

Original Article

Mean Length of Stay of Orthopedic Trauma Patients Admitted in the Intensive Care Unit of a Tertiary Care Hospital: A Descriptive Cross-sectional Study.

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ABSTRACT

Introduction: Audit of intensive care unit admissions is an important tool in monitoring and improving quality of health service provided. Length of stay in the intensive care unit provides key information to health care service providers regarding the burden of major orthopedic trauma and helps in improving treatment policies. Hence, this study aims to find out the mean length of stay among orthopedic trauma patients admitted in the intensive care unit of a tertiary care center.

Methods: A descriptive cross-sectional study was carried out among orthopedic trauma patients admitted to the intensive care unit between January 1, 2022, and December 31, 2022, following ethical clearance from institutional review committee of B.&B. Hospital Gwarko, Lalitpur, Nepal (reference no: B&BIRC-23-09). All orthopedic trauma patients admitted in the intensive care unit were included. Clinical records with missing information and patients who had repeat admissions due to other issues were excluded. Data were collected retrospectively. Convenient sampling method was used. Point estimate and 95% confidence interval were calculated.

Results: Mean length of stay of orthopedic trauma patients admitted in intensive care unit was 4.68 ± 5.01 days (3.89-5.47, 95% confidence interval). Mean age of the patients was 42.07 ± 21.76 years, and 118 (76.62%) were males and 36 (23.38%) were females.

Conclusion: The mean length of stay of orthopedic trauma patients admitted in the intensive care unit of a tertiary care center was lower to that reported in other international studies.

Keywords: Intensive Care Units, Length of Stay, Multiple Trauma

Introduction

Trauma is one of the leading causes of mortality and morbidity.¹ In developing countries, neglect to road safety measures contributes heavily towards higher incidence of road traffic accidents (RTAs) resulting in increased number of patients requiring critical care.^{2,3} As there is lack of hospitals with dedicated trauma specific intensive care unit (TICU), trauma patients requiring critical care are being managed in general intensive care units (ICU), resulting in increased risk of lengthy ICU stay and in-hospital mortality.^{3,4} Audit of ICU admissions is considered to be an important tool in monitoring and improving quality of health service provided.⁴⁻⁶ Length of stay (LOS) in the ICU provides key information to health care service providers regarding the burden of major orthopedic trauma and helps in improving treatment policies. Hence, this study aims to find out the mean LOS among orthopedic trauma patients admitted in the ICU of a tertiary care center.

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METHODS

A descriptive cross-sectional study was carried out among orthopedic trauma patients admitted to the intensive care unit following ethical clearance from institutional review committee (IRC) (reference no: B&BIRC-23-09). Clinical records of orthopedic trauma patients admitted in general ICU between January 1, 2022, and December 31, 2022, were explored. All orthopedic trauma patients admitted in the ICU were included. Clinical records with missing information and patients who had unplanned or repeat admissions due to other issues were excluded. Convenient sampling method was used. Sample size was calculated using following formula:

$$\begin{aligned} N &= z^2 \sigma^2 / E^2 \\ &= 1.96^2 \times 7.7^2 / 2^2 \\ &= 56.94 \end{aligned}$$

Where,

N= minimum require sample

Z=1.96, constant for 95% CI

$\sigma = 7.7$,

Standard deviation (SD) of LOS in the ICU obtained from previous study.⁷

E= 2, error rate

The calculated minimum required sample size was 56.94. A total of 154 patients were included. Following data were extracted: age, gender, mechanism of injury, diagnosis, reason for admission, co-morbidity, LOS, and treatment outcome, and recorded in an electronic pro forma. LOS was reported in days. For patients with multiple admissions, LOS was calculated by adding up multiple durations. Patients were arbitrarily divided into two groups based on LOS: short stay (LOS < 7 days) and long stay (LOS ≥ 7 days). Treatment outcome was divided into three categories: mortality, leave against medical advice (LAMA), and transfer to ward. Continuous data were reported as mean ± SD and categorical data were reported as number (percentage). Point estimate and 95% confidence interval were calculated.

RESULTS

Mean LOS of orthopedic trauma patients admitted in ICU was 4.68 ± 5.01 (3.89–5.47, 95%CI). Mean age of the patients was 42.07 ± 21.76 years, and 118 (76.62%) were males and 36 (23.38%) were females. The demographic characteristics and outcomes of the patients were shown in table 1.

