



ROYAL AUSTRALASIAN
COLLEGE OF SURGEONS

Risk of death

in people aged 85 years and over

who had surgery for hip fracture in 2015 and 2016



Queensland Government



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Shortened forms

IQR	interquartile range
mL	millilitres
mmHg	millimetre(s) of mercury
NOF	neck of femur
QASM	Queensland Audit of Surgical Mortality
Queensland Health	Queensland Department of Health
SD	standard deviation

Chairman's report



Very elderly patients who fall and fracture their hips, and are subsequently admitted to hospital are a vulnerable group. All of us want to do our best for them.

We often feel protective of them because of their age. Do they need an operation? Will they survive an operation? This report shows that elderly patients aged 85 years or older generally do survive an operation to deal with their hip fracture.

They all have risk factors, mostly associated with their age and other comorbidities, but with good support from the healthcare sector most do survive. Cardiovascular disease, of course, is very common at this age, and respiratory disease can also be a significant problem.

The multidisciplinary team is required in both preoperative and postoperative care delivery, and is essential for best outcomes. Orthopaedic surgery plays only a small part in overall fracture management. After careful consideration by the team members, surgery may not be deemed safe or appropriate.

Primary care, however, remains a priority and is a most important part of minimising consequences of the hip fracture pathology in this patient group. The care of the patient from place of injury and transfer to hospital and emergency department, and on to the ward is critical in minimising consequences in this group.

Although the overall picture is positive, some of these patients die. Death most commonly occurs very soon after the patient is admitted – within the first 2 days. And a third of those who die will have acquired an infection in hospital.

Recommendations are presented at the end of this document to help minimise the prospect of death following hip fracture. Arising from the data, the recommendations are actions that we consider important in keeping these vulnerable patients alive and functioning for as long as possible.

Dr John North, FRACS

QASM Clinical Director

Introduction

This report focuses on very elderly (at least 85 years of age) and vulnerable surgical patients who had a hip fracture and were treated in Queensland public hospitals during 2015 and 2016. The report includes information on the demographics of this group of patients.

In medical terminology, hip fractures are referred to as fractured necks of femur (NOF) – either subcapital, intertrochanteric or subtrochanteric fractures. Hip fractures are most commonly caused by a fall.

As life expectancy increases, more very elderly patients are undergoing internal fixation, hemiarthroplasty or total arthroplasty procedures for fractured NOF. (Internal fixation aims to insert metal nails, plates and/or screws into the hip, whereas arthroplasty refers to replacement – part or whole – of the hip joint.) Very elderly patients almost always have more comorbidities than younger patients.

This report is the result of collaboration between the Queensland Department of Health (Queensland Health) and the Queensland Audit of Surgical Mortality (QASM).

This report

This report looks at very elderly patients who were admitted to hospital with a fractured NOF in 2015 and 2016. In particular, the report examines:

- mortality and survival rates
- age and sex distribution
- comorbidities
- fall locations
- time to operation
- infection
- length of stay in hospital from injuries sustained as a result of a fall
- different actions that surgeons might have taken in cases where elderly patients died.

The report concludes with some recommendations to improve patient wellbeing and reduce risks for elderly patients who are admitted to hospital with a fractured NOF.





A very elderly patient's story

Case summary

A patient in his late 90s presented with fractured NOF and multiple comorbidities. A senior orthopaedic consultant surgeon noted severe osteoporosis on plain X-rays. A fracture was considered to be an imminent risk. In addition, the medical records indicated that he had an unstable cardiovascular status before surgery. He was noted on two separate observations to have been significantly hypotensive (with a systolic blood pressure <100 mmHg). Three days after surgery, he developed atrial fibrillation with a pulse of 113 and a left bundle branch block on the electrocardiogram.

The surgery to correct the fracture had been uneventful. After surgery, he received 80 mL/hour of intravenous (IV) fluids. The policy is for patients who are eating and drinking to avoid IV fluids if at all possible. With careful assessment and management by a specialist cardiologist, his cardiac status improved, and mobilisation began 5 days after the operation, despite the standard protocol suggesting mobilisation on the day after the operation. The patient was transferred to rehabilitation on day 10 with an expectation of his eventually going home.

