

## Neurologic Emergency Outcome and Associated Factors in a Hawassa University Comprehensive Specialized Hospital, Ethiopia

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### Abstract

**Background:** Neurological disorders are an important cause of disability and death worldwide. Globally, the burden of neurological disorders has increased substantially over the past 25 years because of expanding population numbers and ageing, among that stroke is abrupt onset of neurologic deficit and attributable to focal vascular cause.

**Objective:** To determine the magnitude of neurologic emergency and associated factors among adult patient who visited the adult emergency department of Hawassa university compressive specialized hospital.

**Method:** Institution based cross sectional study was conducted among adult medical neurologic emergency patient at Hawassa Comprehensive Specialized Hospital, Ethiopia.

**Results:** A total of 3883 medical emergency patient cases were evaluated in the ER of HUCSH. Out of which about 422 (10.8%) were presented with neurologic emergencies. Among patients with neurologic emergency, 251 (59.6%) were males. The mean age of patients was 44.58+ 19.28 years. The main clinical presentation of patients with neurologic emergency were Speech difficulty and Hemi-paresis 123 (29.1%), followed by neck stiffens 43 (10.2%). Patients with Co-morbidity were 2.3 times more likely to have unfavorable neurologic emergency treatment outcome (AOR: 2.30 (1.39-3.80)). Patients who stay in hospital for 3-4 days were 69% less likely to have unfavorable neurologic outcome as compared to patients who stayed for 1-2 days (AOR 0.31, 95% CI 0.16, 0.60).

**Conclusion:** The magnitude of one-year neurologic emergency in the study area was found to be 10.8%. During neurologic emergency, longer hospital stay is advantageous. Presence of chronic disease or comorbidity has negative impact on neurologic emergency outcome. Young patients have better neurologic emergency outcome

**Keywords:** Magnitude; Neurologic Emergency; Hawassa; Ethiopia

### Introduction

According to WHO, neurological disorders are diseases of the central and peripheral nervous system including the brain, spinal cord, cranial nerves, peripheral nerves, nerve roots, autonomic nervous system, neuromuscular junction, and muscles. It can present with different symptoms such as; paralysis, muscle weakness, poor Coordination, loss of sensation seizure confusion pain and altered levels of consciousness. Neurological disorders can create serious obstacles to community reintegration, which is an important aspect to be looked at when the patient returns home after an injury [1]. Neurological disorders are responsible of more than 20% of the world's burden of disease. Neurological and psychiatric disorders are responsible for up to 28% of all years of life lived with disability. Neurologic emergencies contributed to 92 million disability-adjusted life years in 2005 and were projected to be 103 million in 2030. The burden of these diseases is higher in a developing country that constitutes about 85% of the world's population [2]. Neurologic emergencies are significant cause of global morbidity and mortality. It is the reason for almost 10% of total deaths every year around the world. Complications due to neurological disorders are currently estimated to affect as many as a billion people. The annual economic cost of neurological diseases amounted to be approximately 180 billion USD in 2004 contributing about one fifth of all hospital admissions. It was remaining one of the top three killers by 2030 [3].

Related to the its burden estimation, neurological diseases would cause 46 million disability-adjusted life years, more than half of which would come from the developing countries. It is estimated that by 2030, neurological disorders would be responsible for more than 9% of total disability-adjusted life years in the lower- & middle-income countries. In 2001 it was estimated that neurovascular diseases accounted for 5.5 million deaths worldwide, equivalent to 9.6% of all deaths. Two-

thirds of these deaths occurred in people living in developing countries and 40% of the subjects were aged less than 70 years. Additionally, neurovascular disease is the leading cause of disability in adults and each year millions of stroke survivors has to adapt to a life with restrictions in activities of daily living as a consequence of neurovascular disease. Many surviving stroke patients were often depending on other people's continuous support to survive [4].

There is limited information available in Ethiopia about the epidemiology of neuron vascular disease including lack of patient demographics and risk factors clinical presentation and barriers to care. These data are beneficial when creating public awareness programs, developing strategies for primary prevention and improving access to care. Early diagnosis and adequate treatment can prevent death in many of these cases like stroke. On the other hand, many neurological illnesses are chronic, such as epilepsy, and represent a huge socioeconomic burden to the patients and their families. Early and adequate treatment may prevent chronic or secondary damage and increase the patients' and their families' quality of life [5]. In Ethiopia, lack, and shortage of studies on neurological diseases resulted in under treatment and under recognition of its burden. Therefore, the aim of

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our study was to determine the magnitude of neurologic emergencies and associated factor among patients in adult emergency setting. This it turns it will help to identify priorities among neurological patients and prepare the hospital to better management of such cases in a socio-culturally appropriate and cost-effective manner.

