Research Article

# 'Stroke Epidemics', The Neurological Emergency of Concern in South-West, Nigeria, W/Africa: The Burden, Pre-Hospital Care Quality, Patterns of Presentations and Treatment Outcomes of Stroke Patients Managed in a Nigerian Tertiary Health Facility, W/Africa

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## Abstract

Stroke as a rife neurological emergency of note across different age-related, gender-based, economic, and racial lines is now more with us than ever before. Cerebrovascular accident, as it is otherwise called, constitutes a major clinico-epidemiologic burden to conscientious neurological emergency physicians, neurologists and neurosurgeons both at the public and private emergency departments of tertiary health institutions, home and abroad, and in the public domains premised on the loads of stroke patients referred from neighboring peripheral facilities or presenting directly to the emergency departments. The main objective is to assess the pre-hospital care quality, severity and patterns of clinical presentation, and treatment outcomes alongside using the information derived to make informed decisions by stakeholders about health of the public as per stroke burden and in par-parsu, the health workers on the rapidly evolving epidemics of stroke streaking across both young and old age brackets. Analysis of the data on clinical presentations, pre-hospital emergency services and clinical outcomes of stroke patients managed at the Emergency Department, University College Hospital, Ibadan, Nigeria, a large public tertiary facility with a comparative advantage on excellent referral network system, clinical services, research and training in West Africa, between May 01, 2021, and April 30, 2022 using SPSS version-28. Stroke is a social menace in the recent times both on the health of the Young and Old with the morbidities and mortalities in the epidemic proportions if unmitigated. Public enlightenment on prevention primarily, then by extension on the danger signs and symptoms of stroke for early ED presentation will go a long way in changing the narrative. Efficient ambulance services with effective in-hospital stroke team protocol of about 72hours comprehensive treatment algorithm will improve further early treatment initiation, stroke ED stroke management and operations dynamics. Prompt treatment of co-morbidities (obesity, hypertension, Diabetes Mellitus, SARS-Cov-2 infection, etc. will appreciably cut down on heavy stroke admission load and improve clinical outcomes.

**Keywords:** Neurological Emergency Physicians; Neurosurgeons; Neurologists; Stroke; Burden; Hemorrhagic; Ischemic; Emergency Department; Health Policy Analyst

## Abbreviations

ED: Emergency Department; SPSS: Statistical Package for the Social Sciences; WHO: World Health Organization; SARS-Cov-2: Covid-19; UCH: University College Hospital; BIDMC: Beth Israel Deaconess Medical Center; HMS: Harvard Medical School; CT: Computerized Tomography; GCS: Glasgow Coma Scale; EGCS: Extended GCS (financial) scale of Emmanuel; USD: US dollar; #: Naira; W/Africa: West Africa; S/West: South West

## Introduction

Stroke represents vascular or cellular 'accident' in the brain just like vehicular accident on the road, hence the name 'cerebrovascular accident' for it by neuro-doctors. Globally, the prevalence of stroke is between 4 and 20 per 1000 population. Worldwide, every 3.5 minutes, someone dies of it. Stroke mortality has been noted to be relatively higher in blacks. It significantly imparts on the daily

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living activities, and these patients, more often than not, need assistance in performing these everyday activities. It does also claim human lives similar to what is seen with the road traffic accident. It is the third leading cause of death worldwide after ischemic heart disease and cancer. Most of these stroke deaths are found in the developing countries. The deaths in these countries account for as much as 87% of all the stroke deaths. This high death toll is even more in Sub-Saharan Africa Lately, the incidence and prevalence of stroke is drastically increasing in Nigeria, which is a public health issue of concern i.e. 'stroke epidemics' is here with us. The study aimed to assess the burden, pre-hospital services, severity, clinical presentations, and treatment outcomes of stroke patients managed in the emergency department so as to inform decision-making on how to mitigate, curtail or contain the menace thereby making the research work highly imperative and worthwhile.

## Materials and Methods

A well-structured questionnaire was used to elicit relevant information on socio-demographic characteristics of respondents, clinical information (level of consciousness at entry based on Glasgow coma scoring system (3-15), *extended Glasgow coma (financial) scale of Emmanuel (4-18), waiting time before admission, time to initial or definitive treatment, clinical condition at presentation based on Triage Early Warning Score (TEWS) score: 0-2 (Green), 3-4 (Yellow), 5-6 (Orange), > or =7 (Red), the complications or comorbidities associated with stroke, treatment outcomes in terms of length of stay, mortality, morbidities, normal discharges, transfer of care or referral cases. A locally adapted Key Informant Interview (KII) guide was used to elicit relevant information required from consultant neurosurgeon (s) and consultant emergency physician (s) on how policy can be formulated based on the outcome of the study. A Comparative advantage of the study leverages on the fact that it is the facility predominantly serves the referral network of the geopolitical zone.

