

A model three hospital's compliance with guidelines for hip fractures

S. Shaji¹, J. Fahey², M. McShane¹, G. Dowling¹, M. Duggan².

1. School of Medicine, University of Galway, University Road, Co. Galway, Ireland.
2. Department of Anaesthesia, Mayo University Hospital, Castlebar, Co. Mayo, Ireland.

Abstract

Aim

To conduct a retrospective study on Mayo University Hospital's (MUH) compliance with the Association of Anaesthetists guidelines for the management of hip fractures and compare MUH's patient recovery to national standards.

Methods

We collected data on 100 patients who presented with hip fractures to MUH between January 2024 to August 2024. This data includes patient's age, gender, place of residence, time to surgery, nerve block prior to surgery, blood loss, time to remobilisation, time to reablement, length of stay (LOS) and discharge destination.

Results

We found that 31/96 (32.3%) of patients' surgeries did not occur within 36 hours from admission in ED. Nerve blocks were administered in 44/96 (46.8%) of patients in ED and 44/98 (44.9%) were given nerve blocks before surgery. The mean LOS for a patient with a hip fracture at MUH is 14.8 days.

Discussion

MUH meet the Association of Anaesthetists targets for length of stay (LOS) and it is less than the national LOS mean for hip fracture cases. However, there are areas in which MUH can improve as not all patients undergo surgery within 36 hours of admission, receive nerve blocks in ED/ operating room or hit major recovery milestones in time.

Introduction

Hip fractures or proximal femur fractures describe fractures of the proximal femur from the femoral head to 5 cm below the lower border of the lesser trochanter¹. A hip fracture can cause injury to one of four areas of the upper femur, the femoral neck, the intertrochanteric area, subtrochanteric area and the femoral head. Intertrochanteric and femoral neck fractures are the most common types of hip fractures². Majority of these cases occur in the over 65

population who are also 3-4 times more likely to die within one-year post-surgery than the general population ^{2,3}.

Mayo University Hospital (MUH) serves a population of approximately 140,000 people⁴. We calculated from the national census figures of 2022 that approximately 20% of the population is over 65 (national average is 15.1%) and if the figures continue to follow current trends, this percentage will increase over the coming decades⁴.

These trends are concerning as there is a 3.4% inpatient mortality rate associated with hip fractures and a 1-year mortality rate between 20-30% with the highest risk within the first six months⁵. Only 51% will resume independent ambulation, 22% will remain non-ambulatory while the rest requires mixed levels of assistance⁶. The National Office of Clinical Audit (NOCA) has an Irish hip fracture database which publishes its figures yearly. They found that 72,852 acute hospital bed days were occupied for hip fracture patients in 2022, which puts a strain on the Irish healthcare system⁷.

The Association of Anaesthetists created their first guidelines for the management of hip fractures in 2011 to guide in the pre- and post-operative management and recovery of patients and they were updated in 2020 ⁸.

The main recommendations are as follows: patients should undergo surgery within 36 hours of arrival in ED, patient remobilisation should occur on the day of or the day after surgery, patients should recommence their activities of daily living 2-5 days post-surgery, single shot nerve blocks should be provided in the emergency department and at time of surgery if more than 6 hours has passed since first block ⁸. It is recommended that hospitals risk assess all hip fracture patients using at least the Nottingham Hip Fracture Score, a frailty score and the 4AT delirium score⁸.

In our study, we audited Mayo University Hospital's compliance of these recommendations from the 2020 Association of Anaesthetists (AoA) guidelines while observing patient factors such as co-morbidities, patient demographics and baseline frailty and compared our results with the national standard.

Methods

This audit is a single-centre retrospective study on the practices and outcomes from the current peri-operative management of hip fractures in a model 3 hospital. The audit was conducted between the 1st of January 2024 to the 30th of August 2024 at Mayo University Hospital. The data from every patient who had surgery for hip fracture repair was recorded and a total of 100 cases were collected. Ethical approval was granted from the hospital research and ethics committee.

