Original Article

# Clinical profile and outcome of Neurosurgical Patients Admitted to Intensive Care Unit of Rural Tertiary Care Center of Nepal

Praveen Kumar Giri[1], Prem Prasad Panta[2], Nilam Khadka[3]

[1]Department of Anesthesiology and Critical Care, [2]Department of Community Medicine and Public Health, [3]Department of Surgery, Karnali Academy of health Sciences,Jumla.and NAMS.

**Corresponding author:** Dr. Praveen Kumar Giri, E-mail- giripkmd@gmail.com

## ABSTRACT

**Background:** Intensive Care Unit (ICU) is a department of a hospital for patients with the most severe and life-threatening conditions which requires constant and close monitoring, support from specialist, equipment and medications to maintain normal physiological functions. This study will provide information about the clinical profile and outcome of the neurosurgical patient admitted in our ICU.

**Methods**: This is a hospital based secondary data analysis carried out in the teaching hospital of KAHS, Jumla, Nepal. This study was conducted between March to June 2020. Data were retrieved from ICU record book and which had included diagnosis on admission, reason for admission, duration of admission, medical/surgical specialty requesting admission, nature of interventions, outcome of patients admitted and demographic characteristics.. The data were entered into Microsoft Excel and analyzed using SPSS 16.0. Descriptive statistics including percentage, mean, and standard deviation were calculated.

**Results:** A total of 31 patients admitted into the ICU, where 74.2% (n=23) males and 25.8% (n=8) females giving a male to female ratio of 3:1. The ages ranged from 3 month to 70 years. The age group of 15−59 years accounted for highest 51.6% (n=16) of all the ICU admissions. Among all cases, highest 64.5% (n=20) cases were presented from Jumla. Out of the 31 admissions 77.4% (n=24) was due to head injury, while other neurosurgical cases (Stroke, spinal cord injury) accounted 22.6% (n=7). Further dividing head injuries, highest 38.7% (n=12) is due to severe head injury, 22.6% (n=7) moderate head injury and 16.1% (n=5) were mild head injury. Among Stoke cases 71.4% (n=5) cases were due to hemorrhagic origin and only 28.6% (n=2) are ischemic origin. The average length of hospital stay ranged from 1 to 30 days with a mean of 6.3 ± 6.7 days. Among them 64.5% (n=20) were managed conservatively and 35.5% (n=11) underwent surgery. After ICU management 64.5% (n=20) cases were transferred to ward, 12.9% (n=4) referred to higher center, 9.7% (n=3) expired, 13% (n=4) left against medical advice.

**Conclusion:** Head injuries are the highest number of neurosurgical admissions into the ICU with relatively high mortality. Developing a viable trauma team and well equipped neurosurgical ICU with adequately trained staff will help to improve the outcome of patients.

**Keywords:** Head Injury, Intensive Care Unit, Neurosurgery, Nepal, Rural.

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## INTRODUCTION

Intensive Care Unit (ICU) is a special department of the hospital for patients with the foremost severe and life-threatening conditions which often requires constant and close monitoring, support from specialist, equipment and medications in order to maintain normal physiological functions[1,2]. Patient admitted to the ICU from the emergency department or from the general ward following deteriorating clinical condition or as a postoperative case from the operating room following major invasive surgeries with high risk of complications.

The concept of an "advance support of life" which is the foundation for intensive care was developed in the 1950s.[3] In 1953, Bjorn Aage Ibsen established the first ICU in Copenhagen where patients received intermittent positive pressure ventilation.[4] Critical care medicine is still evolving in developing countries and many tertiary hospitals in our country which have developed critical care facilities for the care of the critically ill patients. Critical care is a major challenge in developing countries where health system is often outstrip available resources and, unfortunately, most of the critical health care facilities in our country are still in their primordial stages of development.[5] Karnali Academy of Health Science Teaching Hospital is the largest tertiary institution in the mid-western region of Nepal providing specialist critical care. Currently, it is the only tertiary health facility with ICU facility providing advanced level of intensive care in the entire remote districts of Karnali province. It has been serving over 1.55 million people. KAHS Teaching Hospital is a 300 bedded tertiary hospital and was established in 2011 by parliament act as an autonomous body.[6] At this study time, the hospital had 3 bedded general ICU, which offered only level 1 care as described by London department of health.[7] This study will provide information about the clinical profile and outcome of neurosurgical patients admitted in ICU of KAHS Teaching Hospital. This will contribute to the literature in the field of intensive care facilities in Nepal.

## MATERIALS AND METHOD

This is a hospital based secondary data analysis, which was carried out in the KAHS Teaching Hospital, Jumla, Nepal. This study was conducted between March 2019 to June 2020.Ethical approval was taken from KAHS institutional review committee. Data were retrieved from ICU record book. All neurosurgical cases admitted in our ICU were included and other than neurosurgical cases were excluded. The variables of this study were diagnosis on admission, reason for admission, duration of admission, medical/surgical specialty requesting admission, nature of interventions, outcome, and demographic characteristics. The data were entered into Microsoft Excel and analyzed using SPSS 16.0. Descriptive statistics such as percentage, mean, standard deviation were calculated.