Comments

The assessing surgeon said, 'There is no record showing whether his cardiac function was optimised prior to his surgery. However, in view of his unstable cardiac function, this should have been undertaken, even if it meant delaying his surgery a little longer'. Optimising these complicated patients can be difficult, but the multidisciplinary team approach is always the best option.

This was a situation in which a major operation, with relatively high expected blood loss, was semi-electively planned. The patient had multiple comorbidities and an unstable cardiovascular system preoperatively.

Early postoperative monitoring in a high-dependency unit was justified and effective in this case.

Method

This report is compiled from data from Queensland Health and the QASM. The QASM, as part of the Australian and New Zealand Audit of Surgical Mortality, provided the data on patients who died.¹ Not all questions were answered on a surgical case form (SCF), so denominators may vary throughout the report. The SCF covers all aspects of the surgical care of the patient – preoperative preparation, intraoperative management and postoperative care. The same SCF is used by all surgeons in all hospitals.

Queensland Health provided the data for inpatients in acute public hospitals relating to mortalities, transfers and complications, using the Queensland Hospital Admitted Patient Data Collection.²

The report examines all records of patients aged 85 and older who were admitted to hospital during 2015 and 2016 with a diagnosis of fractured NOF.

The principal diagnosis is the diagnosis established after the study as being chiefly responsible for occasioning the patient's episode of admitted patient care. Cases with a diagnosis of fractured NOF were included.

In this report, the patient's age is that reported at the time of death. Of those patients admitted to public hospitals with fractured NOF who had operations and lived or died, 42% were 85 years or older. Of those who did not have operations, 46% were 85 or older.



Summary of risks, contributing to mortality in patients with fractured neck of femur

AGE



Mortality after surgery **increases** with **age**

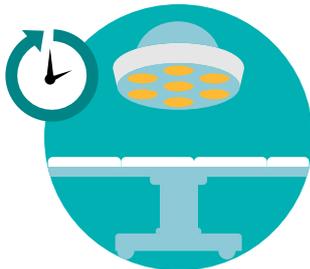
Mortality was:

6.9% in patients aged **85** plus years (169/2443)

4.4% in patents aged **75–79** years (23/521)

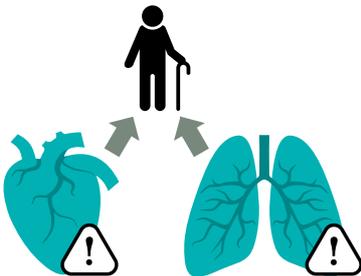
0.0% in patients aged **55–59** years (0/117)

TIME TO SURGERY



The **shorter** the time to surgery, the better the **outcome** for patients

COMORBIDITIES



Comorbidities increase surgical risk. Common comorbidities are **cardiovascular** disease and **respiratory** disease

INFECTION



Infections increase morbidity in surgical patients

One-third of patients who died of fractured neck of femur had an infection. Nearly all acquired these infections while in **hospital**



