised questionnaire given to a cross section of nursing staff from the ward, including healthcare assistants, ward sisters and deputies, was used to assess the impact of the changes to the staff involved. The pressure ulcer incidence rates and the rate of falls for both periods were checked by requesting the anonymised hospital DATIX incident reporting data.

Results

From March to July 2013, 104 patients with proximal femoral fractures were admitted to the reorganised trauma and orthopaedic
ward; 99 patients had been admitted to this ward the previous year and made up the control group.

The average Nottingham Hip Fracture Score was 10% in each group and both groups of patients had similar levels of CKD, stage 3 or worse, on admission (54% vs 57%, study vs controls) suggesting that the patient populations in each group were equivalent (Table 1).

In the intervention group, 11 patients had AKI, at stage 1 or greater, versus 22 patients in the control group (Table 2).

Table 3 describes the effects of intervention on the study patients. There was a 52.4% relative risk reduction in AKI incidence between the control and intervention groups, with a number needed to treat (NNT) of nine patients (NNT = 8.6, CI 4.6 – 64.7).

There were 54 patients with CKD3 or worse in 2012 out of the total of 94 patients who had previous blood test results available.

In 2013, there were 56 patients with CKD3 or worse out of a total of 103 who had previous blood test results available. The conversion rate of CKD to AKI was 11/54 in 2012 and 5/56 in 2013.

The CKD (CKD3 or worse) to AKI conversion rate was 20% (n=11/54) in 2012 and 9% (n=5/56) in 2013. In the intervention group, the number of patients reaching AKI stage 2 or stage 3 was approximately half that of the control group (n=5/104 vs n=9/99, intervention vs control, Table 4, page 22) (n=5/104 vs 9/99).

Intervention reduced the average length of stay from 18.08 days in the control group to 15.56 days, after excluding patients who died during their time in hospital (Table 5, page 22).

Table 6 (page 22) shows the average length of acute hospital stay for all patients admitted during the study period, and Table 7 (page 22) shows the average length of stay for non-survivors. The average non-standardised mortality rates for 2012 and 2013 were 8.02% (n=8/99) and 8.65% (n=9/104), respectively. After excluding patients who died in theatre recovery, there was no difference in mortality rates between the two time periods examined (6.9% vs 7%, intervention, 2013, vs. controls, 2012) (7/104 (6.7%) in 2013 and 7/99 (7%) in 2012).

The two groups had similar nosocomial urinary tract infection rates: significant bacteriuria (10^5 colony forming units/ml) identified on urine samples received between 48 hours of hospital admission until discharge was 15/99 in 2012 and 13/104 in 2013 (data not shown).

For all admissions (proximal femoral fracture and non-proximal femoral fracture patients) there were reductions in rates (n=11/342 vs n=16/310) of pressure ulcers (moisture lesions up to stage 3) and incidence of falls in hospital (n=21/342 vs n=30/310).

There were 310 admissions to C5 during that five-month period in 2012 compared to 342 admissions to C5 in the same period in 2013 (pressure ulcers 2012 = 16/310, 2013 = 11/342; falls 2012 = 30/310, 2013 = 21/342).

### Table 2 Comparison of the development of an acute kidney injury between the control and intervention groups

<table>
<thead>
<tr>
<th></th>
<th>Acute kidney injury (new or worse)</th>
<th>No acute kidney injury (new or worse)</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intervention group</td>
<td>11</td>
<td>93</td>
<td>104</td>
</tr>
<tr>
<td>Control group</td>
<td>22</td>
<td>77</td>
<td>99</td>
</tr>
<tr>
<td>Total</td>
<td>33</td>
<td>170</td>
<td>203</td>
</tr>
</tbody>
</table>

### Table 3 Correlation between intervention and development of acute kidney injury

<table>
<thead>
<tr>
<th></th>
<th>95% confidence interval</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Odds ratio</td>
<td>2.4156</td>
<td>1.1026 to 5.2920</td>
</tr>
<tr>
<td>Relative risk</td>
<td>0.4760</td>
<td>0.2437 to 0.9296</td>
</tr>
<tr>
<td>Risk reduction with intervention</td>
<td>52.4%</td>
<td></td>
</tr>
<tr>
<td>Absolute risk reduction</td>
<td>11.64% (0.1164)</td>
<td>1.55 to 21.75%</td>
</tr>
<tr>
<td>Number needed to treat</td>
<td>8.6 (1/0.1164)</td>
<td>4.6 to 64.7</td>
</tr>
</tbody>
</table>
Discussion

After the reorganisation of the ward there was a significant reduction in the development of post-operative AKI: one event of AKI for every nine patients could be prevented by caring for patients in an acute bay compared to a standard bed on the acute trauma and orthopaedic ward. The length of hospital stay was reduced by an average of two and a half days over a five-month period.

The incidence rates of adverse outcomes, such as falls and pressure sores, were reduced, suggesting that concentrating care for these patients in a particular area of the ward may improve overall care; however, in this study the mortality rates of the two groups were similar.

In this ward, the care of proximal femur fracture patients was improved using an intervention that required changes in ward organisation and staff awareness levels, but did not require significant investment.

This reorganisation was coupled with an improvement in the nursing documentation of fluid charts, judged through internal audits measuring the accuracy of completion of the fluid balance charts between 2012 and 2013.

These changes may help to explain the improvement in care, with earlier identification of renal dysfunction and a greater understanding of appropriate interventions.

Although half of the staff surveyed stated that their overall workload had increased, the levels of satisfaction at the care provided improved from an average of 7.33/10 to 9.4/10 (Table 8). All surveyed staff stated that they would recommend the changes to other wards.

The staff survey involved written anonymised responses attempting to reduce the chances of bias, although not completely eliminating such. There was no patient feedback attempted as it would not have been possible for patients to comment on what took place before their admission - when the acute bay was not set up.

However, we may have attempted indirect comparison of patient satisfaction during the two periods, which could have given some indication as to the quality of care received.

There were a number of limitations to this study. Despite reducing the incidence of AKI, there was no impact on mortality; it is possible that the relatively small sample size did not allow observation of an effect on mortality rates.

There were no described or published changes in the surgical or anaesthetic practices during this period for the management of proximal femoral fracture patients in our unit, but such techniques were not specifically analysed or reviewed.

For length of average hospital stay, it would appear logical that fewer complications following surgery would result in quicker discharge from hospital. However, the differences in community structure and rehabilitation bed availability, which could have affected lengths of hospital stay, were not assessed between 2012 and 2013.

In spite of the limitations and small sample size,
this study demonstrated the use of simple changes to significantly improve patient care. At a time when money is scarce and efficiency savings commonplace, these interventions represent an inexpensive way to improve patient care and management of acute trauma wards. These simple changes have reduced the numbers of patient complications and help reduce length of overall hospital stay. The staff involved have shown enthusiastic support for these changes.

Changing practice in an established team of nurses can be difficult. Having strong leadership on the ward and being adequately supported by the medical team helped bring about the changes. By providing staff with further education, the value and importance of key management principles in patient care can be shared by the whole team.

Table 8  Anonymised staff satisfaction survey

| How satisfied are you of the care given to hip fracture patients before and after commencing the acute bay (satisfaction level 1-10)? |
|---|---|
| Before | 7.3 mean (range 5 - 10) |
| After | 9.4 mean (range 8 - 10) |

| Has the acute bay added extra burden to your workload? |
|---|---|
| Yes | 7 |
| No | 8 |

| Would you recommend it being used on the other wards? |
|---|---|
| Yes | 15 |
| No | 0 |

References


