Annals of Health Research
(The Journal of the Medical and Dental Consultants' Association of Nigeria, OOUTH, Sagamu, Nigeria)
CC BY-NC
Volume 12, Issue 2: 225-234
June 2026
doi:10.30442/ahr.1202-08-328

ORIGINAL RESEARCH

A retrospective analysis of Stroke patients admitted into an Intensive Care Unit of a Middle-income country

Omotayo F Salami[1], Arinola A Sanusi[2], Oluwole F Olatunji[1], Florence A Oguntade[1]

[1]Department of Anaesthesia and Intensive Care, Babcock University Teaching Hospital, Ilishan-Remo, Nigeria
[2]Department of Anaesthesia and Intensive Care, University College Hospital. Ibadan, Nigeria

Correspondence: Dr. Omotayo Felicia Salami, Department of Anaesthesia and Intensive Care, Babcock University Teaching Hospital, Ilishan-remo, Nigeria. email: tsalami40@gmail.com ORCID https://orcid.org/0000-0002-0082-956X

Citation: Salami OF, Sanusi AA , Olatunji OF, Oguntade FA. A retrospective analysis of stroke patients admitted into an Intensive Care Unit of a middle-income Country. Ann Health Res 2026. 12(2):225-234 https://doi.org/10.30442/ahr. 1202-08-328

Abstract

Background: Stroke remains a major contributor to morbidity and mortality worldwide, particularly in lower middle-income countries where access to neuro-critical care is limited. This study examined the outcomes of stroke patients managed in the intensive care unit of a teaching hospital in Nigeria.

Objectives: The study aimed to evaluate various indications for admission of stroke patients into the ICU, the characteristics of such patients and the outcome of care in the ICU.

Methods: A hospital-based retrospective descriptive cohort study was conducted among stroke patients admitted to the ICU of Babcock University Teaching Hospital from January 2020 to December 2025. Data on demographics, comorbidities, GCS, neuroimaging, ICU stay, ventilation use, and outcomes were retrieved from records. Descriptive statistics summarized findings, while Fischer's Exact tested associations at a 5% significance level.

Results: Most (58.3%) patients were aged above 60 years and males constituted (69.4%). Hypertension was the leading comorbidity (70.5%). The main indication for admission into the ICU was Severe stroke (GCS 3–8) which occurred in 86.1% of cases. Ischemic stroke accounted for 41.7%, haemorrhagic for 33.3%, and 25% had no imaging evaluation. The mean ICU stay was 9.06 ± 8.81 days, and 75% required mechanical ventilation. ICU mortality was 72.2%, which was significantly associated with mechanical ventilation (Fischer 's exact = 9.046, p = 0.003).

Conclusion: This study highlights the high burden and poor outcomes of stroke patients requiring intensive care. Mortality was associated with mechanical ventilation.

Keywords: Glasgow Coma Scale, Intensive care unit, Mechanical ventilation, Mortality, Nigeria, Stroke

Introduction

Stroke remains one of the leading causes of death and long-term disability worldwide, posing a major public health and economic burden.[1,2] Globally, stroke is the second leading cause of death, accounting for 11.6 % of all deaths in 2019.[3] Recent data indicate that nearly 15 million people experience a stroke each year, among whom about 5 million die and another 5 million are left permanently disabled, creating substantial demands on acute and long-term care services.[4] Advances in critical care, neuroimaging, and re-perfusion therapies have improved survival rates in high-income countries [5,6] but in many low- and middle-income settings, stroke continues to carry high morbidity and mortality due to limited access to intensive care and specialized management.[7,8]

Intensive care unit (ICU) admission plays a pivotal role in the management of severe stroke, particularly for patients requiring advanced airway protection, haemodynamic stabilization, and continuous neurological monitoring. [9,10] The indications for ICU admission in stroke commonly include decreased level of consciousness, respiratory failure, cerebral oedema, refractory seizures, and complications such as aspiration pneumonia or cardiac instability. [11,12]

Several tools have been developed to standardize the assessment of stroke severity and outcomes. The National Institutes of Health Stroke Scale (NIHSS) is widely used to quantify neurological impairment and predict clinical outcomes, [13] while the Modified Rankin Scale (mRS) remains the most commonly used measure of functional recovery and disability following stroke. [14] These instruments facilitate comparison across studies and support evidence-based decision-making. However, their routine use remains limited in many resource-constrained settings where documentation often focuses on general basic neurological assessments such as the Glasgow Coma Scale (GCS).