## Methods

### Study setting, design and sampling

Retrospective cross-sectional study was conducted at Hawassa University Comprehensive and Specialized Hospital. Hawassa is the capital city of SNNPR of Ethiopia which is 273 km far from South of Addis Ababa. The hospital gives service for about 18 million people of SNNPR and some parts of Oromia region.

The Hospital has 811 different healthy workers to give different service. There are 82 Doctors, 657 Nurse and Midwifery, 57 lab technician, 50 pharmacists, 32 others. The hospital has different department Outpatient department, Internal medicine, Dermatology, pediatrics, Anti-retroviral therapy, Tuberculosis clinic Dental clinic, psychiatry, Radiology, Ophthalmology and Emergency room. It has 350 beds for admitted patient. The emergency department has 38 Nurses and 2 MSC in EMCCNS. There are 43 beds in a total of 10 emergency rooms for admissions purpose. The study was conducted from March 1/2018 to April 30/2018 the maximum sample size determined by using single population proportion with the prevalence of 50% and if P=50% It maximize sample size) and confide level 95% & marginal error is 5%.

We calculate sample size using single population proportion formula.

$$n = \frac{z^2 \alpha / 2 (p(1-p))}{d^2}$$

Where:

n= total sample size

Z= standard normal distribution (Z=1.96) with confidence interval of 95% and  $\alpha=0.05$

d= tolerable margin of error (0.05%)

P=population proportion (50%)

$$n = (1.96)^2 \times 0.5 \times (1-0.5) = 3.84 \times 0.5 \times 0.5 = 384 (0.05)^2 0.0025$$

Finally, by adding 10% for expected incomplete data's during data collection and to prevent outliers, the final sample size was 422.

A total of 3883 medical emergency patients were evaluated in the ED of HUCSH in the study.

### Data collection and Instrument

The data collecting questioners was checked by pre-testing it on 5% of the sample size before the study to make sure that the data collecting questioners is capable of yielding the required data for the study and some modifications was done according to the results found. The data was checked for completeness consistency and clarity.

### Statistical analysis

Data were coded, entered and cleaned using Epi info version 3.5.4 and transported to SPSS version 20.0. Variables that satisfied p-value <0.2 were selected for further analysis using multiple logistic regression models. The strength of association was interpreted using odds ratio and confidence interval. p-value <0.05 was considered statistically

significant in this study.

### Ethical considerations

The Ethics Review Board of Hawassa University approved the study protocol. Written consent was obtained from each study participants.

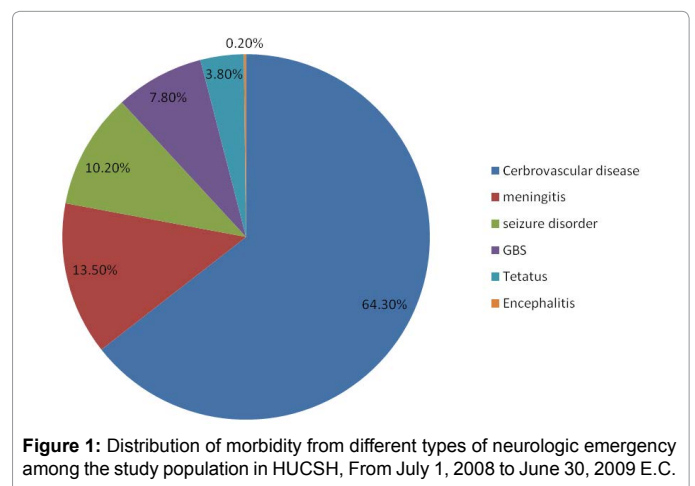
### Operational definitions and glossary

**Neurological emergency:** Structural, biochemical, or electrical abnormalities in the brain, spinal cord or other nerves that necessitates

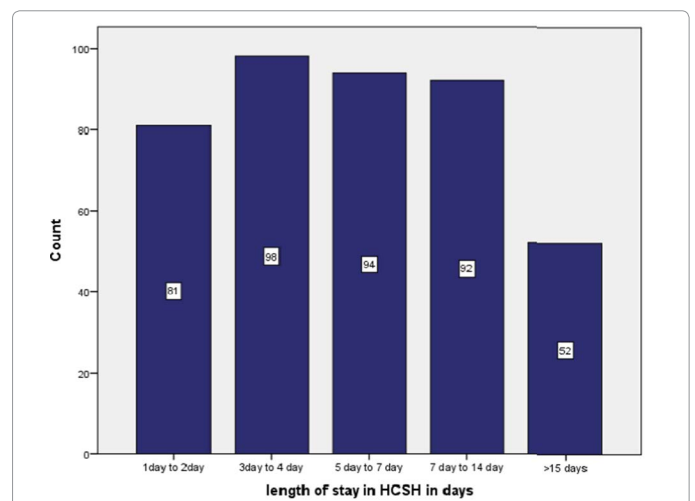
Variables	Parameters	Frequency	Percent
Age	17 to 29 years	101	24
	30 to 50 years	147	34.9
	> 50 years	169	40.0
Sex	Male	251	59.6
	Female	166	39.4
Region	SNNRP	252	59.9
	Oromia	142	33.7
	Others	23	5.5