It is a retrospective study of 1000 patients using data available in the case files, referral notes, nurses registers, and CT-reports of patients admitted over a 12 month-period into the emergency department, UCH, Ibadan, Nigeria. The statistical analysis of the data was done using SPSS version-28 on data pooled into a well-tailored proforma designed suitably for the study between May 01, 2021 and April 30, 2022 using SPSS statistical package version-28. An Extended- Glasgow Coma Score of Emmanuel (4-18) was introduced de- novo factoring cost as a 'modulation factor' to the standard (consciousness) score, vividly captioned as "E-GCS" Financial Scale score of Emmanuel (4-18) as a modification to standard Glasgow Coma Scale score ranging between 3 and 15. Class I patients ( living on less than 2 USD per day), Class II (between 2 and 5 USD per day as equivalent) and Class III patients (above 5 USD per day as equivalent). Classes I and III are assigned score of 1 at the extremes of socio-economic spectrum, Class II is assigned a score of 3 (at the centre of the socio-economic spectrum). Higher E-GCS improves the chance of survival with better prognosis especially among the patients with ' 9-15 'standard Glasgow Coma score.

## Results and Discussion

A total of 1000 stroke patients presented with more males (67%) than females (33%). The median age of the patients was 65.0 years with modal age group being 61-71 years. Young stroke patients (aged <40 years) were found in 201 patients (20.1%). Only about one-fourth of the patients presented less than 6 hours from onset of symptoms with the median time of presentation being 72 hours. Only 50 patients (5%) used ambulance services. Depressed level of awareness (DLOA) was the commonest symptom at review (80.0%). Severity scoring index was premised on Glasgow Coma Scale (GCS) ranging 3 and 15 with score of ≤8 (severely impaired level of consciousness) was recorded in 50.9% of the patients. Based on Triage Early Warning Score, 40% of the patients are RED, 30% Orange, 10% Yellow and 20% Green patients. Only about 5% of the patients used ambulance with or without emergency medical services. It is interesting to note that hemorrhagic (50.2%) and ischemic (49.8%) stroke presentations were almost closing in on each other in percentage frequency distribution.60% of the stroke patients had systemic hypertension. We recorded 200 deaths (20%) commoner in males (60%). Average treatment cost for stroke patient is # 120, 500 with length of hospital stay ranging between 12 days and 90 days. Class 1 and class 3 patients suffer more morbidities and mortalities (88%). Haemorrhagic strokes accounted for most deaths (90%). However, the proportion index of stroke by extrapolation hit a high of more than double (estimated at 3.00/1000 population prevalence) with an average of 3 stroke patients on every other day of the week and with a 30-day case-fatality of approximately 94% which is also more than double as against a range of 30-60% (depending on the geographical location and region of the world in context (WHO). Early presentation (First presentation to the facility account for about 10%, while referrals from peripheral facilities account for about 88% with about 1% for transfer of care to another centre as requested or based on

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two-way referral chain as required. Most of the referrals are from secondary health facilities and private hospitals (80%) while 15% are from primary health facilities and others presented directly (5%). Duration of symptoms ranges averagely from half-hour to 24 hours. Waiting time before admission range between half-hour to 6hours. Most of the patients live below 2 USD (60%), some patients live between 2 and 5 USD (30%) while about 10% live above 5 USD. Most deaths occur between ages 50 and 70 years. About 80% of patients were discharged normally with or without residual deficits to follow-up with neuro-clinics and physiotherapy sessions. Clinical syndromes include Transient Ischemic Attack (TIA), ischemic hemispheric stroke (uni or bi-hemispheric), hemorrhagic (uni or bi-hemispheric) variant including pontine, internal capsule and cerebellar bleeds, with or intraventricular extension, mass effect and imminent or established coning, visual, motor, speech or hearing deficits. Co-morbidities include diabetes mellitus, hypoglycemia, chest infections including Covid-19 pneumonia (SARS-COV-2 infection), decubitus(pressure) ulcers, aspiration pneumonitis/ Mendelson syndrome, renal insults etc. Inferences drawn from the available results is to enlighten the public of need for efficient and effective pre-hospital care at different levels of care and proper referral network so as to draft a stroke management policy document to guide transport, triage, admission, treatment and prognosis so as to be better prepared to mitigate the prevailing stroke waves epidemics ravaging the part of Nigeria, West Africa. This, by extension, will educate the government, health institutions and the masses on the modifiable and preventable causes of cerebrovascular accidents or risky lifestyles associated with stroke in the populace [1-13].

