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Trends of Mortality among Neuro-Medicine Inpatient admitted at a Tertiary Care Neuro Specialized Referral Hospital in Bangladesh

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Abstract

Background: Understanding the patterns and determinants of inpatient mortality among neurological patients presenting with medical problem at a tertiary care Neuro-Specialized Hospital is crucial for optimizing care delivery and improving patient outcomes. **Objective:** This study was aimed to investigate the factors contributing to inpatient mortality in this population. **Methodology:** This was a retrospective study of all patients who died during and after admission into Neuro Critical Care department of National Institute of Neurosciences and Hospital, Dhaka, Bangladesh. This is the largest tertiary care center and the only national referral center hospital in Bangladesh. Data on demography and events from 2017 to 2022 leading to death were collected and were analyzed from emergency unit, HDU and ward. The records were evaluated with the trends of mortality. The aged up to 92years with different treatment purpose was considered as study population. Data including patient demographics, primary neurological diagnoses were collected and analyzed. The subjects were collected from neuro-medicine inpatient departments. **Results:** A total of 244 deaths were recorded among the 1312 patients admitted during the 6-years period giving a mortality rate of 18.59% cases. Among them 59.1% cases were male and 40.9% cases were female. The highest number of the patients belongs to the age group 18-65 years 80.9%. According to length of stay in hospital more than 30 days was 48.51%. Most of the patient got admitted to the hospital in emergency ward 22.6%. Yearly mortality trends were lowest in the year 2019(10.3%) and gradually increased in the year 2022 (32.7%). **Conclusion:** In conclusion the death rate of patients is significant among the admitted neurological diseases conditions. *[Journal of National Institute of Neurosciences Bangladesh, January 2024;10(1):3-7]*

Keywords: Mortality trends; mortality; Neuro-ICU; death

Introduction

About 20.0% of the world's population suffers from neurologic disease, with developing nations bearing the brunt of this burden[1]. In the UK, neurologic disorders have an incidence of 0.6% and a lifetime prevalence rate of 6.0%[2]. Numerous patients with acute or long-term neurological issues are frequently admitted to departments other than general medicine. Neurology was introduced as a specialty in Bangladesh during the 1960s'. Apart from infection and malnutrition, an excess burden of cerebrovascular disease and stroke at an early age denotes a higher risk of mortality and morbidity in Bangladesh[3, 4].

Despite these statistical logics whenever available, expert neurologic assessment and can alter the working diagnosis and can have a positive impact on overall hospital management[5]. Diagnostic errors by non-neurologists are not very uncommon, especially regarding epilepsy and other non-organic illness[6,7]. Neurological disorders (NDs) are common among the elderly, and cause a great burden to patients and healthcare systems, and their numbers are likely to

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greatly increase in the next few decades[8, 9]. A population based study showed that not only neurological disorders but also their initial symptoms predict mortality in elderly patients[10]. Neurological disorders are severely disabling and patients are often admitted to tertiary care hospitals[11, 12, 13]. Furthermore, there is a strong correlation between high hospital mortality and acute NDs such stroke, delirium, acquired weakness from an intensive care unit, epilepsy, and epileptic convulsions[14-18].

Two out of every five dementia patients passed away in hospitals, despite the fact that the trend of dementia-related hospital deaths is reversing[19]. Furthermore, the identification of deaths involving dementia is approximately doubled when hospital records and death certificate information are linked[20]. In addition, individuals with non-motor disorders (NDs) such myasthenia gravis, Parkinson's disease, dementia, muscular dystrophy, amyotrophic lateral sclerosis, and cerebrovascular illnesses typically pass away in a hospital[21-22]. Neurologic disorders are quite common among all medical admissions in NINS and there were lack of facilities elsewhere in the country, varieties of neurological problems are referred to National institute of Neuroscience (NINS).

Previously we did not have any published data regarding the neuro-medicine mortality trends pattern in Bangladesh. The available data on this issue are mostly from European countries. We therefore tried to audit the nature of neuro-medicinal mortality trends pattern in ICU and involvement among patients admitted in different departments. Hence, this study aimed to analyze demographics, NDs, and comorbidities in patients admitted with NDs, to identify predictors of hospital mortality in this particular population.

Methodology

Study Settings and Population: The investigation conducted a retrospective analysis of inpatient neuro-medicine department admitted in hospital between 2017 and 2022. Information regarding demographic characteristics and factors contributing to mortality was gathered and analyzed from records spanning medicine wards, the emergency unit and High dependency unit (HDU) records. The study included individuals age 0 to 92, residing in the Bangladesh.

Study Procedure: Data were gathered from 5% of the standard analytic files for each year from 2017 to 2022. Patients who passed away during their hospital admission were identified and their demographic details, clinical diagnosis at the time of death, immediate cause of death, duration of hospital stay, and year of death were collected and analyzed.

