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A Seven-Year Audit of ICU Admissions and Outcome in a Tertiary Care Hospital in Nepal

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ABSTRACT

Introduction

An audit is used to assess if a particular aspect of health care is in accordance with the standard practice and aims to achieve improvement in quality for the benefit of the patient. The current study is a retrospective descriptive observational audit which intends to study the patient profile and outcome of patients admitted to a level III ICU of a tertiary care hospital in Nepal over a duration of seven years.

Methods

A retrospective descriptive observational audit was conducted in the Tribhuvan University Teaching Hospital (TUTH) ICU from 1st Baisakh, 2074 to 31st Chaitra, 2080. Data on patient profile and outcome were recorded and statistical analysis was performed.

Results

A total of 6,233 patients were admitted, with 53.9% male patients over a duration of 7 years in TUTH ICU. Medical admissions accounted for 51.67% and surgical admissions 48.33%. Overall, the maximum number of cases were admitted under neurosurgical speciality. Of all patients, 64.7% improved and were shifted out of ICU while mortality was 27.4%. An average sequential organ failure assessment (SOFA) score was 6.7 during the study period.

Conclusion

The major finding of the study was a progressive decline in average SOFA score, average length of ICU stay and average length of Mechanical Ventilation over the last 3 years. The highest number of admission was in neurosurgery and respiratory medicine over the duration of seven years.

Keywords
Audit; intensive care unit; outcome; tertiary hospital

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INTRODUCTION

An audit is used to assess if a particular aspect of health care is in accordance with the standard practice and aims to achieve improvement in quality for the benefit of the patient.[1-3] A five years audit at one of the tertiary referral hospitals in Nepal concluded that the most commonly admitted patients in ICU were of male gender, age group of 20-39 years, medical patients and patients with problem related to the gastrointestinal system. The Relative risk in the patients who were ventilated mechanically was 5.52.[4]

The most common patients admitted to one of the tertiary referral ICU's of Nepal were Neurosurgical patients and the mortality was significantly higher compared to ICUs in developed countries.[5] In Eastern region of Nepal, the most common patients admitted in the multidisciplinary ICU were general surgical & general medical patients and significant fraction of the patients admitted in the ICU were taken home by their relatives against medical advice.[6]

An audit in critical care setting is important to deduce useful information about the socio-demographic profile of patients with different illnesses and their outcome. This study aimed to characterise the demographic, clinical, and outcome profile of patients admitted to the Tribhuvan University Teaching Hospital (TUTH) Level III ICU over a seven-year period and evaluate temporal trends to inform clinical governance and resource allocation.

METHODS

This is a retrospective observational study which was conducted in patients admitted in the intensive care unit of Tribhuvan University Teaching Hospital, Kathmandu from 1st Baisakh 2074 to 31st Chaitra 2080. All adult patients with age more than or equal to eighteen years who were admitted to TUTH ICU during this period were included in the study. Patients transferred from other hospitals to TUTH ICU who met the above criteria were also included in the study. Patients once discharged from the ICU who had to be readmitted to ICU again during the same hospital admission were excluded from the study. Ethical approval was taken from the Institutional Review Committee of the Institute of Medicine (IRC approval number: 263 (6-11) E2 081/082). Informed consent was not taken as it was a retrospective study and consent was waived by the IRC.

A predesigned data abstraction form comprising of the following variables was used for collecting data: Age, sex, SOFA score at admission, intubation status, primary speciality of admission, diagnosis, length of ICU stay (LOS), length of mechanical ventilation (MV) and Outcome variable which was further classified as improved and discharged, discharge on Request (DOR), withdrawal of life support, and mortality.

All relevant data were extracted after the review of the ICU admission and discharge book, patient chart records and electronic data. The data was then compiled and recorded in Microsoft Excel (MS-Excel). Mean imputation technique was used for missing data. The data compilation and entry was done by an independent data collector who was trained beforehand to abstract the data using ICU admission and discharge book, patient chart records and electronic data. The data collection and entry was then cross verified by another trained independent data collector to minimize the errors during the process.