## RESULTS

A total of 31 neurosurgical patients admitted in our ICU, there were 74.2% (n=23) males and 25.8% (n=8) females giving a male to female ratio of 3:1. The ages ranged from 3 month to 70 years. The age group of 15 – 59 years accounted for highest 51.6% (n=16) of all the ICU admissions, followed by 19.4% (n=6) are above 60 year, while 16.1% (n=5) are of 5-14 age group and 12.9% (n=4) were under 5 year of age. Among all cases, highest 64.5% (n=20) cases were presented from Jumla, followed by

19.4% (n=6) from Kalikot, 6.5% (n=2) from Mugu and 3.2%(n=1) each from Achham, Bajura and Dolpa.

Table 1: Sociodemographic Characteristics of patients admitted in ICU (n=31)

| Sex | Frequency | Percentage |
|---|---|---|
| Female | 8 | 25.8 |
| Male | 23 | 74.2 |
| Age | Frequency | Percentage |
| <5 | 4 | 12.9 |
| 5-14 | 5 | 16.1 |
| 15-59 | 16 | 51.6 |
| >60 | 6 | 19.4 |
| District | Frequency | Percentage |
| Achham | 1 | 3.2 |
| Bajura | 1 | 3.2 |
| Dolpa | 1 | 3.2 |
| Jumla | 20 | 64.5 |
| Kalikot | 6 | 19.4 |
| Mugu | 2 | 6.5 |

Out of the 31 admissions 77.4% (n=24) was due to head injury while other neurosurgical cases (Stroke, spinal cord injury) accounted for the remaining 22.6% (n=7). Further dividing head injuries, the highest 38.7% (n=12) was due to severe head injury, 22.6% (n=7) was due to moderate head injury and 16.1% (n=5) was due to mild head injury. Among Stoke, 71.4% (n=5) cases were due to hemorrhagic origin and only 28.6% (n=2) were ischemic origin.

The average length of stay ranged from 1 to 30 days with a mean of 6.3 ± 6.7 days. Among them 64.5% (n=20) were managed conservatively and 35.5% (n=11) underwent surgery. After management, 64.5% (n=20) cases were transferred to ward, 12.9% (n=4) were referred to higher center, 9.7% (n=3) were expired, and 13% (n=4) left against medical advice (2 DOPR and 2 LAMA).

## DISCUSSION

Intensive Care Unit requires sophisticated equipment and highly skilled staff. The outcome of patients depends on the level of training and experience acquired by staff. In developing countries where financial resources are limited, periodic training of staff may not be adequate. It also need a tremendous amount of time and effort of staff to treat and improve survival of the critically ill patients.

Table 2: Clinical Profile of patient admitted in ICU (n=31)

| Head Injury | Frequency | Percentage |
|---|---|---|
| No Head Injury | 7 | 22.6 |
| Mild Head Injury | 5 | 16.1 |
| Moderate Head Injury | 7 | 22.6 |
| Severe Head Injury | 12 | 38.7 |
| Stroke | frequency | Percentage |
| No Stroke | 24 | 77.4 |
| Hemorrhagic Stroke | 5 | 16.1 |
| Ischemic Stroke | 2 | 6.5 |
| Intervention | Frequency | Percentage |
| Conservative Treatment | 20 | 64.5 |
| Surgery | 11 | 35.5 |
| Outcome | Frequency | Percentage |
| DOPR/ROPR | 2 | 6.5 |
| Expired | 3 | 9.7 |
| LAMA | 2 | 6.5 |
| P Ward | 3 | 9.7 |
| Referred | 4 | 12.9 |
| S ward | 17 | 64.8 |
| Hospital Stay | Min | Mean +/_ SD |
| Days | 1 | 6.35 +/_ 6.736 |

For this brief period of time the number of neurosurgical cases admitted in ICU was significant. The situation in Karnali Province differs from many of the other parts of the country, especially due to difficult topography and the absence of motorable roads for a large number of people. Approximately 70% of victims need to be transported by people on

their back or by horse to a motorable road, and then either by public transportation or private buses to the hospital. Referral is also a difficult task in this region.[8] Here our findings showed that almost two third of population were male with younger age group affected mostly. Which was similar to study conducted by Nepal Health Research Council in 2009.[9]In 2018, Sah et al conducted a study in BPKIHS, Nepal, they also found that the age group sustaining were 11-50 years. This result was similar with our study finding.[10-12]

Because of limited road assess to neighbor districts, most of the cases were from Jumla. Most of the cases were traumatic brain injury (head injury), which is consistent with other studies too.[1314 15] Severe head injury was the commonest finding among all. This is most likely due to difficult geography, people go to high mountains for agricultural work or to collect fire wood or grass for domestic animals. Students need travel by their foot to school through difficult mountainous road. Fall down from the cliff is another major reason for sustained head injury. Alcoholism, physical assault are other possible causes for such injury.

Among the neurosurgical cases, only one third of cases underwent surgical intervention, while rest of them were managed conservatively. Most of the cases recovered well and transferred to general ward. Mortality rate was about 10%, and there was 13% (n=4) cases referred out for further management. After management and same number of patients quit treatment and outcome could not be recorded. There is still lack of regular neurosurgical service throughout the year, which is the main reason for referral of patients to other centers. This kind of emergency service should be available regularly to improve care for preventing morbidity and mortality in neurosurgical cases. The limitation of our study is low sample size and short time interval. Further study needed to address these limitations.

## CONCLUSION

Head injuries are the highest number of neurosurgical admissions into the ICU with relatively high mortality. Establishing an active trauma team and equipped neurosurgical ICU with adequately trained staff would help to improve the outcome of patients. Furthermore, the development and strict implementation of protocols along with improved documentation will foster better prognosis for ICU patients.

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