Results

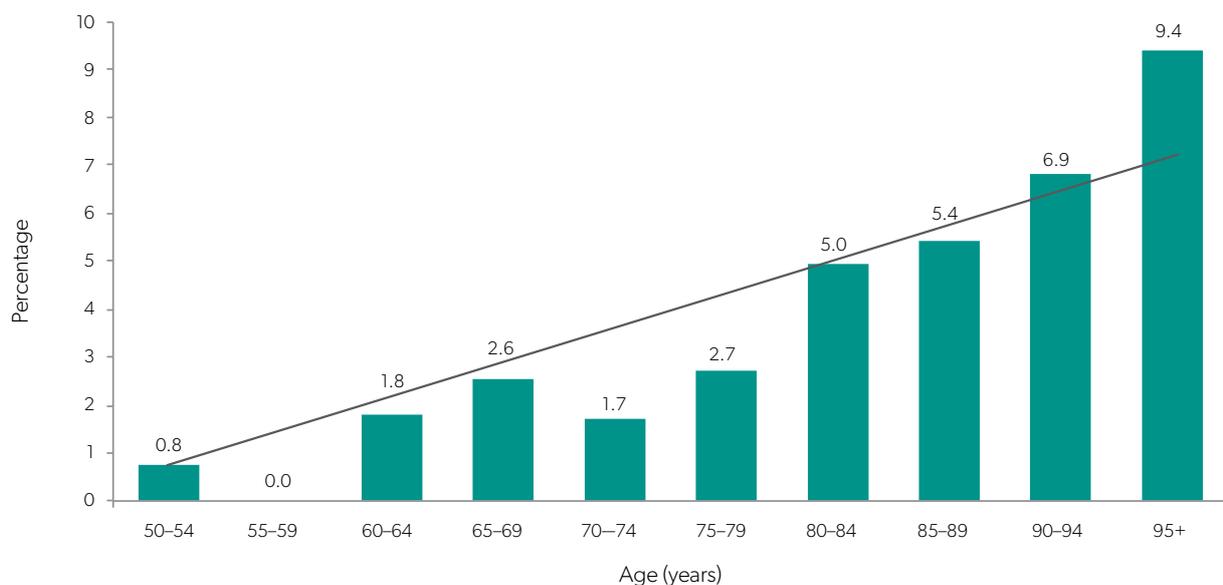
Mortality and survival rates

Queensland Health data showed that mortality after surgery for fractured NOF was higher in patients who were 85+ years than in younger patients,² although most (about 94%) very elderly patients do survive their surgical procedure.² This report does not cover those patients who were discharged from hospital, were not readmitted and died.

In 2015 and 2016, 6083 patients over 50 years of age were admitted to public hospitals in Queensland with a fractured NOF. The total number of patients admitted to Queensland public hospitals in that period was 235 485. The 6083 patients aged over 50 who were admitted with a fractured NOF accounted for 2.6% of the total inpatient population.¹

Some of the patients who had falls and were hospitalised in Queensland died in hospital after they had surgery.³ The hospital mortality rate for patients with a fractured NOF increased with age; for patients aged 85 or older, the mortality rate was 6.9%, while for younger patients between 75 and 79 years it was lower, at 4.4%. Overall in-hospital mortality for all ages over 50 years was 4.3% (209/3707).

Even in patients aged 85 years or older, most patients do well after their operations, with nearly all surviving their stay in hospital. The mortality rate for patients of this age group was 6.9% (169/2443). The survival in-hospital rate was therefore 93.7% (2607/2443; see Figure 1).



Note: $y = 0.071x$; $R^2 = 0.829$

Figure 1 Mortality after repair of fractured neck of femur in public hospital patients, by age

From QASM data, nearly all the very elderly patients who died – 95.3% (161/169; no answers in 8 cases) – had experienced a fall before admission to hospital.

In the QASM data, for patients of all ages, most falls – 59.9% (381/636) – did not result in a fractured NOF. However, the proportion of patients who did not have a fractured NOF after a fall was lower in the very elderly patients – 49.2% (156/317). Falls sometimes also resulted in other pathologies – for example, subdural haemorrhages (0.9%; 3/317).

Age and sex distribution

Age is a known risk factor in surgery, so this review focuses on very elderly patients with a fractured NOF.^{4,5} Patients selected for this review were at least 85 years of age (median age 89; range 85–102).

Queensland Health and QASM data showed that there were more females (62%; 105/169) than males (38%; 64/169) in the group of very elderly patients who died.