Outcomes following ICU admission vary depending on stroke type, severity, comorbidities, and the timeliness of intervention. Studies from high-income countries have reported ICU mortality rates for stroke ranging between 20 and 40%, with worse outcomes observed in haemorrhagic compared to ischemic stroke. [15,16]

In sub-Saharan Africa, the stroke burden is rapidly increasing, driven by population aging, urbanization, and the rising prevalence of hypertension and diabetes.[17] A systematic review and meta-analysis done in Nigeria revealed a stoke incidence of 26 per 100,000 person-years, with a higher incidence in men compared to women.[18]

Despite advancements in stroke management, access to neurocritical care remains severely limited, particularly in Nigeria, where only a small proportion of stroke patients receive ICU care. This limitation is largely attributed to financial barriers, delayed hospital presentation, inadequate diagnostic and monitoring facilities, and insufficiently-equipped critical care units.[19,20] Consequently, data on the indications for ICU admission and outcomes among stroke patients in Nigerian tertiary and teaching hospitals remain sparse. Understanding the clinical indications for ICU admission and the associated outcomes

among stroke patients in resource-limited settings is critical for improving triage, optimizing resource allocation, and guiding clinical protocols. This study therefore examined the outcomes of stroke patients admitted into the ICU of a university teaching hospital in Nigeria.

Methods

Study Design, Setting, and Population

This study was a hospital-based retrospective descriptive cohort study, conducted among stroke patients admitted to the intensive care unit of Babcock University Teaching Hospital, Nigeria, between January 1 2020, and December 31 2025. Eligible cases were identified through a systematic search of the hospital's electronic database using the International Classification of Diseases, Tenth Revision (ICD-10) codes for stroke (I60.0 to I62.0, I63.0 to I63.9, and I64.0). Babcock University Teaching Hospital serves as a major referral centre that provides specialized care for patients with acute neurological conditions, including stroke.

The study population comprised adult patients who were admitted during the study period with a clinical or radiological diagnosis of stroke. Patients were included if they had a confirmed diagnosis of stroke based on physician documentation, regardless of neuroimaging availability, and if their medical records contained adequate demographic, clinical, and outcome data. Stroke diagnosis was based on the WHO criteria, defined as rapidly developing clinical signs of focal or global disturbance of cerebral function lasting more than 24 hours or leading to death, with no apparent cause other than vascular origin, supported by CT or MRI findings where available.[21] Stroke diagnosis was established based on documented clinical findings consistent with acute stroke and evaluation by the managing physician or neurologist. Neuroimaging findings were reviewed where available. Neuroimaging was performed using non-contrast computed tomography (CT) scanning as the primary modality at the study centre, with images acquired on a multi-slice CT scanner at standard acquisition parameters (120 kVp, 5 mm slice thickness). MRI was performed in selected cases based on clinical indication and equipment availability, using standard sequences including T1-weighted, T2-weighted, and FLAIR imaging. Patients without neuroimaging were retained in the analysis if the diagnosis of stroke had been clearly documented by the attending physician based on clinical presentation and supporting clinical evidence. Patients with transient ischemic attacks, stroke mimics such as brain tumours or metabolic encephalopathy, or those with incomplete or missing essential data were excluded from the analysis.

Definition of Comorbidities

Hypertension was defined as a prior diagnosis documented in the medical records or current use of antihypertensive medications. Diabetes mellitus was defined as a prior diagnosis or current use of antidiabetic agents, in accordance with World Health Organization (WHO) diagnostic criteria. Other comorbidities were

identified from documented physician diagnoses in the medical records.

