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Original Research

The Pattern of Medical Admissions at the Intensive Care Unit of the University of Port Harcourt Teaching Hospital, Nigeria

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Abstract

Background. Intensive care units offer specialized care to critically ill patients and are an integral part of modern health care. In low-income countries, with limited resources, the demand to optimize patient care and improve outcomes depends on a better understanding of the pattern of medical referrals to the ICU for varying reasons of resource allocation, staffing, and quality improvement initiatives. This study aims to describe and provide valuable insights into the patterns of medical admissions to the intensive care unit (ICU), including case mixes, intensive care interventions, duration of stay, and outcomes to highlight the need for proper resource allocation

Methodology: A retrospective descriptive study was conducted at the University of Port Harcourt Teaching Hospital ICU between January 2022 and December 2024. We reviewed all patients from the Department of Internal Medicine referred to the ICU with a purely medical diagnosis. Data were retrieved from the ICU admissions register and patients' medical records following ethical exemption approval.

Results: A total of 377 patients with medical referrals were reviewed, accounting for approximately 56.9% of all ICU admissions. More males were admitted, and the mean age of patients was 48.6 ± 15.3 years. The emergency unit was the commonest source of referral and offered a significant source of in hospital delays prior to transfer to the ICU. The most common indication for ICU admission was stroke, with hemorrhagic stroke, sepsis, and cardiogenic shock associated with the worst outcomes.

Conclusion: Stroke predominated medical referrals and provided the worst outcome. The in-hospital delays at the emergency unit which became the largest source of referral contributed to the high mortality. This study highlights the need to strengthen stroke care at the tertiary level of care as well as other medical referrals to improve care.

Keywords: Pattern, Medical Admissions; Intensive Care Unit; Port Harcourt.

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Introduction

The burden of non-communicable diseases is on the rise globally, especially in low and middle-income countries [1]. Noncommunicable diseases inclusive of malignancies when complicated by lower respiratory tract infections which could be community or hospital-acquired are on the rise in Nigeria [2]. This trend has resulted in an increased risk for critical illness with multiorgan failure requiring critical care [3]. This increase, and demand for access to critical care and ventilatory support place an enormous burden on the limited resources of LMICs especially with suboptimal access to critical care facilities and the cost of critical care beyond the reach of many citizens.

The challenges with access to critical care and ICU services in LMICs like Nigeria were amplified during the COVID-19 pandemic which increased the demand for critical care services [4]. Some limitations were that most units in third-world countries are open units that admit both medical and surgical cases and are primarily managed by anaesthetists [5], with input from visiting physicians.

It is evident from the limited documented reports on medical indications for ICU admission in Nigeria that the trend is increasing [6.7,8] The principle of the continuum of care defines critical illness as an integral part of a patient's disease course. This implies that whatever happens in the medical ward or emergency department in terms of early identification of patients at risk, recognizing signs of deterioration to obtaining a positive response to curb sudden deterioration all contribute to the overall outcome of the disease process.

Therefore, an understanding of the pattern of medical ICU admissions is essential for optimizing healthcare resource allocation, improving patient outcomes, and reducing costs. This study aims to highlight the prevalence of medical referrals, ICU interventions, and patient outcomes as additional sources of epidemiological data, with a particular focus on non-communicable diseases in a resource-limited setting.

Methodology

Ethical approval for this study was obtained from the Research and Ethics Committee of the University of Port Harcourt Teaching Hospital, a 920-bed acute care facility. This retrospective descriptive study reviewed medical admissions to the Intensive Care Unit (ICU) over a specified period from January 2022 to December 2024. The study included all adult patients (aged 18 years and older) with medical diagnoses who stayed in the ICU for more than 24 hours. Patients were included if they had complete data that met the analysis criteria. In contrast, patients who died within 24 hours of admission, paediatric cases, and all surgical and obstetric patients were excluded.