Comorbidities

The presence of comorbidities is a known surgical risk factor.⁶

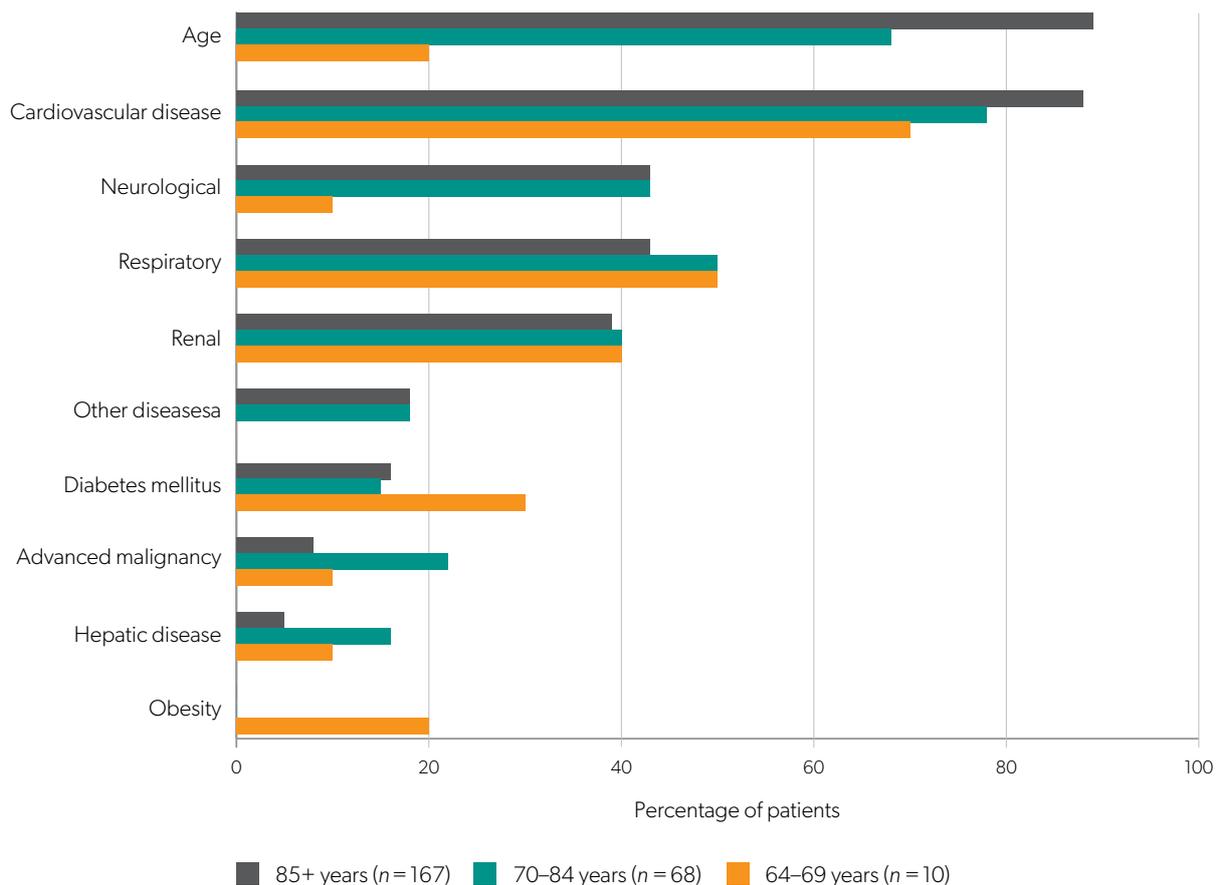
Comorbidities of the very elderly patients who died are recorded in the QASM data. The geriatric giants of polypharmacy, malnutrition, dementia, functional impairment and incontinence largely determine outcomes in older patients.

All the patients who were diagnosed with a fractured NOF for this report and underwent surgery had some level of comorbidities present.

The most common comorbidities in the very elderly patients were age (as a significant factor increasing the risk of death; 89%) and cardiovascular disease (88%) (see Figure 2 for QASM data on comorbidities). In comparison, in patients aged 70–84 years, the most common comorbidity was cardiovascular disease, but it was not as common in this age group as in the 85+ age group.

In the youngest age group (64–69 years), the most common comorbidities were cardiovascular disease (70%) and respiratory disease (50%). The numbers in this age group are very low and should be interpreted with caution.

Assessment of body mass index (BMI) to determine obesity levels in patients with fractured NOF is almost impossible because the patient is unable to stand. Unless BMI had been recorded before the fall, results are likely to be underestimates.



a 'Other' diseases in patients 85 years or older with a fractured neck of femur comprised advanced dementia (6), allergies, anaemia, autoimmune disease, breast cancer (2), cognitive impairment, dehydration, active urinary tract infection, depression, gastrointestinal bleed (2), gastro-oesophageal reflux disease, melaena, malnutrition, osteoporosis, peripheral arterial disease, severe skin condition and vascular disease.

Note: For two patients 85 years or older, no response was given to the survey question about comorbidities.

Figure 2 Comorbidities in patients with fractured neck of femur who died following surgery, Queensland public hospitals, 2015 and 2016

Fall locations

In the QASM data, fractured NOF in very elderly patients was often the result of a fall.⁷ The location of the fall that resulted in a fractured NOF was recorded for 161 patients. (For 8 people, the site of the fall was unknown.)