## Conclusion

In Nigeria, previous studies estimated crude stroke prevalence at approximately 1.14 per 1000 population with a 30-day case-fatality rate as high as 40%. However, the prevalence of stroke as noted in the study locality (a major tertiary centre in the geopolitical zone) by extrapolation hits a high of more than double( estimated at 3.00/1000 population); an average of 3 stroke patients on every other day of the week with a 30-day case-fatality of approximately 94% which is also more than double of the average of 40% in a contemporary study) From the foregoing, stroke is an established social menace of public health concern particularly in the recent times imparting severely on the health of both the Young and Old with the attendant marked morbidities and mortalities of epidemic proportion. Public enlightenment on prevention primarily, then by extension on the danger signs and symptoms of stroke for early ED presentation will go a long way in changing the narrative. Efficient ambulance services with effective in-hospital stroke team protocol of approximately 3-6hours (golden hours) of ED door-to-stroke unit transfer and core-specialty treatment policy will improve early treatment administration. Prompt treatment of co-morbidities (obesity, hypertension, diabetes mellitus, SARS-Cov-2 infection, etc.) will appreciably cut down on heavy stroke admission load and improve treatment outcomes.

## Acknowledgements

## Conflict of Interest

Neither financial interest nor any conflict of interest exists.

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## Bibliography

1. GBD 2019 Stroke Collaborators. "Global, regional, and national burden of stroke and its risk factors, 1990-2019: a systematic analysis for the Global Burden of Disease Study 2019". *Lancet Neurology* 10 (2021): 795-820.

2. Kim K., *et al*. "Correlation between the Activities of Daily Living of Stroke Patients in a Community Setting and Their Quality of Life". *The Journal of Physical Therapy Science* 3 (2014): 417-419.

3. PH., *et al*. "Impacts of stroke and cognitive impairment on activities of daily living in the Taiwan longitudinal study on aging". *Scientific Reports* 1 (2011): 12199.

4. Carvalho-Pinto BP and Faria CD. "Health, function and disability in stroke patients in the community". *Brazilian Journal of Physical Therapy* 4 (2016): 355-366.

5. Lv Y., *et al*. "Disability Status and Its Influencing Factors Among Stroke Patients in Northeast China: A 3-Year Follow-Up Study". *Neuropsychiatric Disease and Treatment* 17 (2021): 2567-2573.

6. European Transport Safety Council. "Social and economic consequences of road traffic injury in Europe. Brussels: Author. Federal Road Safety Commisssion. Federal road safetycorps inaugural annual lecture series. Abuja: Nigerian Federal Road Safety Commission. Manograph 1 (2009).

7. Garg CC and Karan AK. "Reducing out-of-pocket expenditure to reduce poverty: A disaggregated analysis at rural-urban and state level in India". *Health Policy and Planning* 24.2 (2009): 116-128.

8. Kobusingye OC., *et al*. "Emergency medical systems in Low-and Middle-income Countries: Recommendations for action". *Bulletin of the World Health Organization* 83.8 (2005): 626-631.

9. Kumar AG., *et al*. "Burden of out-of-pocket expenditure for RTI in urban India". *BMC Health Services Research* 12 (2012): 285.

10. Labinjo M., *et al*. "The burden of road traffic injuries in Nigeria: Results of a population-based survey. *Injury Prevention* 15.3 (2009): 157-162.

11. Idowu EO., *et al*." Neuro-trauma: a cost analysis of neurotropic substance use (codeine+ tramadol) among commercial bus drivers who were managed as road traffic head Injury Victims in a Tertiary Center in South-West, Nigeria". *International Journal of Innovative Science and Research Technology* 6.10 (2021).

12. James Morrow., *et al*. "Financial burden associated with attendance at a public hospital emergency department in Johannesburg". *African Journal of Emergency Medicine* 12 (2022): 102-105.

13. Uduak., *et al*. "A cost analysis of road traffic injuries in a tertiary hospital in South-West Nigeria". *International Journal of Injury Control and Safety Promotion* 24.4 (2017): 510-518.