ORIGINAL ARTICLE

Clinical Profile of Children Admitted in a General ICU and Outcome at The University of Port Harcourt Teaching Hospital, Nigeria

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ABSTRACT **Background**: Admission of children for intensive care results from different causes and has varying outcomes.

Objectives: The pattern of admissions and outcomes in children admitted between January 2021 - October 2022, at the intensive care unit (ICU) of UPTH was assessed in a retrospective study.

Methods: Data on demography, clinical characteristics and outcomes of admission of children between one month – 17years old, admitted in the ICU during the study period were collected, using records from patient's folders and intensive care registers. SPSS v.25 was used for analysis and results presented as frequencies and percentages.

Results: From a total of 430 patients admitted, children were 47(11.0%) with mean age 7.0 ± 5.5yrs, and M:F ratio 1.9:1. Admissions were for postoperative care [(21/45.0%)], neurological diseases [11(23.0%)], respiratory distress and TBI [(6(13.0% each)] and neuromuscular diseases [3(6.0%)]. Admitting specialties were paediatric respiratory 6(12.8%), neurology 12(25.5%) and neurosurgical teams for nonoperative care 8(17.0%), and surgical specialties for critical postoperative care 21(44.7%). Postoperative patients were admitted following general paediatric 14(29.8%), cardiac and oral maxillofacial surgeries 2(4.3%) each and others 3(6.3%) for postoperative care 21(44.7%), low GCS 15(31.9%) and cardiorespiratory support 11(23.4%). Complications were severe brain injuries 17(36.2%), severe haemorrhage 9(19.1%), respiratory failure 8(17.0%), sepsis 7(14.8%) and electrolyte imbalance 2(4.3%). Mean duration of stay was 5.6 ± 6.3 days, 22(46.8%) were discharged and mortality rate was 25(53.2%), majority being CNS/neuromuscular diseases (17/68.0%).

Conclusion: Critical postoperative care was commonest indication for ICU admission in children, but mortality was highest in CNS/Neuromuscular pathologies.

Keywords: Children, ICU admissions, Outcome.

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INTRODUCTION

Critical illness in the paediatric age group is life threatening and management requires specialized care. This level of care is particularly indicated because as paediatric patients, they are already high risk due to their peculiar physiology, anatomy and pharmacology. They are therefore not to be managed like small adults. It is important to note that the paediatric age spans through a wide age range from birth to 17years, and the neonatal intensive care units (NICU) and paediatric intensive care units (PICU) are readily available dedicated care units for critically ill paediatric patients in the developed economies. Further specialised care centres like the trauma, burn, cardiac or neuro ICU's also have a place in the care of some paediatric patients who suffer from trauma, cardiac or neurological diseases. In the low- and middle-income countries (LMIC) however, the adult intensive care unit (ICU) serves as the place for

dedicated care of the critically ill of all ages and from diverse aetiologies in most centres[1,2]. It therefore serves as a general ICU in most hospitals in these regions. Besides, some paediatric admissions may be for close monitoring and organ support postoperatively, due to the preoperative illness severity, nature of the surgery, type of patient or perioperative events/course[2,3]. Highly invasive surgery or surgery involving major organs fall in this category (e.g. cardiothoracic, neurosurgery, major abdominal or organ transplant). Management of perioperative organ dysfunction or failure may also be an indication for ICU admission, and some postoperative organ dysfunction or failure are a progression from poor preoperative patient conditions, especially with patients in the American Society of Anesthesiologists' (ASA) Physical Status Classes 3 - 5. Some postoperative admissions may also be indicated following critical perioperative incidences such as severe hypoxia, shock, massive haemorrhage, pulmonary aspiration, major drug reactions, convulsions, cardiorespiratory arrest, etc.[3,4]

The PICU and the specialised intensive care units are absent or few when present in many parts of our subregion, and their absence or admission delays (when few), can contribute to grave outcomes. Furthermore, high dependency units (HDU's) are not readily available in many hospitals. The adult general ICU available in most hospitals therefore remains the unit or "go to centre" for acute care of diverse cases that require critical care or monitoring (beyond the routine ward care); best provided in NICU, PICU and other specialized care units listed earlier,[2,3,4] with the Anaesthetist being the Critical Care Physician coordinating required care by different specialists.