Most falls occurred in care facilities (50.3%; 81/161), with the average patient spending 3 years in a residential aged care facility before death.⁸ Many falls (42.9%; 69/161), according to the QASM data, happened at home, and a small number of patients (1.2%; 2/161) fell while in hospital.

Time to surgery

Many surgeons believe that the shorter the time to surgery, the better the outcome for patients with a fractured NOF.

The mode of the length of time between the admission of the patient and the start of their operation for the 169 cases in this study was 17 hours. The mode is the most common value.

The median of the length of time between admission and surgery was 25 hours (IQR 17–44). The median is the middle value. This time is well within the recommendations of the hip fracture clinical care standard from the Australian Commission on Safety and Quality in Health Care.⁹

Length of stay

Very elderly patients who died following a fractured NOF tended to die quickly. A large proportion (48.5%; 82/169) died within the first week of hospitalisation. The length of hospital stay ranged from 1 day to 208 days.

The most frequent length of stay (the mode) for patients who had hip fracture surgery was 2 days. The median was 7 days (IQR 3–13), and the mean was 12 days (SD 21.50). One patient was in hospital for 208 days (see Figure 3), but this patient had been in rehabilitation for some time.

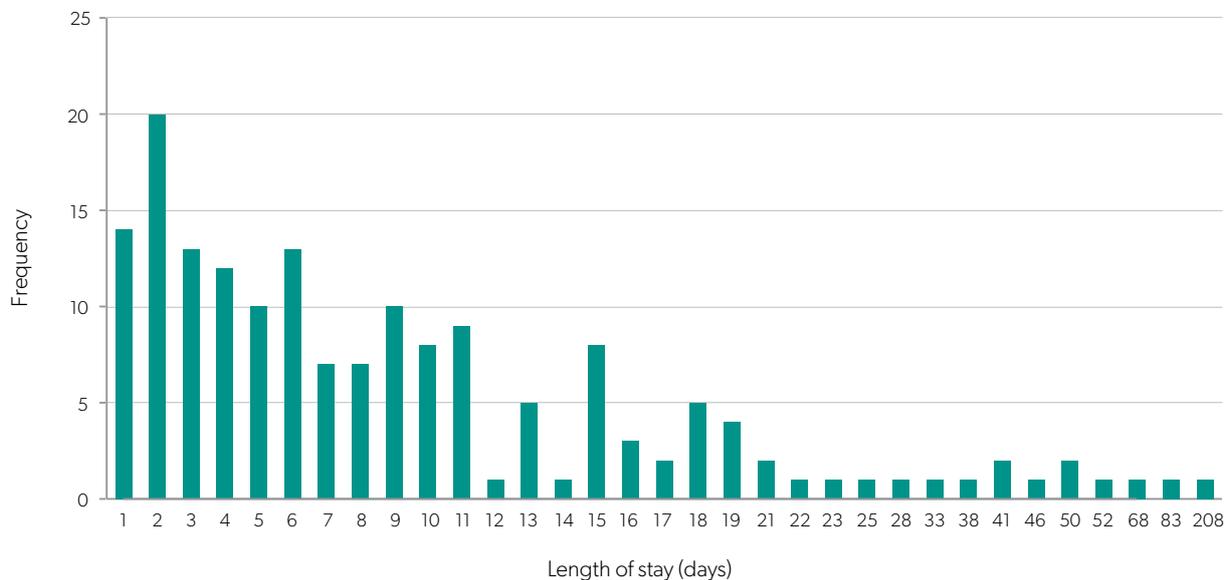


Figure 3 Length of stay in hospital for patients aged 85 years or older with a fractured neck of femur ($n = 169$)

Complications

Complications are considered predictors of death in many surgical situations. However, in the data on very elderly patients from Queensland Health, many patients had complications but did not die.

The overall complication rate in patients aged 85 or over who were not transferred to another healthcare facility was 13.1% (94/716). The death rate, even in the presence of complications, was much lower, at 1.5% (11/716). These figures suggest that many patients, even very elderly ones, can overcome their health-related challenges.

In the patients who died, looking at Queensland Health data, the reported complication rate rose incrementally with age. For patients aged 50–54 years, the reported complication rate was 8.3% (11/132). Despite this, none of this group died.

However, for patients aged 85 or over, the reported complication rate was double that of the younger cohort, at 18.3% (447/2443).