ICU Management

ICU management followed institutional protocols. Ischemic stroke patients were assessed for eligibility for intravenous thrombolysis (tPA) within 4.5 hours of symptom onset,[22] though none received thrombolysis during the study period due to delayed presentation. Blood pressure management followed American Heart Association or American Society of Anaesthesiologist (AHA/ASA) guidelines. Patients requiring airway protection received endotracheal intubation and mechanical ventilation with lung-protective strategies. Antiplatelet therapy was initiated in ischemic stroke patients without contraindications. Nutritional support was provided via nasogastric tube where indicated

Data Collection and outcomes

Data were retrieved retrospectively from patients' medical records, electronic health databases, and ICU admission logs within the study period. A structured data extraction sheet was used to ensure completeness and consistency of information. Each case was assigned a serial number for confidentiality, and only de-identified data were analysed. The variables recorded included Socio-demographic, clinical, and outcome parameters. Socio-demographic variables comprised name, age, and sex. Clinical variables included presenting complaint, pre-existing complaints, and comorbidities. Neurological findings were recorded, including the Glasgow Coma Scale (GCS) score at admission, in the ICU, as well as other neurological signs documented during admission. Neuroimaging data were obtained from CT or MRI reports and categorized based on stroke type. Treatment-related variables included duration of ICU stay, use of mechanical ventilation, days on mechanical ventilation, mechanical ventilation–related complications, and tracheostomy status. The primary outcome variable was clinical outcome at discharge. Patients classified as 'transferred' were those discharged from the ICU to general wards within the same institution for continued care, indicating clinical stabilization. Such patients were considered survivors for the purpose of mortality analysis Secondary outcomes included duration of ICU stay and need for mechanical ventilation.

Statistical Analysis

Data were entered into Microsoft Excel and analysed using Statistical Package for the Social Sciences (SPSS) version 26. Continuous variables were summarized using means and standard deviations, while categorical variables were presented as frequencies and percentages. Associations between categorical variables and patient outcomes were assessed using Fischer's exact test. Statistical significance was set at $p < 0.05$.

Results

Table I presents the Socio-demographic characteristics of the patients. More than half (58.4%) of the study participants were aged above 60 years, while 22.2% were younger than 45 years and 19.4% were

between 45 and 59 years. Males represented a higher proportion of the sample (69.4%), while females accounted for 30.6%.

In Table II, majority of the patients (91.7%) were admitted to the intensive care unit with reduced level of consciousness, while 8.3% presented with post-stroke seizures.

Table I: Socio-demographic characteristics of patients (n=36)

Variables	Frequency	Percentage
Age (years)		
<45	8	22.2
45-59	7	19.4
≥60	21	58.4
Sex		
Female	11	30.6
Male	25	69.4

Table II: Clinical Characteristics at ICU Admission (n=36)

Presenting complaints at ICU	Frequency	Percentage
Reduced loss of consciousness	33	91.7
Post stroke seizures	3	8.3
Comorbidity*		
Hypertension	31	70.5
Diabetes Mellitus	7	15.9
Heart Failure	1	2.3
Atrial Fibrillation	1	2.3
Chronic Kidney Disease	1	2.3
Severe Left Ventricular Dysfunction	1	2.3
Pituitary tumour	1	2.3
Pulmonary Tuberculosis	1	2.3
Glasgow Coma Scale (GCS) score		
Severe (3-8)	31	86.1
Moderate (9-12)	4	11.1
Mild (13-15)	1	2.8
Mean ± SD	5.42 ± 2.98	
Type of stroke (as evaluated by cranial CT)		
Ischemic	15	41.7
Haemorrhagic	12	33.3
No CT	9	25.0

* – Percentages exceed 100% as some patients had more than one comorbidity."*

Hypertension was the most common comorbidity observed in 70.5% of the patients, followed by diabetes mellitus (15.9%). Other comorbidities, (each accounting for 2.3% of the cases), included heart failure, atrial fibrillation, chronic kidney disease, severe left ventricular dysfunction, pituitary tumour, and pulmonary tuberculosis. Based on the Glasgow Coma Scale (GCS), 86.1% of the patients had scores between 3 and 8, 11.1% had scores between 9 and 12, and 2.8% had scores between 13 and 15. The mean GCS score was 5.42 ± 2.98. Among the stroke patients admitted to the ICU, 15 (41.7%) had ischemic stroke, 12 (33.3%) had haemorrhagic stroke, while 9 (25.0%) had no brain imaging performed.