The aim of this study therefore was to retrospectively review the clinical profile of children admitted in a general ICU and the outcome at the University of Port Harcourt Teaching Hospital, Rivers State, Nigeria. The findings from the study will reveal the key profiles of pediatric patients who require critical care, and assist with needs assessment and prioritisation in preparedness for future care and improved outcomes.

METHODOLOGY

Following approval from the Institutional Research and Ethics Committee, a retrospective study was conducted to review relevant data in the folders and ICU records of all paediatric patients who were admitted into the general ICU of the University of Port Harcourt Teaching Hospital. All paediatric patients from one month to 17 years who were managed over a 22-month period from January 2021 - October 2022 were recruited.

Relevant data collected including demographics (age, gender), clinical characteristics (diagnosis, type of monitoring, ventilatory and laboratory support, complications, length of stay), and outcome were analysed using the Statistical Product and Service Solutions (SPSS) v. 25.0. Categorical variables were summarized and presented using frequencies and percentages and continuous variables using the mean. Associations between the final outcome and variables were derived using the Chi-square and t test.

RESULTS

Of the 430 patients admitted into the ICU over the study period, 47(11.0%) were paediatric patients (Figure 1) with a male to female ratio of 1.9:1, adult to paediatric ratio of 9.1:1 and mean age of 7.0 ± 5.5 years (range =1month-17years). The mean duration of stay in the ICU was 5.6 ± 6.3 days with a range of 1-26days. Table I.

The primary diagnosis necessitating ICU admission is shown in Figure 2 with the highest proportion of paediatric patients admitted for postoperative monitoring (21/45.0%) followed by neurological diseases (11/23.0%), respiratory diseases and traumatic brain injury-TBI (6/13.0%) each. Neuromuscular diseases were 3(6.0%). The admitting specialties are shown in Table I with surgical specialties being the highest (21/44.7%). The breakdown of the different surgical specialties that managed paediatric patients shows Paediatric surgical team managed 14(66.7)% surgical patients (29.8% of overall), while others were managed by Cardiothoracic and Oral maxillofacial (2/9.5% each), and Neurosurgery, Orthopaedic and Ophthalmology teams (1/4.8%) each. Types of surgery requiring ICU admission showed exploratory laparotomy as the highest (10/47.6%) - Table II.

There were generally three indications for paediatric admissions into the ICU with postoperative care accounting for majority (21/44.7%), while low Glasgow Coma Scale (GCS) and cardiorespiratory support accounted for 15(31.9%) and 11(23.4%) respectively (Table I). Some of the complications that were managed in these patients while on admission in the ICU included severe brain injury 17(36.2%), severe haemorrhage 9(19.1%) and others as shown in Table I. Four (8.5%) patients had no complications.

The overall mortality in this study was 25(53.2%), and majority were patients managed by Paediatric Neurology [11(44.0%)] and Neurosurgery [6(24%)] teams. The relationship between nature of disease and outcome is summarised in Figure 3; while Figure 4 shows the relationship between planned and unplanned postoperative; as well as nonsurgical ICU admissions and outcome. Of the 21(44.7%) postoperative surgical patients who were admitted into the ICU, 16 (76.2%) were transferred to the ward, whereas 5 (23.8%) patients did not survive; this consisting of 2(28.0%) unplanned and 3(21.0.%) planned postoperative admissions. The highest mortality was seen among the nonsurgical ICU patients, these accounting for 80.0% (20) of all deaths in the ICU among paediatric patients. There was a significant association between nature of disease and outcome ($p = 0.001$). Table III.

Complications like unconsciousness and respiratory distress on admission (5/62.5%) were associated with a higher risk of death compared to other complications. (2/22.2%) ($p=0.001$).

