Geriatric Trauma: A Retrospective Cohort Study Reviewing Factors Affecting Mortality to Guide Advanced Care Planning

Authors

Dr Florence Meek, Dr Harry Temple, Dr Saniya Khan, Dr Jeevan Judge, Dr Zainah Moin, Dr Christine Mustapha, Dr Ijeh Nkeonyenaecheya, Dr Milord Hamal, Dr Natasha Newton, Mr Ian Chinery

OBJECTIVES

1. To establish what injury patterns contribute to increased mortality in our local geriatric population following trauma and how this compares to national data.
2. To determine what impact frailty, cognitive impairment and pre-existing medical conditions have on short and medium term survival in our local population.
3. To review our ability as a hospital to ensure advanced care planning is in place for patients at a high risk of not surviving their admission

INTRODUCTION

Older adults represent a rapidly growing proportion of trauma admissions, with low level falls (<2m) accounting for the majority of injuries in this group[1]. Ageing is associated with reduced physiological reserve, multimorbidity, and increased vulnerability to even low-energy mechanisms, resulting in disproportionately higher mortality compared with younger patients.

Recent research suggests that frailty is a stronger predictor of mortality and adverse outcomes than age or injury severity alone. Systematic reviews and cohort studies have shown that frailty independently predicts in-hospital and longer-term mortality, complications, and discharge to institutional care after trauma[2]. Cognitive impairment and multimorbidity further increase vulnerability, with studies demonstrating that cognitive frailty and multiple comorbidities are associated with higher mortality following injury.

As the geriatric trauma population grows, there is increasing emphasis on early frailty assessment, prognostication, and advance care planning. Understanding which injury patterns and patient factors are associated with poorer outcomes is essential to guide escalation decisions and ensure appropriate, patient-centred care.

METHODOLOGY

Initial patient selection occurred during the period December 2023 - January 2024 at a UK trauma unit. The first 100 patients admitted during this period were identified using data prepared for The National Major Trauma Registry and selected for analysis. The inclusion criteria were patients eligible for upload to the registry, admitted during the selected dates and age >65.

The patient cohort were followed for 24 months with any deaths during this time period recorded. At the end of this period, medical records were reviewed and data was collected in the following categories: frailty score/cognitive impairment, injuries, co-morbidities, higher level interventions (surgery/ITU), readmission and advanced care planning (ReSPECT/DNACPR/TEP).

RESULTS/DISCUSSION

Injury Vs Mortality (*Table 1)*

The data set strongly suggested that long bone injuries had poorer outcomes. Mortality rates were 20% for lower limb fractures and 16.7% for upper limb fractures. This likely reflects greater immobility in the period after injury, increased frailty and a reduction in independence. This is in line with national statistics [4,5].

Low mortality was noted in patients with pneumothoraces and solid organ injuries though this is likely due to small participant numbers.

The literature would suggest a higher rate of mortality from rib fractures than was found in this data[3]. This may suggest that these injuries are well managed at the unit but given the small sample used, further data is required to confirm this result.

These findings are useful to guide prognostication which can assist constructive and realistic conversations with patients and families.

Frailty/Co-morbidity Vs Mortality

The mean age of survivors was 84.4 compared to a mean age of 86.5 for non-survivors. The mean Rockwood Frailty Score (RFS) of survivors was 4.9 while that of non-survivors was 5.8. This suggests that, while age trends in the expected direction, frailty is more strongly associated with mortality than age itself (this is reflected in the wider literature).

Higher mortality rates are noted in patients with cardiac disease and underlying orthopaedic pathology (e.g. OA, osteoporosis, pre-existing fractures) *(Table 2)*. This are classic frailty associated conditions and likely reflect reduced physiological reserve.

Unsurprisingly, increased cognitive impairment suggests worse overall mortality with the risk increasing up to 20% in patients with severe impairment. Inability to understand or comply with care and therapy goals is critical to surviving the immediate injury and long term recovery. Cognition generally declines with age so this pattern may be, in part, due to increased frailty.