The study period spanned from January 1, 2022, to December 31, 2024. Demographic data were collected retrospectively from the ICU register, patient case notes, and nursing records. Variables such as age, gender, admission diagnoses, comorbidities, ICU interventions (including mechanical ventilation), length of stay, and outcomes (alive, deceased, or referred to other ICUs) were compiled. Due to challenges in assessing components of the APACHE scoring system within the first 24 hours of admission, its use for analysis was excluded. Statistical analysis was performed using SPSS version 16.0 for Windows (SPSS, Inc., Chicago, IL, USA). Categorical variables were analyzed using the Pearson Chi-square test.

Results

Three hundred seventy-seven (377) patients with medical referrals were admitted during the period under review. Of these, three hundred sixty-two (362) met the criteria and had complete data, representing 96.0%. Fifteen (15) patients had incomplete data and were excluded (4.0%). The demographic data are summarized in Table 1.

Table 1: Demographics and Clinical Characteristics of ICU Patients (2022–2024)

Category	Parameter	Value
Demographics	Male-to-Female Ratio	52.7% males: 47.3% females
	Age (years)	48.6 ± 15.3 (18-92years)
	Height (meters)	1.65 ± 0.10
	Weight (kilograms)	76.62 ± 14.00
	Body Mass Index (kg/m²)	28.1 ± 4.2
Clinical Characteristics	Total patients admitted in ICU (2022-2024)	662
	Total number of medical referrals	377
	Total deaths from medical referral	151
	Number of survivors	226
	Mortality rate	40.1%
	Cases requiring Inotropes (%)	35 (9.2%)
	Cases requiring Paralysis (%)	15 (3.9%)
	Mean ICU stay (days)	6 ± 2
	Hospital stays (days)	23 ± 4
	Duration of stay before ICU admission	4 days± 2.1 (mean)
Referral Sources	Accident and Emergency (A&E) unit	(274) 72.7%
	Direct from peripheral ICU	(26) 6.9%
	Wards	(77)20.4%
The mean duration of hospital Delay(days) at A&E		4± 2.7 days

This study presents a comprehensive overview of ICU patients' demographics, clinical characteristics, referral sources, and outcomes over three years. The patient population had a near-equal gender distribution, with 52.7% males and 47.3% females. The mean age was 48.6 ± 15.2 years, with an average height of 1.65 ± 0.10 meters and weight of 76.62 ± 14.00 kilograms, leading to a mean body mass index (BMI) of 28.1 ± 4.2 kg/m².

Table 2: Distribution of cases by subspeciality in 2022

Specialty	**Diagnosis**	**Total cases** **112**	**Death** **43**	**Mortality 38.4 (%)**
Neurological disorder	Ischaemic CVA	14	5	4.5
	Hemorrhagic CVA	21	9	8.0
	Subarachnoid Hemorrhage (SAH)	7	3	2.6
	Meningitis	4	1	0.9
	Encephalitis	3	1	0.9
Cardiology	Acute Myocardial infarction	6	1	0.9
	Heart failure	9	3	2.6
	Cardiac Arrhythmias	6	2	1.9
	Cardiac Tamponade	2	0	0
Respiratory	Pneumonia	11	4	3.4
	COPD	5	2	1.8
	ARDS secondary to sepsis	5	3	2.7
	Pulmonary Embolism	12	5	4.5
	Acute severe Asthma	1	0	0
Gastroenterology	Gastrointestinal bleeding	3	1	0.9
	Acute liver failure	2	2	1.9
	Severe pancreatitis	1	1	0.9

A total of 112 medical cases were admitted to the Intensive Care Unit (ICU) of the University of Port Harcourt Teaching Hospital, with an overall mortality rate of 38.4% (43 deaths). Neurological disorders constituted a significant proportion of admissions, with hemorrhagic stroke being the deadliest, accounting for 21 cases and 9 deaths (8.0%). Ischemic stroke recorded 14 cases with a 4.5% mortality rate, while subarachnoid haemorrhage, meningitis, and encephalitis had lower case numbers but contributed to overall mortality. Cardiology cases included acute myocardial infarction, heart failure, cardiac arrhythmias, and cardiac tamponade, with heart failure being the most fatal among them, contributing to 3 deaths (2.6%). Respiratory conditions such as pneumonia, chronic obstructive pulmonary disease (COPD), acute respiratory distress syndrome (ARDS) secondary to sepsis, pulmonary embolism, and acute severe asthma were also recorded. Pulmonary embolism had a significant impact, with 12 cases and 5 deaths (4.5%), while ARDS due to sepsis and pneumonia contributed to further mortality. Gastroenterology-related admissions, including gastrointestinal bleeding, acute liver failure, and severe pancreatitis, had relatively lower-case numbers, but acute liver failure and severe pancreatitis recorded high mortality rates.