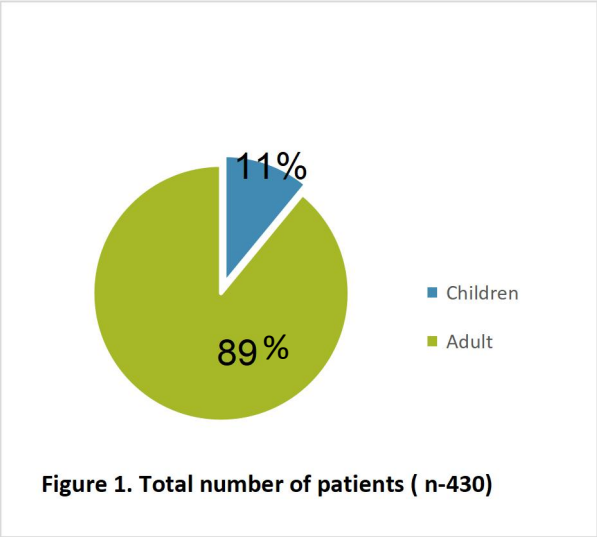

Figure 1. Total number of patients (n-430)

Table I: Demographic and clinical characteristics of paediatric admissions in ICU (n-47)

Characteristic	Value
Gender	
Male	31 (66%)
Female	16 (34%)
Mean age (years)	7.0 ± 5.5
Indications for admission	
Postoperative care	21(44.7%)
Glasgow Coma Scale (GCS) <10	15(31.9%)
Cardiorespiratory support	11(23.4%)
Admitting Specialties	
Paediatric Respiratory	6 (12.8)
Neurosurgery (non operative care)	8 (17.0)
Paediatric Neurology	12 (25.5)
Surgical specialties (postoperative care)	21 (44.7)
Complications in ICU	
Severe brain injury	17(36.2%)
Severe haemorrhage	9(19.1%)
Respiratory failure	8(17.0%)
Sepsis	7(14.8%)
Electrolyte imbalance	2(4.3%).
None	4(8.5%)
Days of ICU stay (mean/range)	5.6 ± 6.3/1-26