Table 1

Injury type	N with feature	2-year mortality
Lower limb fracture	15	**20.00%**
Upper limb fracture	18	**16.70%**
Vertebral fracture	22	9.10%
Pelvic injury	23	8.70%
Rib/sternal fractures	27	7.40%
Head injury	23	4.30%
Pneumothorax	9	0%
Solid organ injury	2	0%

Table 2

Comorbidity	N with feature	2-year mortality
Cardiac disease	80	**10.00%**
Orthopedic disease (osteoporosis etc.)	44	9.10%
Renal disease	29	6.90%
Neurological disease	35	5.70%
Respiratory disease	20	5.00%
Endocrine disease	40	2.50%
Psychiatric disease	6	0%
Malignancy	26	0%

Advanced Care Planning/Readmission

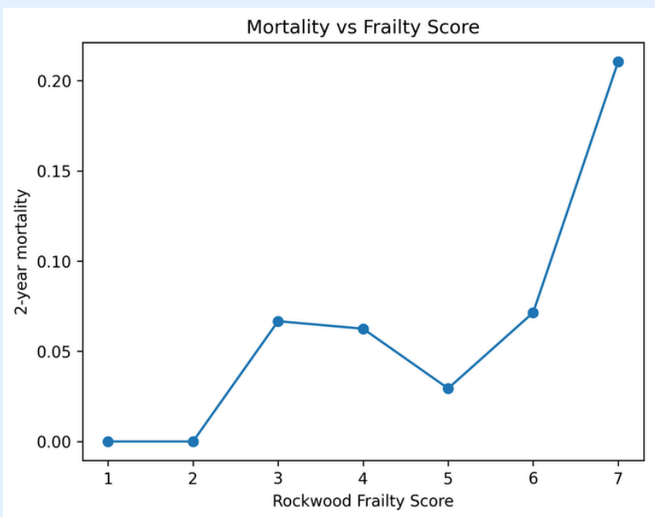
Only 36 patients were found to have advance care planning in place either before admission or in place within the first 24 hours. Given the risk of deterioration in the elderly population, there is room for improvement to ensure adequate recognition of prognostication and ceilings of care.

Impaired baseline cognition is noted to negatively impact frailty scores and readmissions. However, poorer cognition correlated with lower rates of surgical intervention and ITU admission suggesting appropriate ceilings of care were in place even if not formally documented within 24 hours.

When readmission rates are compared against frailty score, the data shows a reduction in readmission. A RFS of 1 had a mean readmisson rate of 3 while a RFS of 7 had a rate just over 1. This may reflect appropriate advanced care planning being put in place at discharge.

Limitations

- Small sample size impacting data analysis
- Poor medical records kept during admissions leading to omissions in data pool
- The data was not adjusted for injury severity (beyond the ISS>9 cut off for the Registry database)



Conclusion

In this cohort of geriatric trauma patients, frailty, cognitive impairment, and long bone injuries were the strongest indicators of increased two-year mortality. Frailty demonstrated a clearer association with survival than chronological age, supporting growing evidence that physiological reserve is a more meaningful predictor of outcome in older trauma patients. Lower limb fractures, in particular, were associated with the highest mortality, likely reflecting the combined effects of immobility, deconditioning, and pre-existing frailty.

Comorbidities such as cardiac and orthopaedic pathology were also associated with poorer outcomes, reinforcing the role of multimorbidity in limiting recovery after injury. Patients with cognitive impairment experienced higher mortality and readmission rates, suggesting increased vulnerability and the need for targeted support.

No consistent difference in two-year mortality was observed between admitting wards; outcomes appeared to be driven primarily by frailty and injury characteristics rather than location of care.

Despite these risks, only a minority of patients had documented advance care planning within the first 24 hours of admission. These findings highlight the importance of early frailty assessment, recognition of high-risk injury patterns, and proactive discussions around goals of care. Embedding structured geriatric assessment and advance care planning into trauma pathways may improve patient-centred decision-making and align treatment with individual prognosis and preferences.

References:
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