Table III: ICU Stay and Mechanical Ventilator Support

Length of ICU Stay (days)	Number	Percentage
1-4	8	22.2
5-8	12	33.3
9-12	11	30.6
>12	5	13.9
Mean ± SD	9.06 ± 8.81	
On Mechanical Ventilator		
Yes	26	72.2
No	10	27.8
Days on Mechanical Ventilator (n=26)		
< 2 days	4	15.4
2–6 days	12	46.1
≥7 days	10	38.5
Mechanical Ventilator related complications		
No	23.1	88.9
Yes	2.9	11.1
Tracheostomy		
No	34	94.4
Yes	2	5.6

Table III shows the duration of stay in the intensive care unit (ICU) among patients. About one-third (33.3%) stayed between 5 and 8 days, 30.6% stayed for 9 to 12 days, 22.2% stayed for 1 to 4 days, while 13.9% had ICU stay exceeding 12 days. The mean duration of ICU admission was 9.06 ± 8.81 days. Majority (72.2%) of the patients required mechanical ventilation, whereas 27.8% did not. Among those who received mechanical ventilation, 15.4% were ventilated for less than 2 days, 46.1% for 2 to 6 days, and 38.5% for 7 days or longer. Mechanical ventilator-related complications occurred in 11.1% of patients, while 88.9% had no reported complications. Tracheostomy was performed in 5.6% of the patients.

Regarding patient outcomes, 72.2% of the individuals admitted to the intensive care unit died, while 27.8% were transferred from the ICU to other wards for continued management. A significant relationship was found between the use of mechanical ventilation and medical outcome among stroke patients admitted to the ICU (*Fischer's exact* = 9.046, p = 0.003). Among patients who required mechanical ventilation, 22 (61.1%) died and 4 (11.1%) were transferred, while among those not mechanically ventilated, 4 (11.1%) died and 6 (16.7%) were transferred.

Discussion

The demographic and clinical characteristics of stroke patients admitted to the intensive care unit in this study reflect the evolving epidemiology of stroke in Nigeria. The predominance of older adults above 60 years aligns with reports from other tertiary centres across the country, where mean ages at presentation range from the late fifties to early sixties.[19,23] This pattern mirrors the global shift in stroke burden towards older populations, driven by population aging and the cumulative effect of vascular risk factors over the life course. A German study reported even older populations with a mean

age of 70.8 years among 347 patients admitted to the ICU for acute stroke, with 28.8% comatose and 66.6% requiring intubation.[24] Similarly, in two recent French studies, median age was 63.8 to 68.2 years, most patients were comatose, and 87 to 100% were intubated.[25,26]

The male predominance observed in this cohort is consistent with several hospital based studies in Nigeria. Adeloye in a systematic review and meta-analysis reported that the incidence and prevalence of stroke are significantly higher in men than in women, with an incidence rate of 34.1 per 100,000 among men compared to 21.2 per 100,000 among women.[18] Recent hospital-based studies conducted in Ilorin and Ibadan corroborate these findings, reporting that men constituted 61.9% and 62.6% of stroke survivors respectively.[27,28]

The mean ICU stay in this study (9.06 ± 8.81 days) was longer than previous figures reported in other Nigerian tertiary hospitals. At Obafemi Awolowo University Teaching Hospital Complex, Ile-Ife, the mean stay was 4.9 ± 5.95 days and 5.13 ± 3.42 days was reported at the Nnamdi Azikiwe University_Teaching Hospital, Nnewi.[29,30] The longer duration observed in this study may indicate more severe cases, delayed recovery, or a greater need for prolonged ventilatory support.

The ICU mortality rate of 72.2% in this study is comparable with a previous study in Abakaliki (71%), [31] reflecting the severe nature of stroke cases requiring critical care. In contrast, the multicentre SIREN study, which included both ICU and non-ICU patients, reported a much lower rate of 21.8%.[32] These differences likely reflect variations in disease severity, resource availability, and timing of presentation, with the higher mortality in this study suggesting delayed presentation.