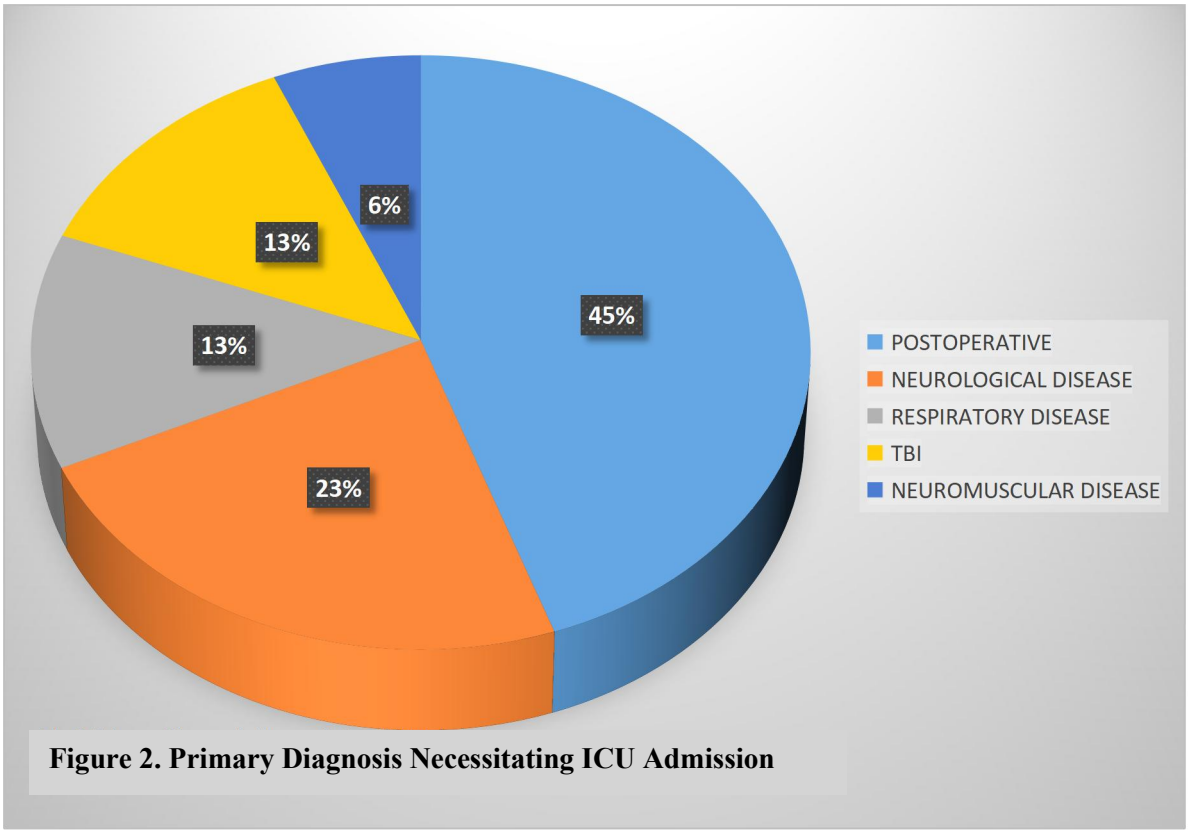

Figure 2. Primary Diagnosis Necessitating ICU Admission

Table II: Types of surgery in paediatric patients admitted for ICU care.

SURGICAL UNIT	N (%)
Paediatric	
Exploratory laparotomies	10 (47.6)
PSARP	1 (4.8)
Ramstedt pylorotomy	1 (4.8)
Axillary lymphangioma excision	1 (4.8)
Cervical haemangioma excision	1 (4.8)
Cardiac	
Patent ductus arteriosus (PDA) ligation	2 (9.5)
Maxillofacial	
Cleft lip repair & Excision of facial neurofibrosis (1 each)	2 (9.5)
Neurosurgery	
Extensive scalp laceration suture	1 (4.8)
Orthopaedic	
Implant removal	1 (4.8)
Ophthalmologic	
Trabeculectomy	1 (4.8)
TOTAL	**21 (100.0)**

Table III. Relationship between outcome of paediatric patients in ICU and other variables

Indices	Chi square	P value
Age	1.629f	0.737
Gender	0.869[f]	0.351
Indication for admission	14.7[f]	*0.001
Nature of disease	16.5[f]	*0.001
Specialty	19.1[f]	*0.002
Pathology	20.27[f]	1.000
Complication	21.6[f]	*0.001
Duration of stay	8.316[f]	0.396

***P < 0.05 - significant**

DISCUSSION

In this study, paediatric patients accounted for 10.9% of all ICU admissions, and males were nearly twice the number of females. The incidence was much smaller to similar studies. Abubakar et al[5] reported 19.8% with a M:F ratio of 1.3:1. Embu et al[3] reported 22.1% with M:F female ratio of 1.5:1. An explanation for the lower reported incidence in the present study could be due to the shorter study duration and paediatric burn patients were not managed in our ICU because of the availability of a Regional Burn Centre and a high dependency unit in the Paediatric department. The consistent gender variation is not surprising, as gender difference among paediatric admissions has often been reported.[3,5,6] Almossawi et al[7] reported a more males at PICU admission but observed that mortality was more in females. The gender difference in admission into our general ICU was significant, but we observed no association between gender and outcome (p = 0.351). similar studies reported this disparity in admission based on gender. Investigating the reasons for this disparity may help provide insight for further care and policy in our society.

Postoperative care was a major reason for admission as reported by previous workers. Embu et al[3] reported 51.6%, while Abubakar et al[5] reported 69.5%. Certain factors contribute to postoperative ICU admission such as diminished reserve from immature organs like the cardiorespiratory and renal systems in the face of acute illness, age, metabolic demands in the postoperative period, as well as the presence of comorbidities. Health facilities in low resource countries may not have a well-equipped high dependency unit, thereby contributing to the high postoperative ICU admissions. Although it was observed that a third of postoperative ICU admissions were unplanned, some have reported even higher values. The poorer the ASA physical status classification, the more likely a patient would require postoperative ICU admission.[6]