In case of any discrepancies between the data collectors, the final decision was taken by the principal investigator. Blinding was not done which is one of the limitations of the study design. Statistical analysis was done using SPSS v 20.0. Descriptive statistics was used to calculate the numbers and percentages. MS-Excel was used to design graphs and figures. Comparative data of seven years was summarized using graphical methods and tables.

Table 1. Definition of outcome measures

Duration of stay	Two Wheeler
Improved and discharged	The primary reason for ICU admission resolved and patient was shifted out of ICU
Discharge on Request (DOR)	The patients' primary reason for ICU admission hadn't resolved and the patient was discharged from the hospital
Withdrawal of life support	The life support measures like mechanical ventilation and vasopressors were stopped with consent from the patient's next of kin in view of futile care as advised by the treating physician
Mortality	Patient succumbed to illness despite all life saving measures in place

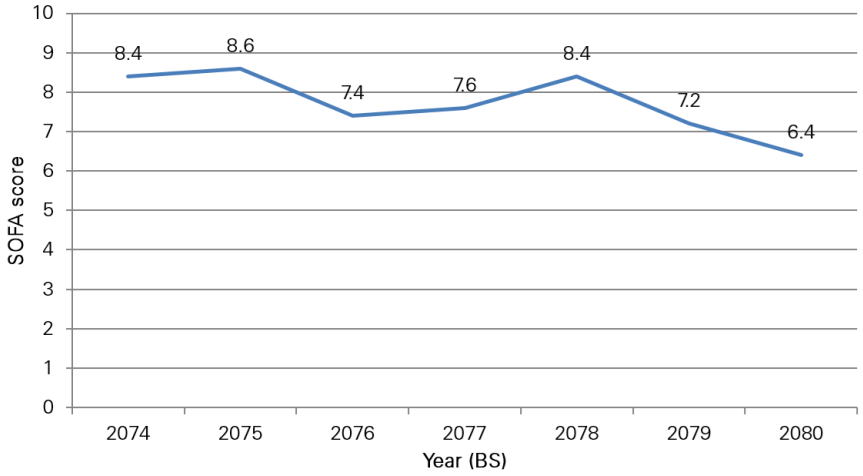

Figure 1. Year wise distribution of average SOFA score of patients at ICU admission

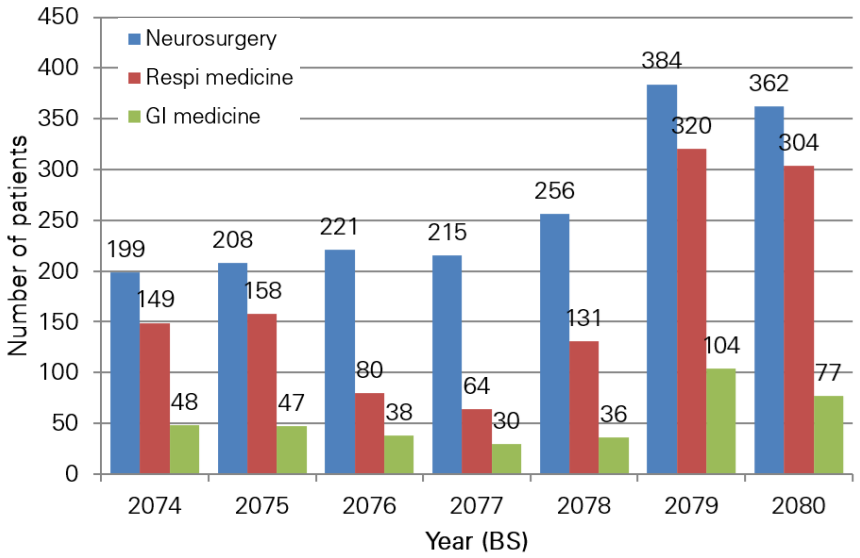

Figure 2. Year wise distribution of patients based on top three primary speciality of admission