The relative risk for the older group of experiencing a complication was more than twice that of the younger group (2.20; 95% confidence interval 1.24 to 3.89 – this is statistically significant).

The relative risk of the older group for death after experiencing a complication compared with the younger group could not be calculated because there were no deaths in the younger group with complications.

Infection

The data show that infections are predictors of death in surgical patients.¹⁰ Nearly one-third of very elderly patients (31.5%; 52/165) who died having fractured their NOF also died with a clinically significant infection present.

Of those patients with infections, nearly all (91.7%; 44/48) acquired the infection during the hospital admission. There were no data on timing for two cases.

Pneumonia was the most common infection seen, comprising 74.5% (38/51) of all infections.

In some cases (10/50), the organisms that caused the infections were identified and reported. The organisms were:

- *Staphylococcus aureus* (n = 4)
- *Pseudomonas aeruginosa* (n = 3)
- *Escherichia coli* (n = 1)
- *Klebsiella pneumoniae* (n = 1)
- *Proteus mirabilis* (n = 1).

Different actions

Only 8.0% (14/169) of surgeons whose patients aged 85 or older died following surgery for fractured NOF indicated that, in retrospect, they would have done something differently in terms of the treatment provided to their patient. The different actions varied, and there was no single theme arising from the comments.

The surgeons' comments have been classified into the following groups:

- change in technical aspects of surgery
- not operate – palliate
- more supervision of junior staff
- better medical care postoperatively
- better medical care preoperatively
- better anaesthetic reviews.

Examples of their opinions included, in their words:

- Probably we shouldn't have operated – but it was a very difficult decision that was carefully considered. All members of the team, including the family, ultimately concluded that it was better to try and make her comfortable by fixing the fracture.
- Closer monitoring of bowel function.
- Ensured advance healthcare directive to avoid cardiopulmonary resuscitation being commenced when prognosis was dire.
- Ensured consultant anaesthetist was in theatre when cement was being inserted.
- I believe that choosing to operate on this patient as a palliative procedure was the right decision. This was supported by the orthogeriatrician and the anaesthetist.
- Would have investigated the drop in haemoglobin – computed tomography (abdomen).
- More use of hospital services – high-dependency unit.
- Improved timing so acute care would not be needed on weekends.

Considerations

The Hip Fracture Clinical Care Standard provides guidance to all clinicians caring for patients with hip fracture in Australia.⁹ To minimise morbidity and mortality in these patients, the Royal Australasian College of Surgeons and the QASM recommend that the following additional actions be taken for all very elderly patients who are admitted to hospital with fractured NOF.

Preoperative considerations for medical staff include the following:

- Begin 2-hourly pressure-area care in the emergency department and record all procedures followed.^{11,12} Also place the patient on a pressure redistribution mattress.¹²
- Unless contraindicated, insert an indwelling catheter in the emergency department for comfort for all patients, especially when the patient is incontinent or serious urinary odour is observed.^{13,14}
- Request pathology for
 - urine microscopy culture and sensitivity¹³
 - full blood count, erythrocyte sedimentation rate, C-reactive protein, urea, electrolytes, liver function tests, coagulation and iron studies, thyroid function tests, 25-hydroxy vitamin D, B12 and folate
 - swab of any ulcer or sore on lower limbs for culture and sensitivity
 - blood cultures if the patient is febrile and has a temperature higher than 38 °C.
- Take anteroposterior and lateral X-ray of the hip and pelvis, and a chest X-ray.¹⁴
- Notify the orthogeriatric team and anaesthetics to review the patient.
- Prescribe analgesia
 - at triage in patients with a suspected hip fracture
 - as a continuous infusion of local anaesthetic through a femoral nerve catheter.¹⁵
- Take an electrocardiogram and review it.¹⁴
- Chart current medications and analgesia, including deep vein thrombosis prophylaxis, according to local guidelines. An up-to-date medication list should be compiled by the pharmacy in the emergency department.

- Admit the patient directly to the ward if they are stable and have been cleared by the emergency department consultant.
- Ensure consultant handover of care to avoid 'lost in the ward' syndrome.
- Complete advance care planning with the patient/substitute decision maker and document the discussions.

