Original

Pattern of Mortality among Orthopaedic Patients in a University Teaching Hospital: A Ten-Year Review

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Abstract

Background: Patients with ortho-traumatic condition often presents with musculoskeletal conditions that require surgical intervention or close monitoring to improve the outcome of care. Mortalities being a potential adverse endpoint, this study determined the prevalence and pattern of mortality among hospitalized orthopaedic patients in the University of Port Harcourt Teaching Hospital.

Method: This was a retrospective review of ward admission records, in-patient records and death certificates of orthopaedic patients who died while on admission in the orthopaedic wards of the University of Port Harcourt Teaching Hospital. Data obtained was analyzed descriptively. Results were presented in tables and charts where necessary. Chi-square test and students' t-test for continuous variables were used where appropriate to test observed differences, and p-value of <0.05 was deemed statistically significant.

Result: Total admission within the study period were 4,680. There was a total of 105 mortalities giving a crude mortality rate of 2.24% with the 20-44 age group contributing nearly half of the number. There were more deaths from traumatic spinal cord injury (n=52, 49.8%) than from most other causes combined. Mortality was higher (n=88, 83.8%) in patients who stayed for less than 30 days compared to those who stayed more than 30 days (n=17, 16.2%) with 75% of the mortalities occurring during the night shift.

Conclusion: More deaths occurred in the younger age group and from traumatic spinal cord injuries. These findings may be helpful in formulating policies aimed at reducing mortality.

Keywords: Mortality pattern, orthopaedic deaths, UPTH

Introduction

The patient with orthopaedic or traumatic condition that warrants in-patient care as dictated by the severity of the condition, the nature of intervention and the peculiarity of the patient is regarded as the hospitalized orthopaedic patient. Such patients generally have musculoskeletal conditions that require surgical intervention or close monitoring to improve the outcome of care.[1]

In 2008 alone about 258 million surgical procedures are carried globally with approximately 4,000 procedures per 100,000 population in many countries and up to 11,000 procedures per 100,000 population in countries with high-volume health facilities.[2]

The number of orthopaedic surgeries done globally in 2017 was 22.3 million.[3] With an annual increase of 4.9%, this figure is estimated to reach 28.3million by 2025.[3] Many of these patients will require hospital admissions, care in intensive /high dependency units as well as require multiple multispecialty reviews. The prolonged stay in the hospital and multiple surgical procedures in orthopaedic patients required may lead to more complications.

The spectrum of complications seen in orthopaedic patients is dictated by the peculiarities of patient demographics, the severity of injuries involved, the invasiveness of procedures required and the quality of available surgical, nursing and ancillary services. These risks are presumed to be higher in the hospitalized orthopaedic patient. The problems of prolonged immobilization, care-related medication errors as well as increased risk of multi-drug resistant hospital-acquired infections seem to further increase the risks of such complications in the hospitalized orthopaedic patient.

Mortality is one and perhaps the most adverse endpoint of such complications. The prevalence, spectrum and predictors of mortality may be an indicator of the quality of care received in any facility and play useful role in quality improvement decisions.[4,5]

Certain patient and institution-related factors may predict the pattern of mortality among hospitalized orthopaedic patients. Independent variables like age, gender and socio-economic status have been known to predict the outcome of care. The severity of injury, extent of surgical intervention and invasiveness of surgical procedures are other widely studied variables.

Of less interest are care facility related factors such as the number and appropriateness of health personnel available at the time when emergency care is required, availability of needed basic and advanced life support capability of the personnel, equipment and medications as well as medication-related errors. This study aims to determine the prevalence and spectrum of mortality among hospitalized orthopaedic patients in the University of Port Harcourt Teaching Hospital.

Method

Study Setting

The orthopaedic ward at the study centre, has three arms: male, female and children wards. All three wards were involved in this study. There are three units in the orthopaedic department each manned by several specialist and Postgraduate residents in orthopaedics consultants, senior registrars and registrars. All units were involved in general orthopaedic and trauma practice until 2016 when Sub-specializations were introduced. Admissions into the wards were mainly from three routes, viz the orthopaedic outpatient clinics, the children emergency wards and the Accident and emergency department. Within the study period, trauma patients were assessed and resuscitated on arrival by trained medical officers in the A&E. The orthopaedic team on call was involved in the resuscitation if invited early, when there are mass casualty events and when the team is off other clinical duties. The team on-call otherwise reviewed initial resuscitation done by the emergency room personnel and made modifications where necessary. Orthopaedic procedures as dictated by the patient's injury/ orthopaedic condition were carried out mainly by the unit consultants, assisted by the senior residents.