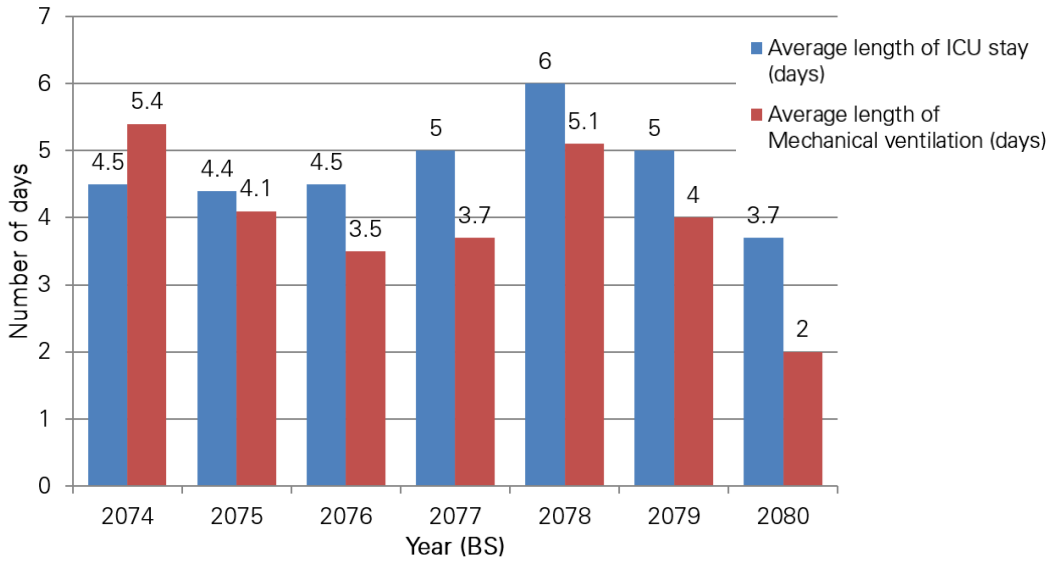

Figure 3. Year wise distribution of average duration of ICU stay and average duration of mechanical ventilation

Table 2. Year wise distribution of LOS, Length of MV and SOFA score at ICU admission

Year (B.S.)	Length of stay (days)	Length of Mechanical ventilation (days)	SOFA score at ICU admission
2074	4.5	5.4	8.4
2075	4.4	4.1	8.6
2076	4.5	3.5	7.4
2077	5	3.7	7.6
2078	6	5.1	8.4
2079	5	4	7.2
2080	3.7	2	6.4

RESULTS

In total, 6233 patients were admitted in TUTH ICU over a period of 7 years from 1st Baisakh 2074 to 31st Chaitra 2080. These patients were admitted from different units of hospitals like wards, operation theatre, high care units and emergency. The highest number of admission was done in the year 2079 and average number of admission was 2.43 patients per day during this time period. An average Sequential organ failure assessment (SOFA) score was 6.7 during the study period. The SOFA score of respective years is shown in Figure 1 and Table 2.

Among total admitted patients, there were 3364 (53.97%) male and 2869 (46.03%) female patients which clearly showed a male preponderance in ICU admission. Majority of the patients admitted to ICU fell within the age group of 15 to 65 years with a total number of 4536 (72.77%). Among the total admitted patients, 3221 (51.67%) belonged primarily to medical speciality and the remaining 3012 (48.33%) belonged primarily to surgical speciality. There is a variable yearly distribution of this data. Over the period of 7 years, the majority of cases admitted were from the neurosurgical department followed by respiratory medicine. The distribution based on primary speciality of admission is shown in figure 2.

The average duration of ICU stay and average duration of mechanical ventilation were 4.2 and 3.96 days respectively over a period of 7 years with year wise data distribution as shown in figure 3 and Table 2.

The outcome of patients admitted over 7 years duration was studied which showed that 4033 (64.7%) patients improved and were transferred out from ICU which accounted for the majority of patients. Seventeen hundred and nine patients died during the study period with an average mortality of 27.4%. Three hundred and eleven patients (4.98%) were discharged on request and 180 patients (2.88%) underwent withdrawal of active life support due to financial or familial issues. The outcome of patients over the study duration is depicted in Table 3.