Table 3: Distribution of cases by subspeciality in 2023

Specialty	**Diagnosis**	**Total cases** **141**	**Death** **54**	**Mortality** **38 (%)**
Neurological	Ischaemic CVA	14	4	2.8
	Hemorrhagic CVA	24	9	6.4
	Subarachnoid Hemorrhage (SAH)	4	2	1.4
	Meningitis	5	1	0.7
	Encephalitis	6	4	2.8
	Tetanus	4	3	2.1
	Hypoxic encephalopathy	4	4	2.8
	Status epilepticus	4	1	0.7
Cardiology	Acute Myocardial infarction	8	2	1.4
	Heart failure Anaemic heart failure Cardiogenic shock	7 1 5	2 0 2	1.4 0 1.4
	Cardiac Arrhythmias	4	1	0.7
	Cardiac Tamponade	5	1	0.7
	Pulmonary Embolism	10	3	2.1
	Acute coronary syndrome	6	1	0.7
Respiratory	Aspiration pneumonitis	5	3	2.1
	COPD	4	1	1.4
	Sepsis-induced ARDS	8	5	3.5
	Carbon monoxide poisoning	3	1	0.7
Gastroenterology	Gastrointestinal bleeding (PUD)	2	1	0.7
	Decompensated chronic liver failure	2	2	0
	Hepatocellular carcinoma	1	0	0
	Inflammatory bowel disease	2	0	0
Others	SLE Diabetes nephropathy Acute confusional state	1 1 1	1 0 0	0.7 0 0

A total of 141 medical cases were admitted to the Intensive Care Unit (ICU) of the University of Port Harcourt Teaching Hospital, in 2023, with an overall mortality rate of 38% (54 deaths). Neurological disorders accounted for a significant proportion of admissions, with hemorrhagic stroke being the most fatal, contributing to 9 deaths (6.4%) out of 24 cases. Ischemic stroke, encephalitis, tetanus, hypoxic encephalopathy, and status epilepticus also contributed to mortality, with hypoxic encephalopathy recording the highest fatality rate among neurological conditions (4 deaths out of 4 cases). Cardiac-related conditions such as acute myocardial infarction, heart failure, cardiogenic shock, cardiac arrhythmias, cardiac tamponade, pulmonary embolism, and acute coronary syndrome were also prevalent. Cardiogenic shock had a high mortality rate, with 2 deaths (1.4%) out of 5 cases, while pulmonary embolism contributed to 3 deaths (2.1%). Respiratory conditions, including aspiration pneumonitis, chronic obstructive pulmonary disease (COPD), sepsis-induced acute respiratory distress syndrome (ARDS), and carbon monoxide poisoning, significantly impacted patient outcomes, with sepsis-induced ARDS accounting for 5 deaths (3.5%). Gastroenterological conditions such as gastrointestinal bleeding, decompensated chronic liver failure, hepatocellular carcinoma, and inflammatory bowel disease had lower case numbers, but chronic liver failure recorded a high mortality rate. Other conditions, including systemic lupus erythematosus (SLE), diabetic nephropathy, and acute confusional states, had minimal impact on overall mortality.