Using the AoA guidelines, we collected data under the following headings: age, gender, place of residence, level of independence at home, ASA status, co-morbidities, haemoglobin on admission, nerve block in ED, time to specialist ward (hours), time to surgery (hours), nerve block prior to spinal or general anaesthesia, blood loss, post-op haemoglobin, time to remobilisation, post-operative delirium, pain scores, acute kidney injury, and infections, time to reablement, length of stay in days and discharge destination. The data was collected manually using a paper audit form using the patient's records during their hospital stay. We omitted any missing data from the statistics.

We organised the data into an excel spreadsheet and then used IBM SPSS version 27 for our calculations.

Results

Table 1	Mean (SD)	
Age (years)	78.2 (14)	
Number of Comorbidities	2.9 (1.4)	
Hb on admission (g/ dl)	12.3 (1.8)	
	Frequency	Percent
Gender		
Male	35	35%
Female	65	65%
Total	100	100%
Residence		
Home	82	82%
Nursing Home	15	15%
District hospital	2	2%
Long care facility	1	1%
Total	100	100%
Independence		
Yes	60	63.2%
No	35	36.8%
Total	95	100%
Missing	5	
ASA		
1	2	2.3%

2	37	43%
3	41	47.7%
4	6	7%
Total	86	100%
Missing	14	

Population statistics

The results showed that 35% (35/100) of the hip fracture patients were male and 65% (65/100) were female. The mean age of men and women were 76.3 and 79.3 respectively; the overall mean age was 78.2 years. ASA 2 (43% - 37/86) and ASA 3 (47.7% - 41/86) were the most common ASA levels reported. Patients had a mean of 2.9 comorbidities on arrival to ED with a hip fracture and the most common of these was hypertension. The majority of patients (82%) were admitted from their own home, 15% were residents of a nursing home, 2% arrived from a district hospital and one patient lived in a long-term care facility. Most patients 63.2% (60/95) could live independently before arrival to ED and the remaining 36.8% (35/95) could not. The mean haemoglobin level of patients on admission was 12.3 g/dL. This is summarised in Table 1.

Pre-surgery statistics

Our results show that 46.8% (44/94) of patients received a nerve block in ED. It took a mean of 7 hours 56 minutes to transfer patients from the ED to a specialised ward (orthopaedics ward) and a mean of 30 hours 36 minutes to undergo surgery after arriving in ED. Despite the mean time to surgery, 32.3% (31/96) of patients had surgery outside the 36-hour window upon arriving in ED.

Surgery statistics

In our audit 44.9% (44/98) of cases were given a nerve block before surgery. 81% (81/100) of our patients underwent spinal anaesthesia the rest were given general anaesthesia (19% - 19/100).

Mean blood loss was 283.8mls and mean haemoglobin post op was 9.97 g/dL.

Post-operative statistics

Post-operative delirium was found in 20.5% (18/88) of patients and 12.9% (12/99) had a documented acute kidney injury post-surgery. Postoperative infection was diagnosed in 28.3% (28/99) of patients of which a respiratory tract infection was the most common at 17.2% (17/99) of the total recorded cohort. The breakdown for where patients were discharged to were as follows: Home – 26.5% (26/99); Nursing home – 25.5% (25/99); district hospital – 35.8% (35/99); Rehab – 11.2% (11/99); Hospice – 1% (1/99).

The mean patient remobilised on day 1.5 and reenabled on day 1.9. In 24.2% (24/99) of cases, patients were unable to remobilise on the day of or the day after surgery and 19.6% (19/97) were unable to conduct their activities of daily living (ADL) within 5 days post-surgery. The mean length of stay was 14.8 days. Table 2 and 3 summarises our findings.