Statistical Analysis: Statistical analysis was performed by Windows based software named as Statistical Package for Social Science (SPSS), versions 22.0 (IBM SPSS Statistics for Windows, Version 22.0. Armonk, NY: IBM Corp). Continuous data were expressed as mean, standard deviation, minimum and maximum. Categorical data were summarized in terms of frequency counts and percentages. Chi-square test was used for comparison of categorical variables and Student t test was applied for continuous variables. Every effort was made to obtain missing data. A two-sided P value of less than 0.05 was considered to indicate statistical significance. Differences between case and control were tested.

Ethical Implications: This study was approved by local authority. The patients were not required to provide consent for participation in this study. The Institutional Review Board waived informed consent for participation in this study. All methods in this study were carried out in accordance with relevant guidelines and regulations of studies involving human beings. Because the data were extracted from the record system, we did not consent the study participants, but the dataset was kept in confidential folder and was de-identified.

Results

The results of this study were brought the true picture of patient deaths in neuro- ICU presenting with medical

Table 1: Distribution of Demographic and Treatment Variables among Study Population (n=1312)

Variables	Frequency	Percent
Age Distribution		
• Less Than 17 Years	173	13.2
• 18 to 65 Years	1061	80.9
• More Than 66 Years	78	5.9
Mean ± SD	38.19±18.02	
Gender		
• Male	775	59.1
• Female	537	40.9
• Male: Female (ratio)	1.07:1	
Department of admission		
• From ward	792	60.4
• Emergency ward	296	22.6
• HDU	115	8.8
• Direct From Emergency	109	8.3
Length of Stay		
• Under 7 days	40	3.03
• 7 to 30 days	160	12.23
• More than 30 days	637	48.51

problem. It was analyzed 1312 neuro-medicine ICU patient, with 60.4% patients admitted in the direct from ward and second highest admitted emergency ward 22.6% in the hospital. During the study period 1312 inpatients with neurological diseases that needed neurological care were admitted to Neuro-medicine ICU. The age of these individuals had a normal distribution with a mean of 38.19 ± 18.02 years and median age of 76 years. The highest percentage of patients belongs to age group (18-65) Seven hundred and seventy-five fatalities (59.1%) were male whereas (40.9%) were females giving a male to female ratio of 1.07:1. Among the age group highest 80.9% of patient belong to 18 to 65 years of age group. Most of the patient got admitted to the hospital in emergency ward 296(22.6). Yearly mortality trends were lowest in the year 2019(10.3%) and gradually increased in the year 2022 (32.7%).

Table 1 shows according to the age distribution of the patients for inpatients with neurological disorder the highest number of the patients belongs to the age group 18-65 years 1061(80.9) and male 775(59.1) are higher than the female 537(40.9). Most of the patient got admitted to the hospital in emergency ward 296(22.6). According to the length of stay in hospital 637(48.51) patients had stayed more than 30 days.

Table 2 shows 18- 65 years age group patient mortality 199(18.8) and 862(81.2) patient were survived from this age group. The hospital mortality rate for inpatients with neurological diseases was 244(18.59). Total 244 mortalities were recorded from 1312 patients admitted during the 6-years period.

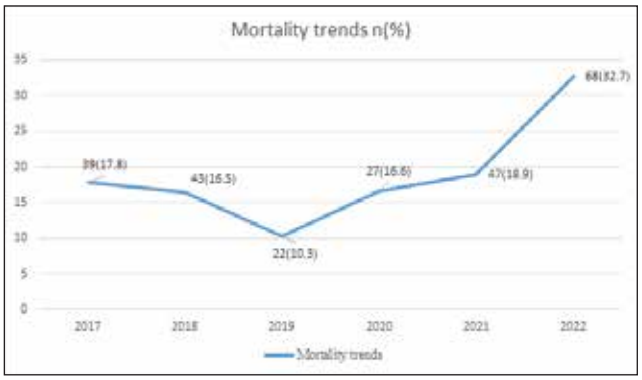

Figure I: Yearly Mortality Trends

Figure I shows over the period from 2017 to 2022, there was a consistent trend showing an increase in the frequency of inpatient department admission. Among the in-patient department studied, there was a notable rise in the proportion of patient death in inpatient hospital settings, 2017 to 2022. This rate exceeded the overall rate for all inpatient treatment, as we specifically chose these 4 categories due to their higher likelihood of being performed in inpatient settings.