Table 4: Distribution of cases by subspeciality in 2024

Specialty	**Diagnosis**	**Total cases** **124**	**Death** **40**	**Mortality 40(%)**
Neurological	Ischaemic CVA	17	4	4.0
	Hemorrhagic CVA	24	14	14.0
	Subarachnoid Hemorrhage (SAH)	2	2	2.0
	Meningitis	3	1	1.0
	Encephalitis	2	1	1.0
	Gullain Baire Syndrome	1	0	0.0
	Tetanus	1	1	1.0
Cardiology	Deep vein thrombosis	3	1	1.0
	Heart failure	6	3	3.0
	Cardiogenic shock	2	2	2.0
	Peripartum Cardiomyopathy	3	1	1.0
	Pulmonary Embolism	15	2	2.0
	Acute coronary syndrome	2	0	0.0
Respiratory	Pneumonia	1	0	0.0
	COPD	1	1	1.0
	ARDS from sepsis	1	1	1.0
	Aspiration pneumonitis	2	0	0.0

	Myasthenia gravis	1	1	1.0
	Guillain-Barre' syndrome	1	0	0.0
Others	Upper GI bleeding	2	0	0.0
	Decompensated liver failure	1	1	1.0
	SLE	2	1	1.0
	Acute kidney injury	5	2	2.0
	Suicide with Sniper	2	1	1.0

A total of 124 medical cases were admitted to the Intensive Care Unit (ICU) of the University of Port Harcourt Teaching Hospital in 2024, with an overall mortality rate of 40% (40 deaths). Neurological disorders again accounted for a significant portion of the admissions, with hemorrhagic stroke (CVA) contributing the highest number of deaths, accounting for 14 fatalities (14%) out of 24 cases. Ischemic stroke (CVA) also had a notable mortality rate, with 4 deaths (4%) out of 17 cases. Other neurological conditions such as subarachnoid haemorrhage, meningitis, encephalitis, and tetanus contributed to mortality, with tetanus recording 1 death (1%) out of 1 case. Guillain-Barré syndrome had no mortality. In the cardiology category, heart failure, cardiogenic shock, deep vein thrombosis, and pulmonary embolism contributed to ICU admissions. Heart failure had 3 deaths (3%) out of 6 cases, and cardiogenic shock had 2 deaths (2%) out of 2 cases. Pulmonary embolism, despite its presence in 15 cases, only caused 2 deaths (2%). Acute coronary syndrome recorded no deaths. Respiratory conditions, including pneumonia, chronic obstructive pulmonary disease (COPD), acute respiratory distress syndrome (ARDS) from sepsis, aspiration pneumonitis, and myasthenia gravis, were recorded. COPD, ARDS from sepsis, and myasthenia gravis contributed to mortality, with COPD and ARDS from sepsis each causing 1 death (1%). Pneumonia and aspiration pneumonitis had no associated deaths. Other conditions, including upper gastrointestinal bleeding, decompensated liver failure, systemic lupus erythematosus (SLE), acute kidney injury, and suicide by sniper, also contributed to ICU admissions. Decompensated liver failure and SLE each resulted in 1 death (1%), and acute kidney injury contributed to 2 deaths (2%).

Table 5: Mortality rate by specialty

Unit pathology	**Total admitted**	**Deaths**	**Mortality rate (%)**
Stroke	(123)	(52)	
Ischaemic stroke	45	13	34.4%
Haemorrhagic stroke	65	32	
Subarachnoid haemorrhage	13	7	
Heart failure/ cardiogenic shock/ pulmonary embolism	94	23	15.2%
Ischaemic hypoxic encephalopathy following spinal anaesthesia	5	4	2.7%

The total number of admissions across different units included 123 cases of stroke, with 45 deaths, resulting in a mortality rate of 36.6%. Specifically, ischemic stroke accounted for 52 admissions and 13 deaths, yielding a mortality rate of 34.4%. Hemorrhagic stroke included 65 cases with 32 deaths, resulting in a higher mortality rate of 49.2%. Subarachnoid haemorrhage had 13 admissions and 7 deaths, with a mortality rate of 53.8%.

For heart failure, cardiogenic shock, and pulmonary embolism, there were 94 total cases, and 23 deaths, resulting in a mortality rate of 15.2%. Additionally, ischemic hypoxic encephalopathy following spinal anaesthesia accounted for 5 cases, with 4 deaths, resulting in a high mortality rate of 80%.