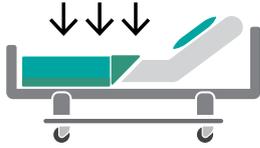
Postoperative considerations include:

- sputum culture and sensitivity if clinically appropriate
- early mobilisation WBAT (weight bearing as tolerated) – preferably day 1 postoperatively
- early removal of an indwelling catheter
- allowing patients to eat and drink as soon as possible postoperatively, and avoiding IV fluids if the patient is eating and drinking
- monitoring for
 - delirium
 - infection
 - constipation
 - urinary retention
 - pain
- whether osteoporosis secondary prevention is needed.



Summary of recommendations for elderly patients in hospital with fractured neck of femur

PRESSURE INJURIES



Begin **2-hourly pressure-area care** in the emergency department

Place the patient on a **pressure redistribution mattress**



- Elderly immobilised patients are more prone to pressure injuries

INCONTINENCE



Insert an **indwelling catheter** if the patient is incontinent or serious urinary odour is observed

- Incontinence can cause or worsen other **complications**

PATHOLOGY

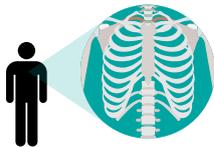


Request **pathology**:

- urine
- blood properties
- sputum
- swab of any ulcer or sore on lower limbs
- blood cultures if the patient has a temperature higher than 38 °C

- These tests can detect infection, anaemia, reduced organ function, and stressors that may **affect the outcome** of an operation

X-RAY



Chest
X-ray

- May reveal **additional injuries** such as broken ribs, or **complicating factors**, such as pneumonia



Hips and pelvis
X-ray

- May reveal **additional injuries**

MEDICATIONS



Chart current **medications** and analgesia

ELECTROCARDIOGRAM



Take an **electrocardiogram**

- Recording and reviewing the patient's progress is an essential part of responsible care

COMMUNICATION



Talk to the family and the multidisciplinary team

Admit the patient directly to the ward if they are stable and have been cleared by the emergency department consultant

Ensure appropriate consultant **handover** of care to avoid 'lost in the ward' syndrome

- Ward care contributes greatly to a patient's prognosis

ANAESTHETIC



Provide a femoral nerve catheter with continuous infusion of local **anaesthetic**

- Pain relief is important for all patients

Appendix A Data

Data sources

Data for this report were sourced from Queensland Health and the QASM. The data are limited to Queensland public hospital patients.

The two data sources were in agreement in terms of the proportion of patients who were admitted with injuries that included fractured NOF, and who subsequently died, in 2015 and 2016.

Queensland Health data cover all patients – those who die and those who do not.

QASM data are restricted to patients who died.

Definitions

The principal diagnosis is defined as the diagnosis established after study as being chiefly responsible for occasioning the patient's episode of care in hospital.¹⁶

Selection criteria

This report describes the incidence of falls-related injuries in the older Queensland population that resulted in admission to a hospital.

Period

This report is restricted to admitted patient episodes that ended in the period 1 January 2015 to 31 December 2016.

Falls cases

Falls injury cases comprised cases that met the following criteria:

- The patient was 85 years or older at admission (for Queensland Health data) or death (for QASM data).
- The principal diagnosis was fractured NOF (READ codes 4779, 29413, 24188, 24184, 24121, 29403, 24308, 49281, 49286, 49285, 49262, 49266).

Length of stay

QASM data calculated the patient days in hospital by finding the number of days between the date of admission and the date of death. In the statistical program SPSS, this is done by subtracting the two dates and rounding the fractions.

Time to operation

The times to operation in hours in QASM data were calculated by subtracting the time the patient was admitted from the time that the operation took place. This was calculated using Microsoft Excel 2010 software and IBM SPSS Statistics 24 software. Patients were excluded if either time was not recorded in the QASM data.

Appendix B Coding

Queensland Health

ICD10-AM codes used to define ‘complications’ in fractured NOF patients in Queensland Health data:

Fractured NOF patients with an external cause code of Y60.0, Y60.1, Y60.3, Y60.6, Y60.8, Y60.9, Y61.0, Y61.1, Y61.7, Y61.8, Y61.9, Y62.0, Y62.1, Y62.6, Y62.8, Y62.9, Y63.0, Y63.1, Y63.2, Y63.3, Y63.5, Y63.6, Y63.8, Y63.9, Y64.x, Y65.x, Y66.x, Y69.x, Y83.1, Y83.2, Y83.4, Y83.5, Y83.8, Y83.9, Y84.2, Y84.4, Y84.6, Y84.7, Y84.8, Y84.9 or another diagnosis code of M96.6 for any episode of care within the whole admission.