\*Others: Patients from other regional state of Ethiopia other than SNNRP and Oromia

**Table 1:** Socio-demographic characteristics of the study population from July 1, 2008 to June 30, 2009, E.C.



**Figure 1:** Distribution of morbidity from different types of neurologic emergency among the study population in HUCSH, From July 1, 2008 to June 30, 2009 E.C.



**Figure 2:** Distribution of length of hospital stays of study population in July 1, 2008 to June 30, 2009 E.C.

emergency or urgent treatment

**Disability Adjusted Life Years (DALYs):** This is a summary measure of years of life lost because of premature mortality (YLL) and years of healthy life lost because of disability (YLD). One DALY can be thought of as one lost year of healthy life due to a specific disease.

**Favorable outcome:** Mean improvement observed after treatment

**Unfavorable outcomes:** Which include death or worsening of the conditions.

## Results

A total of 3883 medical emergency patients were evaluated in the ER of HUCSH. About 422 (10.8%) were founded to be neurologic emergencies. Data forms were completed in 417 (98.8%) of the cases. Those with Incomplete information in their medical records 5 (1.2%) were excluded from the study.

Variables		Frequency (n=417)	Percent
Duration of illness during presentation	6 to 12 hrs	102	24.4
	12 to 24 hrs	122	29.2
	1 to 2 days	84	20.2
	3-5 days	78	18.7
	6-10 days	19	4.6
	>10 days	12	2.9
Clinical presentation	Hemiparesis and Speech difficulty	123	29.1
	Neck stiffens	43	10.2
	Altered mental status and headache	33	7.8
	Loss of conciseness	29	6.9
	Hemiparesis	29	6.9
	Convulsion	25	5.9
	Alter mental status and loss of conciseness	19	4.5
	Speech difficulty and loss of consciousness	18	4.3
	Alter mental status Speech difficulty	12	2.8
	Speech difficulty and Neck stiffens	10	2.4
	Loss of memory	10	2.4
	Alter mental status Neck stiffens	10	2.4
	Paraplegia	14	3.5
	Truisms	6	1.4
	Truisms and Speech difficulty	5	1.2
	Headache	5	1.2
	Truisms and alter mental status	4	0.9
	Loss of consciousness and Hemi-paralysis	3	0.7
	Quadriplegia and headache	2	0.5
	Quadriplegia	18	4.3
Others	3	0.6	

**Table 2:** Clinical profile of the study population in HUCSH, in July 1, 2008 to June 30, 2009 E.C.

Variables	Management out come		COR (95% CI)	AOR (95% CI)
	Favorable	Un- favorable		
Age in years	17-29	73	28	1
	30-50	85	62	1.90 (1.10,3.28)
	>50	91	78	2.24 (1.32,3.80)
Sex	Male	152	99	0.92 (0.61,1.37)
	Female	97	69	1
Co- morbidity	Yes	123	46	2.59 (1.70,3.94)
	no	126	122	1
Length of hospital stay in days	1-2	27	54	1
	3-4	58	40	0.35 (0.19,0.64)
	5-7	68	26	0.19 (0.10,0.37)
	7-14	57	35	0.30 (0.16,0.57)
	>15	39	13	0.17 (0.07,0.36)
Diagnosis of neurologic emergency	CVD	147	120	0.93 (0.38,2.9)
	Seizure	33	10	0.19 (0.12,1.31)
	GBS	17	16	0.76 (0.36,4.01)
	Meningitis	43	15	0.14 (0.13, 1.33)
	Tetanus	9	7	1

\*Statically significant association, p-value<0.05

**Table 3:** Factors associated with neurologic emergency treatment outcome among patients presented with neurologic emergency in HUCSH, Hawassa Ethiopia, 2017.

## Socio-demographic data

Age and sex distribution: The sex distribution of participants was 251 (59.6%) males and 166 (39.4%) Females, giving a sex ratio (M:F) of 2.33:2. The age of mean of reviewed patients was 44.58 years (SD±19.28years), median and mode of the study population was 37 and 35 years respectively. Patient age ranged from 17-100 years. More cases were seen in age of >50 years accounting about 169 (40%). About 252 (59.95) of participants were come from SNNPR (Table 1).

## Clinical profile

The main clinical presentation of participants that visited emergency room with neurologic emergency were Speech difficulty and Hemi paresis 123 (29.1%), followed by neck stiffens 43 (10.2%). The complaints are presented in Table 2.