Discussion

Intensive care units provide the best platform to optimize and support dysfunctional organs/systems at risk of worsening decompensation. This crucial role, as ably demonstrated during the COVID-19 pandemic, has become an integral part of modern healthcare. Our retrospective analysis of medical referrals reveals several key findings worth reporting, and it is the first report from the University of Port Harcourt Teaching Hospital Intensive Care Unit to examine the clinical profile of medical referrals and outcomes. Earlier reports from the same unit demonstrated that obstetric admissions utilized most of the ICU beds sixteen years ago [11], as well as trauma cases three years later [12]. In this study, medical referrals accounted for 56.9% of all ICU admissions. Improvements in perioperative care and increased awareness of the utility of the intensive care unit to optimize medical conditions may explain the surge in numbers.

The majority of the referrals consisted of males (52.7%). This trend of male predominance among critically ill medical referrals [13,14] is especially evident in urban centers, unlike reports of female predominance [15] in a rural ICU. The mean age of 48 years in this study was like earlier reports by Akinjola et al, [10] and Poluyi et al [13], clearly placing this age bracket at high risk for non-communicable diseases. Most admissions were routed through the emergency units, further highlighting the crucial role of emergency services in identifying and triaging critically ill patients [16-19]. The concept of essential emergency and critical care underscores the importance of integrating these two sectors to improve outcomes. Delays in transferring patients from the ER to the ICU due to bed shortages and transfers to definitive managing teams(inter-unit) affect patient outcomes. A minimum delay of four days was observed in this analysis, which remains a significant risk factor for increased ICU length of stay and mortality [20].

It is evident in Nigeria that stroke is the leading cause of medical referrals, accounting for 33% of all medical admissions in this study, and causing34% of total mortality. In developing countries, stroke remains the leading cause of death in intensive care units [21]. Hemorrhagic stroke contributed to more deaths than any other medical condition and predominantly affected younger individuals. Poorly controlled diabetes and hypertension are likely major contributors to this trend. Most studies in Nigeria referencing medical referrals to the ICU report an increasing prevalence of neurological diseases, particularly cerebrovascular accidents [10,13]. Stroke care in the intensive care unit aims at preventing secondary brain injury to improve functional outcomes. In low-resource settings like ours with limited ICU bed spaces, the continued delay in transferring stroke patients to the ICU and definitive neurology team at this study centre contributed to the high mortality. Intraoperative cardiac arrest following the administration of spinal anaesthesia, resulting in hypoxic-ischemic encephalopathy with high mortality, was noted in this study. This was another contribution of poor anaesthetic practice to perioperative disaster. The inability to secure the airway following the incident and the lack of well-defined post-cardiac arrest care strategies contributed to the high mortality rate. In Ethiopia, Tesema et al [22] noted that cardiovascular decompensations were the most common medical referrals. In this study, cardiovascular dysfunction including heart failure, cardiomyopathies, arrhythmias, and acute coronary syndrome was prevalent. Pulmonary embolism remains a major cause of mortality in this study and lack

of early recognition and the inability to institute satisfactory thrombolytics could account for the increased mortality. Could the increase in respiratory diseases in the immediate post COVID period (2022), be a coincidence? Community or hospital-acquired pneumonia, and aspiration pneumonitis (especially in patients with low GCS, who were fed and sepsis-induced ARDS contributed to respiratory system-associated mortality. Some of these mishaps were avoidable as simple interventions like the passage of nasogastric tubes, and early initiation of antibiotics and vasopressors could have attenuated the sudden deterioration to require ICU admission.

The implications of our findings highlight the urgent need for early identification and aggressive management of critically ill medical referrals, particularly at the point of sudden deterioration which in our study were at the emergency units and the medical wards. ICU mortality in Nigeria will continue to remain high due to a lack of awareness in recognizing early signs of critical illness, delays in referral, poor assessment, inadequate intervention, and insufficient funding to improve infrastructure and workforce development.

Conclusion

This study revealed the importance of understanding the predominant causes and outcomes of medical referrals to the intensive care unit and emphasized the relevance of early recognition, timely intervention, and aggressive management of critically ill patients at the emergency units and medical wards to improve outcomes.

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