Payment for elective interventions are based on out-of-pocket for most patients since the insurance coverage is quite low.[6] The emergency care policy of the hospital provides some cover for emergency procedures, but drugs and advanced surgical interventions are not included in this policy.

Study Instrument

The ward admission records and in-patients' records were retrospectively reviewed to extract relevant information on patient's demographics, admission indications, treatment spectrum, unexpected events during admission time from admission to death, Length of stay in the ward and possible cause of death. Where indicated, surgical records, records from the intensive

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care units and postmortem reports (where available) were also extracted and analyzed.

Study Design
This was a retrospective study spanning over ten years (January 1st 2011 to December 31st 2020). Death certificates, medical records and post-mortem examination findings were used to arrive at the possible causes of death of deceased patients. For analysis, patient co-morbidity was defined as the presence of pre-existing medical conditions that could alter the outcome of treatment of the orthopaedic condition.

Study Population
Orthopaedic patients who died in the hospital while on admission within the study period.

Inclusion criteria: Hospitalized orthopaedic patients who died in the any of the three orthopaedic wards between 1st January 2011 and 31st December 2020.

Exclusion criteria:
Deaths among trauma patients in the Accident & Emergency (A&E); deaths among non-trauma orthopaedic patients in the A&E; deaths among orthopaedic patients in the theater and the intensive care unit.

Data Analysis
Data obtained was analyzed descriptively. Results were presented in tables and charts where necessary. Mean and standard deviations were used to represent certain variables. Chi-square test and students' T-test for continuous variables were used where appropriate to test observed differences, and p-value of <0.05 was deemed statistically significant.

Results
Total admission within the study period were 4,680. There were a total of 105 mortalities giving a mortality rate of 2.24%

Table 1: Demographics

Variable	Freq (n=105)	Percent (%)
Age		
0-19	6	5.7
20-44	51	48.6
45-64	31	29.5
≥ 65	17	16.2
Gender		
Female	33	31.1
Male	72	67.9

Table 2: Distribution of Primary Injuries/Diseases

Primary Injury / Insult	Freq (n=105)	Percent (%)
Trauma	78	74.2
Degenerative diseases	1	0.9
Bone infections	5	4.8
Soft tissue infections	5	4.8
Primary Bone malignancies	6	5.7
Soft tissue malignancies	3	2.8
Metastatic bone disease	7	6.7

Table 3: Trauma distribution

Variable	Freq (n=78)	Percent (%)
Femoral shaft fracture	3	3.8
Fracture neck of femur	2	2.6
Trochanteric fractures	2	2.6
Knee and shoulder dislocation	1	1.3
Multiple bone fractures	7	9.0
Open fracture	3	3.8
Pathologic fracture	3	3.8
Pelvic fracture	3	3.8
Spinal cord injury	52	66.7
Infected fracture	2	2.6

Table 4: Injury severity score, length of stay and time of death

Variable	Freq (n)	Percent (%)
Injury Severity score		
1-8 (mild)	3	2.8
8-16 (moderate)	7	6.7
17-25 (moderately severe)	25	23.8
>25 (severe)	70	66.7
Duration of stay in the hospital (days)		
< 30	88	83.8
≥ 30	17	16.2
Time of death		
Day	26	24.8
Night	79	75.2

Table 5: Distribution of invasiveness of intervention and presence of comorbidities

Variable	Freq (n)	Percent (%)
Surgery		
No	80	76.2
Yes	25	23.8
Invasiveness of intervention		
A (no intervention)	80	76.2
B (mildly invasive intervention)	3	2.9
C (moderately invasive intervention)	20	19.0

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D (highly invasive intervention)	2	1.9
Comorbidity		
No	68	65.8
Yes	37	35.2

Discussion

A total of 4,680 patients were admitted in the study center within the study period. This was higher than findings from Orimolade et. al[3] in Ife (2,418) and Edomwonyi et al[8] from Irrua (2,129) both in Nigeria where this study is undertaken. The location for this study is however more densely populated, more urban with higher vehicular movement compared to the two cities where those studies were undertaken. Banerjee et al[9] in Mumbai, India with far more dense population than the study city had higher figures (10,937) in three years.