In this study majority of participants were due to cerebrovascular disease with 267 (63.4%) patients (Figure 1). The length of stays in hospital was 98 cases for three to four days (Figure 2).

## Factors associated with neurologic emergency outcome

The univariate analysis indicates age have significant association with neurologic emergency outcome. If all other factors were kept constant, Patients over 50 years were 2.24 times more likely to have unfavorable neurologic emergency outcome as compared to those less than 30 years (COR 2.24 95% CI 1.32, 3.8). In our study, we found statistically significant association between comorbidity and neurologic emergency outcome. Our study revealed that, patients with comorbidity were 2.30 times more likely to have unfavorable neurologic emergency outcome as compared to those patients without comorbidity (AOR: 2.30 (1.39-3.80)). Patients who stay longer in hospital were less likely to have unfavorable neurologic outcome. Patients who stay in hospital for 3-4 days were 69% less likely to have unfavorable neurologic emergency outcome as compared to patients who stayed for 1-2 days (AOR 0.31, 95% CI 0.16, 0.60). Patents with seizure have worst outcome as compared to other diagnosis. For detail refer (Table 3).

## Discussion

The magnitude of neurologic emergencies in this study is also lower than the magnitude of neurological disease seen in Ethiopian patient's hospitalized in general medical wards in two hospitals in Addis Ababa which made up 18.0% and 24.7% of all medical admissions [6-14]. But it was lower than that reported in Nigeria where neurologic emergencies accounted for 25.7% of medical emergencies [6] and in France where neurological emergencies were observed to account for 15% of the medical emergencies [8]. The low rate could be from poor awareness of the public on neurologic disorders; still a lot of peoples in Ethiopia believe neurologic disorders are treatable only by holly water or spiritual power than proper medical management and follow up in hospitals. Besides, the lower magnitude of neurologic disease may be related to the leaving standard of Ethiopian patients as compared to France and Nigerians. In addition to this our study bases secondary data which is prone to poor data handing and messing of valuable information. The mean age of patients with neurologic emergencies was 44.58 years and the SD was +19.28 years. This figure was lower than study done in Nigeria, France and Spain had reported mean age of neurological emergencies to be 49, 59 and 59 years respectively [15-19], It was also higher than studies in Indian were the mean age of those with neurologic emergencies was 37.4 years [20,21]. The difference of this may be due to socio demographic status and the life expectance difference among these countries.

The main complaint for neurologic emergency visit was hemiparesis and speech difficulty. This finding was consistent with a study conducted at Tikur Abbess specialized and Teaching Hospital. This was also correlated with other studies where the most common chief complaints for emergency visit were focal weakness. But in UK Headache was the frequent presentation to ED followed by loss of consciousness, balance difficulties and power loss [22,23]. This difference could be from setting and time variation between the studies and the health services utilization coverage. Longer stay in hospital has significant importance in neurologic emergency outcome. This may be attributable to the care they can get in hospitals is better than outside. That is in hospitals they will get more specialized health care providers and nursing care which have significant importance in improving acute patient conditions. Increases risk of unfavorable outcome among patients with comorbidity may be due to double physiologic burden posed on the patient. Furthermore, most patients with chronic disease were most likely to have diminished immune status i.e., it is not surprising for those patients with comorbidity to have poor prognosis of unfavorable neurologic outcome. We tried to integrate primary and secondary data to triangulate the result. It is the first study in our hospital which focuses on neurologic emergency. However, since this study is institution based it cannot be generalized for the whole country. Besides this study is cross sectional therefore it is not possible to see cause effect relationship.

## Conclusion

The magnitude of one-year neurologic emergency in the study area was found to be 10.8%. Longer hospital stay is advantageous for neurologic emergency outcome. Presence of chronic disease or comorbidity is negatively associated with neurologic emergency outcome. Young patients have better neurologic emergency outcome.

## Recommendations

- Health care providers who take care of neurologic emergency should have to give special attention for those patients with comorbidity.
- Health care providers should not be hurried to discharge patients with neurologic emergency since longer hospital stay feverous prognosis and outcome
- Health care providers should give special attention for old patents with neurologic emergency should have to get special attention
- It is better to undertake more comprehensive study on neurologic emergency and its outcome.

## Ethics Approval and Consent to Participate

Ethical clearance was obtained from community-based education and ethical review committee of the department of emergency medicine and critical care and from the department of emergency medical OPD and adult health, school of nursing and midwifery in Hawassa University. Official letter of permission from the department was submitted to HCSH to conduct the research. All the collected data was kept confidential and no one except the members of the research team had access to the collected information. All paper and computer records of the study is kept in a secured place under lock and the name and/or other personal information is not be notified in any report.

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