Table 2: Age and Percentage of mortality (n=1312)

Group Age	Morality	Survival
More Than 17 Years	29(16.8)	144(83.2)
18 to 65 Years	199(18.8)	862(81.2)
≥66 Years	16(20.5)	62(79.5)
Total	**244(18.59)**	**1068(81.40)**

Table 3: Association of Patient's Death with Admission Distribution (n=1312)

Admission Distribution	Death	Survival	P value
From ward	138(17.4)	654(82.6)	
Emergency Ward	69(23.3)	227(76.7)	
HDU	13(11.3)	102(88.7)	0.019
Direct from emergency	24(22.0)	85(78.0)	
Total	**244(18.6)**	**1068(81.4)**	

Table 4: Association between Use of Smokeless Tobacco and Tobacco Smoking with Severity of Carcinoma (N=185)

Diagnosis				P value
	Admission (n)%	Survival	Death	
SAH	279(21.3)	234(83.9)	45(16.1)	
GBS	564(43.0)	497(88.1)	67(11.9)	
Stroke	133(10.1)	83(62.4)	50(37.6)	
Status Epilepticus	29(2.2)	25(86.2)	4(13.8)	
Meningoencephalitis	97(7.4)	57(58.8)	40(41.2)	0.000
Brain tumor	20(1.5)	16(80.0)	4(20.0)	
Myasthenia Gravis	102(7.8)	94(92.2)	8(7.8)	
AVM	47(3.6)	41(87.2)	6(12.8)	
Tubercular Meningitis	41(3.1)	21(51.2)	20(48.8)	

Table 3 shows 138(17.4) patient were death and 654(82.6) patient were survived for inpatient neurological diseases from ward. The association between admission ward and mortality in ICU of the patient is significant, the P value is 0.019.

Table 4 shows the association with the mortality of different disease. Most of the patient were admitted inpatient with neurological disease GBS patient got admitted 564(43.0) where survival rate 497(88.1) death rate was 67(11.9) and the second highest was SAH patients got admitted in hospital 279(21.3) where survival rate 234(83.9) and death rate was 45(16.1). There P value is 0.000 that is significant.

Discussion

All patients admitted with neuro-medicine unit as the major diagnosis upon discharge, comorbidity or complication of another condition, were enrolled in this study over a two-year period. With regard to the rates of disease frequency and hospital mortality of all NDs as well as their comorbidities that may have an impact on the hospital mortality of patients admitted to NINS, this method allowed for acceptable accuracy.

Hospital death rates were high for all NDs and their comorbidities, even though the frequency of NDs and their comorbidities varied widely. The range between the lowest and highest rate of hospital mortality was found to be small. Because all NDs had a similar high probability of hospital mortality, our results suggested that all inpatients with NDs were very unwell, regardless of their neurological diagnosis or comorbidity.

Because all NDs had a similar high probability of hospital mortality, our results suggested that all elderly inpatients with NDs were very unwell, regardless of their neurological diagnosis or comorbidity. This was unexpected because initially, we anticipated that comorbidities in the highest rank of hospital mortality, such as infections and respiratory and cardiovascular problems, as well as delirium, epilepsy, and cerebrovascular diseases would be predictors of death in this population[24, 25, 26, 27]. Consequently, this investigation was unable to find predictors of hospital mortality among NDs or among comorbidities, while demonstrating a significant hospital mortality rate in this cohort.

It is important to acknowledge the limitations of this study, which stemmed from its retrospective study conducted in a single center. The fact that we employed two methods-examining the discharge lists and checking the neurological procedure records-to find all NDs that might have an impact on the hospital mortality of older patients, however, made the data we collected quite strong. Additionally, after making their decision, the authors went over each patient's written health record in detail, ensuring data quality and identifying any pertinent patient multi-morbidity.

This research underscores the importance of continuous monitoring, rigorous data analysis, and collaborative efforts among healthcare professionals to address mortality trends of neuro-medicine patients effectively in the Neuro-ICU, ultimately striving for improved patient survival rates and enhanced quality of care. Future work should identify reasons for increased mortality among these high-risk groups and implement targeted interventions.

Conclusion

Analyzing the mortality patterns within neuro-critical care unit aids in devising plans and delivering high-quality care. Direct from the emergency were the main site for mortality recorded in the surgical units of our hospital. There is the need to improve emergency departments quality of care and ensuring improved management. Health care strategies toward prevention and screening methods for early detection of disease and appropriate treatment should also be encouraged. The analysis of mortality trends in the neuro-medicine ICU offers valuable insights into the challenges and opportunities in caring for critically ill patients with neurological conditions. By identifying patterns of mortality and associated factors, this study contributes to ongoing efforts to enhance the quality, safety, and effectiveness of neuro-critical care.

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Contribution to authors: Islam MS, Mallick UK conceived and designed the study, analyzed the data, interpreted the results, and wrote up the draft manuscript. Asaduzzaman M, Begum N, Hossain KI, Mostafa N, Galib CMF involved in the manuscript review and editing. All authors read and approved the final manuscript.

Data Availability
Any inquiries regarding supporting data availability of this study

should be directed to the corresponding author and are available from the corresponding author on reasonable request.

Ethics Approval and Consent to Participate
Ethical approval for the study was obtained from the Institutional Review Board. As this was a prospective study the written informed consent was obtained from all study participants. All methods were performed in accordance with the relevant guidelines and regulations.

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