Table 2

Table 2	
	Mean (SD)
Time to ortho wards (Hrs: mins)	7:56 (6:28)
Time to surgery (Hrs: mins)	30:36 (19:07)
Blood Loss (mls)	283.8 (349.5)
Hb post-op (g/dl)	9.97 (1.8)
Day of remobilisation	1.5 (0.8)
Post op Pain scores	2.5 (2.5)
Day of Reablement	1.9 (1.12)
Length of Stay (days)	14.8 (16.5)

Table 3	Frequency	Percent
Nerve block in ED		
Yes	44	46.8%
No	50	53.2%
Total	94	100%
Missing	6	
Nerve block pre-surgery		
Yes	44	44.9%
No	54	55.1%
Total	98	100%
Missing	2	
Spinal or General Anaesthesia		
Spinal	82	82%
General	18	18%
Total	100	100%

Missing	0	
Post-op AKI		
Yes	12	12.9%
No	81	87.1%
Total	99	100%
Missing	1	
Post-op Delirium		
Yes	18	20.5
No	70	79.5
Total	88	100%
Missing	12	
Source of infection		
unrecorded source	2	2%
None	71	71.7%
RTI	17	17.2%
UTI	7	7.1%
Cholecystitis	2	2%
Total	99	100%
Missing	1	
Discharge destination		
Home	26	26.5%
Nursing Home	25	25.5%
District Hospital	35	35.8%
Rehab	11	11.2%
Hospice	1	1%
Total	99	100%
Missing	1	
Remobilisation =< day 2		
Yes	75	75.8%
No	24	24.2%
Total	99	100%
Missing	1	
Reablement =< day 5		
Yes	78	80.4%
No	19	19.6%
Total	97	100%
Missing	3	

Discussion

The figures for the Irish hip fracture database collected by the National Office of Clinical Audit in 2022 found that 84% of patients were admitted from home, while 11% came from a nursing home or long stay facility, 5% were transferred from another hospital⁷. This compares to our figures of 82 % home, 15 % from a nursing home, 2% coming from a district hospital and 1% from a long-term care facility.

Nationally 32% of patients were ASA 2, and 51% were ASA 3 compared to our figures of 43% of cases being ASA 2 and 47.7% being ASA 3⁷.

Nationally, 69% of patients were female and the mean age of male patients was 81 while the mean for females was 80⁷. This compares to our results of 65% of patients being female and the mean age of all participants being 78.2 with mean age of males being 76.3 and mean age of females being 79.3 years. 29% of patients were discharged home in the national audit compared to our figures of 26.5%⁷.

The AoA guidelines have not labelled a preference between spinal or general anaesthesia in terms of patient outcome, and we see that our results show that we favour spinal anaesthesia in our hospital. Reasons documented why patients received a general anaesthetic included scoliosis, failed spinal attempts, infection elsewhere, confusion and dementia and unable to position for spinal, on antiplatelet agents for cardiac stents.

MUH does not conduct Nottingham hip fracture scores or a frailty score for all patients and only tests patients that show signs of delirium with the 4AT scores. The AoA recommends that these scores are calculated for all patients⁸.

A study in Derry by McKeag et al between 2007 and 2010 reported that 19.2% of patients develop AKI following surgery for hip fracture⁹. Our figure (12.9%) is lower than this value.

The mean patient at MUH remobilises on day 1.5 which has been linked with reduced rates of in-hospital mortality¹⁰. The mean day of reablement is on day 1.9 which is within the guidelines recommended range⁸. 24.2% of patients at MUH were unable to mobilise on the day of or the day after surgery which is below the guidelines value of 20%⁸. Our cohort also had a lower LOS (14.84) than the national mean of 18.6 days⁷.

REDUCE was a record-linkage cohort study in which national databases for all patients aged 60 years and older who sustained a hip fracture in England and Wales were linked with hospital metrics from organisational data sources¹¹. Organisational factors such as the provision of physiotherapy on Saturdays or Sundays was associated with fewer days in hospital per patient which MUH does provide.

Areas to improve at MUH regarding the AoA guidelines include making it standard practice to give nerve blocks in ED and before surgery to all eligible patients, ensuring that all patients

undergo surgery at MUH within 36 hours and reducing time to remobilisation. The AoA guidelines are very similar to other clinical guidelines such as the NICE guidelines on hip fracture management¹² and the American Association of Orthopaedic Surgeons (AAOS)¹³. Multidisciplinary management is emphasised in all guidelines. Fragility hip fractures are a major public health problem with a notable effect on quality of life for patients and their families.