Crude mortality rate was 2.24% with the 20-44 age group contributing nearly half of the number. This was similar findings from Edomwonyi et al[8] in Irrua, Nigeria (2.1%) but lower than that reported by Orimolade et al[9] in Ile-Ife (3.47%). Bhattacharya et al in Boston USA (0.92%.) and Banerjee et al in Mumbai India (0.55/1000 admissions) reported lower mortality rates. This could presumably indicate higher quality of care in the latter two study sites[10,11,12] or a better organized health care and trauma care systems in these regions.

The 20-44 years age group contributed to almost half of all deaths during the study period, with most deaths resulting from trauma. This contrast findings from Oromolade et al and Barneejee et al which showed older age groups (>45years). The pattern of mortality is not surprising as the age group are the most economically active group with the highest risk exposure to injuries. Efforts at reducing deaths among these young and physiologically sound age group by promoting injury prevention measures could economically benefit the region and the nation as well as reduce other social indices. Tan[13] in the U.K. reported a median age was 82.14 with most deaths from their study from metastatic bone diseases.

This study had more deaths from traumatic spinal cord injury (n=52, 49.8%) than from most other causes combined. Spinal fixation surgeries were still an evolving specialty at the study centre at the time of this study. While the numbers of cervical spine fixation surgeries are beginning to peak, the promptness of fixation is still largely predicted by the patient's ability to pay for surgery and other institutional bottlenecks. These factors left most patients with traumatic cervical cord injuries with conservative treatment options with attendant numerous problems of prolonged restriction to bed and poorer outcome.

The study by Banerjee et al[9] reported closed trauma as the most common cause of death (52.7%) with 38.33% of the total deaths from patients above 60 years of age who had either hip fracture or pelvic-acetabular fractures. Tan et al[13] in the U.K however reported tumours as the most common cause of deaths while Bhattacharya et al.[5] in U.S.A reported trauma, tumour, and infections as the leading causes of death.

Most authors[14-17] have reported trauma as a leading cause of death among the young population. The significant contribution of traumatic spinal cord injuries in this study could be explained by the severity of such injuries (especially with low level of compliance with use of safety gadgets among those who utilize the commonly available motorcycles) as well as the absence of spine surgery specialist for the initial period of this study.

Both Orimolade et al[9] in Ile-Ife, Nigeria (n=45, 58.4%) and Banerjee et al in Mumbai India (52.7%) reported long bone fractures as the most common contributor to mortalities. The latter study reported more hip fractures in the elderly population while the former study (similar to the index study) reported more deaths among the young population, a reflection of the socio-demographics in the different populations.

Mortality was significantly higher (n=88, 83.8%) in patients who stayed for less than 30 days compared to those who stayed more than 30 days (n=17, 16.2%). Tan et al also reported higher mortality (n=66, 51.6%) within the first week of admission in their study. The severity of the injuries may have played more role than the duration of stay as most mortalities in the index study were from severe traumatic spinal cord injuries. These patients with more life-threatening primary presentations were more likely to have a short hospital stay compared to others because of early mortality. Ekeke et al[18] in a similar study at the surgical wards of the same study centre also reported that over 91.3% of mortalities occurred in less than one month of admission. They also reported that traumatic brain injury and spinal cord injuries had major contributions to the observed mortalities.

Most authors[19-22] have reported injury severity as key predictor of trauma mortality and hospital stay. Efforts at injury prevention and early prehospital intervention

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have shown good effect at reducing the mortality burden[23-26]

Interestingly, this study reported that 75.2% (n=79) of mortalities occurred during the night. Most night shifts at the study centre are manned by fewer and low cadre health personnel with less than adequate knowledge and skill in detection of cadio-vascular derangements and initiation of cadio-pulmonary resuscitation. There is also the trend of punishing erring health workers with night shifts who in most cases are far less motivated than at other times. These variables may contribute to the observed finding. Needed equipment and resources for resuscitation may also be lacking during these shifts. This observation indicates the need for policy review and change to address the observed pattern for better outcome.

Cortigiani et al[27] reported higher mortalities from surgeries done during the night shifts than those done during the day shifts. Most authors[28-30] have reported higher surgical mortality during night shifts and have advocated a review of the night shift rotations among health workers to reduce health workers fatigue and increase alertness and efficiency.

Conclusion

More deaths occurred in the younger age group and from traumatic spinal cord injuries. The findings from this study will be useful to health system managers in formulating policies aimed at reducing mortalities among hospitalized patients in the orthopedic wards.

Declarations

Authors' contribution: Both authors were involved in the conceptualization, conduct and reporting of the research as well as gave their consents for the publications of this research.

Conflict of interest: Nil conflict of interest declared.

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