Table 3. Year wise distribution of patients admitted to ICU based on outcome

Year (B.S.)	Improved (%)	Mortality (%)	Discharge on request (%)	Withdrawal of life support (%)
2074	56.5	33	7.7	2.8
2075	59.8	33.1	4.7	2.4
2076	62.5	30	5.6	1.9
2077	63.8	27	5.2	3.9
2078	63.9	27	5.1	4
2079	73.8	23	2	1.2
2080	65.7	24.1	6.3	3.9

DISCUSSION

The audit of admission profile and outcome of patients in level III ICU of TUTH showed that majority of patients were admitted under medical speciality (51.67%) in comparison to that of surgical speciality (48.33%). It also showed that the SOFA score in the recent years was in a declining trend which indicate that patients reach ICU at a stage when they are less sick than in previous years. The average SOFA score in our study was 6.2. In a study by Do et al. in viatnamese ICU's, the median SOFA score at the time of admission was 7 (IQR 4.5-10), which was higher in comparison to our which indicate that patients reach their ICU's in a more sicker state than ours.[7] The hospital mortality for patients with sepsis in their study was 40.1% which was higher than our mortality of 27.4%. We need to keep in mind that our mortality was an overall mortality of all septic and non-septic patients and provides the importance of segregating mortality into patients with and without sepsis for further comparison of our septic subset with septic patients across other ICU's. Seventeen hundred and nine patients died during the study period in our ICU with an average mortality of 27.4%. The finding of majority of patients belonging to medical speciality was similar to the study done by Vaidya et al. in Bir hospital which showed 72% medical admissions and only 28% surgical admissions.[4] However, data from an Indian study by Divatia et al.[8] found an ICU mortality of 18.1% with an average SOFA score of 3.8. Again clearly, the patients in this study seemed to be less sicker as reflected by the lower SOFA score and that explains the lower mortality in comparison to ours.

However, in a study by Koirala et al.[6], the majority of patients were surgical (49%) followed by medical (51%). In another study done by Cuthbertson et al [9] in the UK, 60-70% admissions were surgical patients. In our context, among all different specialties, neurosurgical speciality occupied the highest number of admission each year with 29.6% among all admitted patients and 61.2% of all surgical admissions. Next speciality with the maximum number of admissions was respiratory medicine. The high volume of neurosurgical patients can be seen as a necessity of a separate and dedicated neurointensive care unit which can be helpful to improve the quality of care in this subspeciality of patients. Similarly, a high number of patients with primary respiratory illness can be seen as a need to expand the number of beds in high dependency units (HDU) with services like Bilevel Positive Airway Pressure (BIPAP) devices and manpower specially trained in managing patients with respiratory issues after they are shifted out from the ICU. Among 6233 patients, 3364 (53.9%) were male patients and 2869 (46.1%) were female patients with the ratio of male to female almost similar to the study conducted by Acharya et al.[5]

Among all the patients admitted during the study period, 4033 (64.7%) patients improved clinically and were transferred out from ICU. This is comparable to other studies where discharge rate was 64.16% in a study done by Vaidya et al[4] and 68% in another study done by Paneru et al.[10] Seventeen hundred and nine patients died during the study period with an average mortality of 27.4%. This is lower in comparison to the previous study done in the same institute by Acharya et al.[5] and Pathak et al.[11] where mortality was 32.8% and 31.7% respectively. The decreased mortality compared to previous years is most likely due to increasing resources, infrastructure and a coordinated teamwork among all ICU staffs. Mortality was slightly higher compared to different studies done in other centers of our country by Paneru et al.[10] and Koirala et al.[6] with 17% and 26% deaths respectively. In another study by Vincent et al. the overall mortality in ICU patients was 16.2% which was much lower than that observed in our study.[12] The high incidence of mortality in our study in comparison to these studies is most likely because patients admitted to TUTH ICU are very sick patients referred from all across the country as indicated by an average SOFA score at admission of 6.7.

Similarly, three hundred and eleven patients (4.98%) were discharged on request and 180 patients (2.88%) underwent withdrawal of life support during the study period of 7 years which was significantly high compared to a study done by Poluyi et.al in West Africa.[13] This data was significantly low compared to other study done by Koirala et al in BPKIHS, Dharan where 13% patients left against medical advice.[6] In another study by Huaqing et al in China, the average rate of withdrawal of treatment was 1.9% over a duration of 3 years from 2015 to 2017.[14] This number was lower than what we observed in our study.