The very high frequency of mechanical ventilation in this cohort reflects the clinical severity of cases admitted during the study period. Three quarters of patients required mechanical ventilatory support, consistent with the clinical profile observed in strokes complicated by reduced consciousness, loss of airway protective reflexes, aspiration risk, and respiratory failure.[33] Mechanical ventilation in this context is best interpreted as a marker of severe neurological impairment and haemodynamic instability rather than an independent determinant of outcome. The strong association observed between mechanical ventilation and mortality in this cohort is therefore likely to reflect confounding underlying neurological severity. This interpretation is consistent with studies reporting in-hospital or 28-day mortality among ventilated stroke patients commonly in the range of 50 to 65%, depending on case mix and treatment-limitation policies.[34,35] In pragmatic terms, requirement for invasive ventilation may serve as an objective triage indicator when scarce ICU beds are allocated and when prognostic discussions with families are undertaken, though causal inference cannot be drawn from this association alone.

The predominance of severe neurological impairment on admission with 86.1% of patients scoring 3 to 8 on the Glasgow Coma Scale, further clarifies the clinical profile of this cohort. Similarly, a multicentre study reported 75.7% of their patients had impaired consciousness which contributed to

need for mechanical ventilation and increased mortality.[34] Low GCS score at ICU admission is a validated predictor of mortality and poor functional recovery after stroke.[24] High proportions of patients with depressed consciousness in hospital series from low resource settings likely reflect delayed presentation, larger infarct or haemorrhage volumes, and limited availability of immediate interventions. It should be noted that GCS score in isolation does not fully capture the spectrum of stroke-related neurological deficits. However, from a public health perspective, the pattern of late and severe presentation requires intensified community education to promote earlier recognition of focal neurological signs and for strengthening primary care hypertension detection and control to reduce catastrophic presentations.

Limitations: The retrospective nature of the study in addition to a small sample size with incomplete neuroimaging in some patients limit the generalizability of the findings. The absence of a stroke-specific severity measure such as the National Institutes of Health Stroke Scale (NIHSS) represents a methodological limitation of this study.

Conclusion

This study highlights the high burden and poor outcomes of stroke patients requiring intensive care, with mortality strongly associated with severe neurological impairment and mechanical ventilation. The findings emphasize the need for early stroke detection and triage, improved community education, timely ICU referral, and improved neuro-critical care capacity to enhance survival and recovery among stroke patients in Nigeria.

Ethical Considerations: Ethical approval for this study was obtained from the Ogun State Health Research Ethics Committee (OGHREC/467/2026/1151/APP). The study utilized retrospectively collected hospital records and involved no direct patient contact. Patient confidentiality was maintained throughout the study by removing all personal identifiers before data analysis. Data were stored securely and accessed only by members of the research team.

Conflicts of interest: The Authors declare no conflict of Interest
Funding supports: None
Authors' contributions: SOF and SAA prepared the manuscript, OFO and OFA contributed to data collation while all the authors proof read and approved the final version of the manuscript.
Acknowledgements: The authors wish to acknowledge the assistance of the Physicians and nurses in the Intensive Care Unit, in the conduct of this study.
Publication history: Submitted 21 May 2026, Accepted 29 June 2026

References

1. Donkor ES. Stroke in the 21st Century: A Snapshot of the Burden, Epidemiology, and Quality of Life. Stroke Res Treat. 2018;2018:3238165. doi: 10.1155/2018/3238165
2. Song D, Xu D, Zhang K, Lou Y, Du Y, An Y, *et al*. Stroke mortality risk factors: Global trends and regional variations (1990–2021). J Am Heart Assoc. 2025;14(12):1-11. doi: 10.1161/JAHA.125.042107
3. Pu L, Wang L, Zhang R, Zhao T, Jiang Y, Han L. Projected global trends in ischemic stroke incidence, deaths and disability-adjusted life years from 2020 to 2030. Stroke. 2023;54(5):1330-1339. doi: 10.1161/STROKEAHA.122.040073