Principal diagnosis codes in Queensland Health data were S720 (Fracture of neck of femur), S721 (Petrochanteric fracture), S722 (Subtrochanteric fracture) with at least one of the following procedure codes: 4751900 (Internal fixation of fracture of trochanteric or subcapital femur), 4752200 (Hemiarthroplasty of femur), 4752801 (Open reduction of fracture of femur with internal fixation), 4753100 (Closed reduction of fracture of femur with internal fixation), 4931200 (Excision arthroplasty of hip), 4931500 (Partial arthroplasty of hip), 4931800 (Total arthroplasty of hip, unilateral).

Periprosthetic hip fractures were not included.

QASM

QASM READ codes used that were equivalent to the Queensland Health ICD10-AM codes were 4779, 29413, 24188, 24184, 24121, 29403, 24308, 49281, 49286, 49285, 49262 and 49266.

References

1. Queensland Audit of Surgical Mortality. Queensland Audit of Surgical Mortality annual report 2010–2011. Brisbane: Royal Australasian College of Surgeons; 2012.
2. Queensland Health. Queensland Hospital Admitted Patient Data Collection. <https://www.health.qld.gov.au/hsu/collections/qhapdc> (accessed 21 February 2018).
3. Sanz-Reig J, Salvador Marín J, Pérez Alba JM, Ferrández Martínez J, Orozco Beltrán D, Martínez López JF. Risk factors for in-hospital mortality following hip fracture. *Rev Esp Cir Ortop Traumatol* 2017;61(4):209–15.
4. Blommers E, Klimek M, Hartholt KA, van der Cammen TJ, Klein J, Noordzij PG. Perioperative care of the older patient. *Z Gerontol Geriatr* 2011;44(3):187–91.
5. Alcock M, Chilvers CR. Emergency surgery in the elderly: a retrospective observational study. *Anaesth Intensive Care* 2012;40(1):90–4.
6. Armitage J, van der Meulen J, Royal College of Surgeons Co-morbidity Consensus Group. Identifying co-morbidity in surgical patients using administrative data with the Royal College of Surgeons Charlson Score. *Br J Surg* 2010;97:772–81.
7. Partridge JSL, Harari D, Dhesei JK. Frailty in the older surgical patient: a review. *Age Ageing* 2012;41(2):142–7.
8. Australian Institute of Health and Welfare. Residential aged care in Australia 2010–11: a statistical overview. <https://www.aihw.gov.au/reports/aged-care/residential-aged-care-in-australia-2010-11-a-stat/contents/table-of-contents> (accessed 29 March 2018).
9. Australian Commission on Safety and Quality in Health Care. Hip fracture clinical care standard. Sydney: ACSQGC; 2016.
10. Esper AM, Moss M, Lewis CA, Nisbet R, Mannino DM, Martin GS. The role of infection and comorbidity: factors that influence disparities in sepsis. *Crit Care Med* 2006;34(10):2756–82.
11. Boyko TV, Longaker MT, Yang GP. Review of the current management of pressure ulcers. *Adv Wound Care (New Rochelle)* 2018;7(2):57–67.
12. Hamel MB, Henderson WG, Khuri SF, Daley J. Surgical outcomes for patients aged 80 and older: morbidity and mortality from major noncardiac surgery. *J Am Geriatr Soc* 2005;53(3):424–9.
13. Wendt K, Heim D, Josten C, Kdolsky R, Oestern HJ, Palm H, et al. Recommendations on hip fractures. *Eur J Trauma Emerg Surg* 2016;42(4):425–31.
14. Layzell MJ. Use of femoral nerve blocks in adults with hip fractures. *Nurs Stand* 2013;27(52):49–56; quiz 8.

15. LeBlanc J, Donnon T, Hutchison C, Duffy P. Development of an orthopedic surgery trauma patient handover checklist. *Can J Surg* 2014;57(1):8-14.
16. Australian Institute of Health and Welfare. Principal diagnosis data cubes. www.aihw.gov.au/reports/hospitals/principal-diagnosis-data-cubes (accessed 17 May 2017).



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