In another study by Fong et al. 6.2% of patients underwent withdrawal of life support over a duration of 6 years in ICU's across Singapore.[15] This number was however higher than what we observed in our study. In another systematic review by Mark et al. the mean prevalence of withdrawal of life-sustaining treatment for patients who died varied from 0 to 84.1% between studies, with standard deviation of 23.7%.[14] Most of the studies included in this systematic review was from Europe and North America. Our prevalence of withdrawal of active life support was therefore comparable to the studies included in this systematic review despite having a lower socio-economic status than theirs.[16] Most of the cases of withdrawal of life support and DOR in our study is likely due to excessive financial burden on the family and ineffective coverage of health insurance services across the country. Though the data on number of patients who are under health insurance schemes is lacking, very less patients are under the government health insurance scheme

from our clinical experience which might have contributed to the decisions for withdrawal and DOR. There is a provision of department based free beds to the needy patients, which includes free investigations and bed charges to the respective patients. But this doesn't include expensive medications and antibiotics required during life threatening illness to the patients. Inability to bear the expenses of these drugs and consumables is likely the leading cause for high rate of discharge on request and withdrawal of life support. Out of all patients shifted from ICU, most of them were transferred to Post-operative Ward (POW) and High Dependency Unit (HDU). This also suggests a fact that in a developing country like Nepal, with limited tertiary level hospitals and a small number of ICU beds, we need to develop more beds in step down units like POW and HDU so that clinically improved cases can be shifted early which will increase the availability of ICU beds for the sicker patients in the waiting list.

The average length of ICU stay in our study was 4.72 days which was comparable to other studies by Moitra et al.[17] and Agrawal et al.[18] where the average length of ICU stay was 3.4 days and 4.01 days respectively. Their study was also performed in a mixed medical surgical like ours.

There are a few limitations in our study. The data for this study was collected from manually filled admission and discharge books and limited electronic data entries available within ICU. There are possibilities of errors while filling this information manually even though we cross verified data entry using two operators. This is one of the limitations of our study. Missing data was another limitation of our study for which mean imputation was performed. This was another limitation of our study which can be improved through the implementation of an electronic medical recording system in the coming days.

CONCLUSION

This seven-year audit of ICU admissions in a tertiary-level hospital highlights the importance of clinical audit for continuous evaluation and quality improvement in critical care. The key findings of the study is the highest number of admission of neurosurgical patients and patients with respiratory illness over the duration of seven years. A progressive decline in average SOFA score, length of ICU stay and length of Mechanical Ventilation over the last 3 years is another notable finding of the study. Average mortality over seven years was observed to be 27.4%. The findings underscore the need for the development of specialized ICUs, such as a neuro-intensive care unit to cater the high volume of neurosurgical patients, and the expansion of step-down facilities with BIPAP to cater the high load of patients with respiratory issues. Regular clinical audits are essential tool for assessing healthcare delivery, identifying gaps, and implementing strategies for better patient care. The integration of an electronic medical record system and a structured ICU registry are essential to ensure data quality and is strongly recommended to enhance the accuracy and efficiency of future audits. Lastly, we strongly recommend health insurance reform to reduce the rate of withdrawal of life support and discharge on request.

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CONFLICT OF INTEREST

The author(s) declare that they do not have any conflicts of interest with respect to the research, authorship, and/or publication of this article.

AUTHOR CONTRIBUTIONS

S Sharma and SP Acharya were involved in determining the research concept. GS Shrestha and S Pathak were involved in research design. PS Shrestha, HR Paneru and D Rijal contributed in literature review. S Sharma, D Rijal and SP Acharya contributed during data collection. GS Shrestha, PS Shrestha, HR Paneru and S pathak were also involved in data analysis. S sharma, GS Shrestha and D Rijal were also involved in statistical analysis. All authors contributed during manuscript preparation and finalization.

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