4. GBD 2021 Stroke Risk Factor Collaborators. Global, regional, and national burden of stroke and its risk factors, 1990-2021: a systematic analysis for the Global Burden of Disease Study 2021. Lancet Neurol. 2024;23(10):973-1003.
5. Aderinto N, Olatunji D, Abdulbasit M, Edun M. The essential role of neuroimaging in diagnosing and managing cerebrovascular disease in Africa: a review. Ann Med. 2023;55(2):2251490. doi: 10.1080/07853890.2023.2251490
6. Chen Y, Wang S, Xu S, Xu N, Zhang L, Zhou J. Current advances in neurocritical care. J Intensive Med. 2024;5(1):23-31.
7. Kayola G, Mataa MM, Asukile M, Chishimba L, Chomba M, Mortel D, *et al.* Stroke Rehabilitation in Low- and Middle-Income Countries: Challenges and Opportunities. Am J Phys Med Rehabil. 2023;102(2S Suppl 1):S24-S32.
8. Wiyarta E, Fisher M, Kurniawan M, Hidayat R, Geraldi IP, Khan QA, et al. Global Insights on Prehospital Stroke Care: A Comprehensive Review of Challenges and Solutions in Low- and Middle-Income Countries. J Clin Med. 2024;13(16):4780. doi: 10.3390/jcm13164780
9. Roy J, Musmar B, Tziviskos N, Patel S, DeLeon R, Thommana A, et al. Comparison of Outcomes Among Neurovascular Patients Managed in Dedicated Neurological Intensive Care Units vs. General Intensive Care Units. J Clin Med. 2025;14(9):3090. doi: 10.3390/jcm14093090.
10. Sonneville R, Gimenez L, Labreuche J, Smonig R, Magalhaes E, Bouadma L, et al. What is the prognosis of acute stroke patients requiring ICU admission? Intensive Care Med. 2017;43:271-272.
11. Kirkman MA, Citerio G, Smith M. The intensive care management of acute ischemic stroke: an overview. Intensive Care Med. 2014;40(5):640-653.
12. Carval T, Garret C, Guillon B, Lascarrou JB, Martin M, Lemarié J, et al. Outcomes of patients admitted to the ICU for acute stroke: a retrospective cohort. BMC Anesthesiol. 2022;22(1):235. doi: 10.1186/s12871-022-01777-4.
13. Lyden P. Using the national institutes of health stroke scale: a cautionary tale. Stroke. 2017;48(2):513-519.
14. Powers WJ, Rabinstein AA, Ackerson T, Adeoye OM, Bambakidis NC, Becker K, et al. Guidelines for the early management of patients with acute ischemic stroke: 2019 update to the 2018 guidelines. Stroke. 2019;50:e344-e418.
15. Mohammed AS, Degu A, Woldekidan NA, Adem F, Edessa D. In-hospital mortality and its predictors among stroke patients in sub-Saharan Africa: A systemic review and meta-analysis. SAGE Open Med. 2021;9:20503121211036789. doi: 10.1177/20503121211036789
16. Kurtz P, Bastos LSL, Zampieri FG, de Freitas GR, Bozza FA, Soares M, et al. Trends in Intensive Care Admissions and Outcomes of Stroke Patients Over 10 Years in Brazil: Impact of the COVID-19 Pandemic. Chest. 2023;163(3):543-553.
17. Owolabi MO, Akarolo-Anthony S, Akinyemi R, Arnett D, Gebregziabher M, Jenkins C, et al. The burden of stroke in Africa: a glance at the present and a glimpse into the future. Cardiovasc J Afr. 2015;26(2 Suppl 1):S27-38.
18. Adeloye D, Ezejimofor M, Auta A, Mpazanje RG, Ezeigwe N, Ngige EN, et al. Estimating morbidity due to stroke in Nigeria: a systematic review and meta-analysis. J Neurol Sci. 2019;402:136-144.
19. Osuegbu O, Adeniji F, Owhonda G, Kanee R, Aigbogun E. Exploring the Essential Stroke Care Structures in Tertiary Healthcare Facilities in Rivers State, Nigeria. Inquiry. 2022;59:00469580211067939 doi: 10.1177/00469580211067939
20. Komolafe MA, Idowu AO, Peter ME, Oyinlola HW, Sanusi AA, Balogun SA, et al. Neurocritical Care in Nigeria. West Afr J Med. 2023;40(6):630-633.
21. Feigin VL, Stark BA, Johnson CO, Roth GA, Krishnamurthi RV, Parmar P, et al. 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 Neurol. 2021;20(10):795-820.
22. Bai QK, Zhao ZG, Lu LJ, Shen J, Zhang JY, Sui HJ, et al. Treating ischaemic stroke with intravenous tPA beyond 4.5 hours under the guidance of a MRI DWI/T2WI mismatch was safe and effective. Stroke Vasc Neurol. 2019;4(1):8-13.
23. Arabambi B, Ogun Y, Oshinaike O. Pattern, risk factors, and outcome of acute stroke in a Nigerian university teaching hospital: A 1-year review. Niger J Med. 2021;30(3):252.
24. Alonso A, Ebert AD, Kern R, Rapp S, Hennerici MG, Fatar M. Outcome predictors