The management and rehabilitation after a neck of femur fracture should begin as soon as possible after surgery at Mayo University Hospital. This is undertaken by the multidisciplinary team that ensures integration of all services.

Declaration of Conflicts of Interest:

None declared.

Corresponding author:

Shyam Shaji,
School of Medicine,
University of Galway,
University Road,
Co. Galway,
Ireland.

E-Mail: s.shaji1@universityofgalway.ie

References:

1. Alim D, Nordin L. Hip fractures and best practice tariffs. *Surgery (oxford)*. 2023 Mar 1;41(4):207–14. Available from: <https://www.sciencedirect.com/science/article/pii/S026393192300039X>
2. Fischer S, Gray J. Hip Fractures - OrthoInfo - AAOS [Internet]. Aaos.org. 2020. Available from: <https://orthoinfo.aaos.org/en/diseases--conditions/hip-fractures/>
3. Morri M, Ambrosi E, Chiari P, Orlandi Magli A, Gazineo D, D' Alessandro F, et al. One-year mortality after hip fracture surgery and prognostic factors: a prospective cohort study. *Scientific Reports* [Internet]. 2019 Dec 10;9(1):18718. Available from: <https://www.nature.com/articles/s41598-019-55196-6>.
4. Press Statement Census of Population 2022 - Summary Results Mayo - CSO (Central Statistics Office) - Central Statistics Office [Internet]. www.cso.ie. 2023. Available from: <https://www.cso.ie/en/csolatestnews/pressreleases/2023pressreleases/pressstatementcensusofpopulation2022-summaryresultsmayo/>

5. Blanco JF, da Casa C, Pablos-Hernández C, González-Ramírez A, Julián-Enríquez JM, Díaz-Álvarez A. 30-day mortality after hip fracture surgery: Influence of postoperative factors. Farouk O, editor. PLOS ONE. 2021 Feb 16;16(2): e0246963. Available from: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7886122/>
6. Kazley J, Bagchi K. Femoral Neck Fractures [Internet]. Nih.gov. StatPearls Publishing; 2019. Available from: <https://www.ncbi.nlm.nih.gov/books/NBK537347/>
7. Irish Hip Fracture Database National Report 2022 | Clinical Audits [Internet]. NOCA. 2022. Available from: <https://www.noca.ie/documents/irish-hip-fracture-database-national-report-2022/>
8. Griffiths R, Babu S, Dixon P, Freeman N, Hurford D, Kelleher E, et al. Guideline for the management of hip fractures 2020. Anaesthesia. 2020 Dec 2;76(2):225–37. Available from: <https://associationofanaesthetists-publications.onlinelibrary.wiley.com/doi/full/10.1111/anae.15291>
9. McKeag P, Spence A, Hanratty B. Acute Kidney Injury Following Surgery for Hip Fracture. Acta Ortopédica Brasileira. 2020 Jun;28(3):128–30. Available from: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3598517/>
10. Ferris H, Brent L, Coughlan T. Early mobilisation reduces the risk of in-hospital mortality following hip fracture. European Geriatric Medicine. 2020 Apr 9;11(4). Available from: <https://pubmed.ncbi.nlm.nih.gov/32297275/>
11. Baji P, Patel R, Judge A, Johansen A, Griffin XL, Chesser T, et al. Organisational factors associated with hospital costs and patient mortality in the 365 days following hip fracture in England and Wales (REDUCE): a record-linkage cohort study. 2023 Jul 1; Available from: [https://www.thelancet.com/journals/lanhl/article/PIIS2666-7568\(23\)00086-7/fulltext](https://www.thelancet.com/journals/lanhl/article/PIIS2666-7568(23)00086-7/fulltext)
12. www.nice.org.uk/guidance/cg124.
13. O'Connor MI, Switzer JA. AAOS Clinical Practice Guideline Summary: Management of Hip Fractures in Older Adults. J Am Acad Orthop Surg 2022;30:e1291-e1296 .DOI: 10.5435/JAAOS-D-22-00125