Table 1 demographic characteristics and outcomes of orthopedic trauma patients admitted in ICU (n=154)

Characteristics	Frequency, n (%)
Mechanism of injury	
Road traffic accidents	108 (70.13%)
Fall	40 (25.98%)
Others	6 (3.89%)
Diagnosis	
Polytrauma	71 (46.10%)
Femur fractures	39 (25.32%)
Hip and pelvic injuries	22 (14.28%)
Spine injuries	10 (6.49%)
Multiple fractures	8 (5.19%)
Crush injuries	4 (2.59%)
Reason for admission	
Observation and monitoring	99 (64.28%)
Hypovolemia/shock	24 (15.58%)
Fat embolism syndrome	19 (12.33%)
Requiring mechanical ventilation	9 (7.14%)
Septicemia/shock	3 (1.94%)
Length of Stay	
Short (<7 days)	122 (79.22%)
Long (≥7 days)	32 (20.77%)
Outcomes	
Transfer to ward	138 (89.61%)
Left Against Medical Advise (LAMA)	9 (5.84%)
Mortality	7 (4.54%)

Discussion

This study identified that the mean LOS of orthopedic trauma patients admitted in the ICU of a tertiary care center was 4.68 days. The finding was lower than that report-

ed in the international studies, which was around 5.1–11.5 days.^{7–9} Balthrop et al. (2007) conducted a study in United States, including 188 orthopedic patients, where they reported that 70 (37.23%) patients required ICU admissions and mean LOS in the ICU was 8.4 days.⁷ Ala-Kokko et al. (2006) conducted a study in Finland, including 1044 adult trauma patients, where they reported that 45% had multiple traumas, and the mean LOS in the ICU was 5.1 days.⁹ Similarly, Burkhardt et al. (2012) conducted a study in Germany, including 402 patients with multiple trauma and pelvic disruption, where they reported that the mean LOS in ICU was 11.5 days.⁸ Furthermore, a systematic review of 191 articles including 3,668 patients with injury severity score (ISS) of >16 found that the mean LOS in the ICU was 8.2 days.¹⁰ The higher LOS in these studies could be due to inclusion of patients with severe trauma (ISS > 16). However, in our study, all orthopedic trauma patients admitted to ICU were included, and only around 46% had polytrauma. In addition, majority (79.22%) had short LOS (< 7 days). This suggests that the LOS in ICU increases with increase in the severity of trauma. This study also identified that the prevalence of mortality was 4.54%. The finding was similar to that reported in the study conducted in other international studies, which was around 4.8–5.6%.^{7,9} Balthrop et al. (2007) conducted a study in United States where they reported that among 70 orthopedic trauma patients requiring ICU admissions, the ICU mortality was 4.8%.⁷ Similarly, Ala-Kokko et al. (2006) conducted a study in Finland where they reported that among 334 orthopedic trauma patients managed in university level ICU, the ICU mortality was 5.6%.⁹ However, these two studies have included patients with severe trauma (ISS > 16) whereas all orthopedic trauma admitted to ICU were included in this study.^{7,9} This suggests that the prevalence of mortality among patients with severe orthopedic trauma may be higher in our settings. This argument is also supported by the finding of a study conducted in Germany by Burkhardt et al. (2012), in which among 402 patients with multiple trauma and pelvic disruption, the prevalence of in-hospital mortality was 7.5%.⁸ Although the actual ICU mortality was not reported, it can be assumed that the prevalence of ICU mortality increases with increase in the severity of trauma. This study has several limitations. It is a single center study and there is potential risk of selection and reporting biases. In addition, all orthopedic trauma patients admitted to the ICU were included. As there are no standard guidelines for ICU admissions and uniform scoring systems (such as, ISS) establishes in our settings, most ICU admissions (64%) were only for observation and monitoring, and majority (79%) had short LOS, suggesting more liberal ICU admissions. This may have influenced the overall outcome of the study, i.e., lower mean LOS than other international studies. Furthermore, 9 (5.84%) patients went on LAMA, whose outcomes were unknown. This could potentially influence overall mortality of the orthopedic trauma patients. Thus, the observed findings cannot be generalized. However, this is one of the few studies conducted in Nepal reporting the audit of orthopedic trauma patients admitted to ICU. The outcome of this study provides the overview of the burden for orthopedic trauma patients presenting to tertiary care center in Nepal requiring ICU admission.

Conclusion

The mean length of stay of orthopedic trauma patients admitted in the intensive care unit of a tertiary care center was lower than that reported in other international studies. However, a prospective observational study with well-defined admission and discharge criteria including standard injury severity score measurements is required to identify the actual burden of ICU stay among orthopedic trauma patients.

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