of acute stroke patients in need of intensive care treatment. Cerebrovasc Dis. 2015;40:10-17.
25. de Montmollin E, Terzi N, Dupuis C, Garrouste-Orgeas M, da Silva D, Darmon M, et al. One-year survival in acute stroke patients requiring mechanical ventilation: a multicenter cohort study. Ann Intensive Care. 2020;10:53. doi: 10.1186/s13613-020-00669-5.
26. Sonneville R, Gimenez L, Labreuche J, Smonig R, Magalhaes E, Bouadma L, et al. What is the prognosis of acute stroke patients requiring ICU admission? Intensive Care Med. 2017;43:271-272.
27. Ogunde GE, Akinyemi R, Akinyemi JO, Kalaria R. Long-term outcomes among Nigerian stroke survivors; data from the CogFAST-Nigeria study. J Neurol Sci. 2021;429:119729. doi: 10.3389/fstro.2025.1586814
28. Ameen H, Asafa S, Oladiji F, Yusuf K, Alatishe-Muhammad B, Bolarinwa A, et al. Stroke Severity and Health-Related Quality of Life Among Stroke Survivors at a Tertiary Hospital in Nigeria. Zagazig Univ Med J. 2025;31(3):1299-1310. doi: 10.21608/zumj.2025.352764.3794.
29. Akinjola O, Olateju S, Idowu A, Aaron O, Adetoye A, Ogunmodede A, et al. Indications and Outcomes of Medical Intensive Care Admissions in a Nigerian Tertiary Hospital. Ann Health Res. 2023:9(4):313-321. doi:10.30442/ahr.0904-04-216
30. Nwachukwu C, Nwachukwu J, Okpala B, Nwachukwu C, Oranusi I, Ufoaroh C, et al. A 7-year review of medical admission profile for clinical diseases in an intensive care unit of a low-resource setting. SAGE Open Med. 2023 Feb 12;11:20503121231153104. doi: 10.1177/20503121231153104. 2023;11.
31. Eze C, Okoro F, Nnaji T, Nwobodo M, Kalu U, Ewah R. Mortality Pattern in Intensive Care Unit: Experience at Abakaliki Southeastern Nigeria. World J Cardiovasc Dis.2020;10(7):473-482. Doi:10.4236/wjcd.2020.107047
32. Sarfo FS, Akpa OM, Ovbiagele B, Akpalu A, Wahab K, Obiako R, et al. Patient-level and system-level determinants of stroke fatality across 16 large hospitals in Ghana and Nigeria: a prospective cohort study. Lancet Glob Health. 2023;11(4):e575-e585.
33. Robba C, Bonatti G, Battaglini D, Rocco PRM, Pelosi P. Mechanical ventilation in patients with acute ischaemic stroke: from pathophysiology to clinical practice. Crit Care. 2019;23(1):388. doi: 10.1186/s13054-019-2662-8.
34. Ershov V, Belkin A, Gorbachev V, Gritsan A, Zabolotskikh I, Lebedinsky K, et al. Mortality Predictors in Stroke Patients Requiring Mechanical Ventilation: A Multicenter Prospective Observational Study. J Intensive Care Med. 2025;40(11):1169-1176.
35. Isokuortti H, Virta JJ, Curtze S, Tiainen M. One-Year Survival of Ischemic Stroke Patients Requiring Mechanical Ventilation. Neurocrit Care. 2023;39(2):348-356.

This open-access document is licensed for distribution under the terms and conditions of the Creative Commons Attribution License (http://creativecommons.org/licenses/by-nc/4.0). This permits unrestricted, non-commercial use, reproduction and distribution in any medium provided the original source is adequately cited and credited.