Sepsis, neurological and cardiorespiratory diseases are some reasons for non-surgical ICU admissions. In our study, low GCS from different causes (managed by Paediatric Neurology and Neurosurgery teams) and respiratory support accounted for significant patient admissions which would have required specialized ICU's in other climes. Having a dedicated PICU; or trauma, burn or neuro ICU would provide the added advantage of specialised staff for paediatric, trauma, burn or neurological care in the respective units as indications for ICU admission in the paediatric age can be diverse. With these units, closer monitoring or organ support (neurological, neuromuscular, cardiovascular, respiratory, renal, or metabolic) requiring multispecialty care is facilitated. Neurological failure may be associated with altered consciousness levels, while neuromuscular cases may be related to bulbar paralysis and respiratory failure. Cardiorespiratory failure requires cardiorespiratory support, and severe renal or metabolic failure are associated serum electrolyte derangements and with severe disturbances of the internal milieu of and major organs.

The presence of complications arising from the primary condition that necessitated ICU admission is a significant indicator of the admission outcome. Such complications like ARDS, Sepsis, heamodynamic instability requiring the use of inotropes will worsen outcome. In a study by Dendir and colleagues[8], they reported that presence of comorbidities, the need for mechanical ventilation and use of inotropes were all significant determinants of poor outcome among patients managed in their intensive care unit. The presence of complications, as seen in this study, was a significant determinant of mortality among paediatric patients managed in the ICU.

A mortality rate of 53.2% was considerably high and could be a reflection of the severity of the critical illnesses managed. In low resource settings, critically ill patients often present late. McCrossan et al[9] reported an

overall mortality of 30.3%. Among postoperative patients, they had 44% mortality and 89% in children considered too ill, whereas only 15% was reported among patients who were not considered too ill. The more critical a paediatric patient, the higher the risk of mortality especially in resource poor societies. Embu et al[3] reported 36.1% mortality, similar to other related studies.[2] A recent study also corroborated the poor outcome of very ill children with severe neurological illnesses/coma,[10] a finding that was observed in the index study with highest mortality in nonoperative paediatric admissions with neurological diseases.

In a publication from the same institution in 2009 by Mato and co-workers,[11] critically ill children were managed in the adult ICU. With the same finding in the present study, a need for an upgrade to a specialized and dedicated care facility such as PICU for critically ill children is overdue in our subregion for enhanced care.

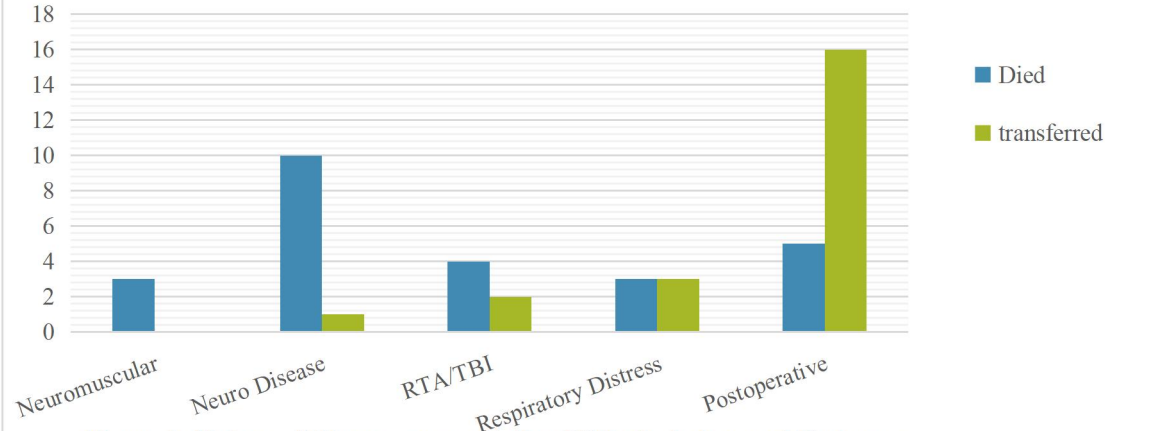

Figure 3: Nature of Diseases necessitating ICU admission and Outcome

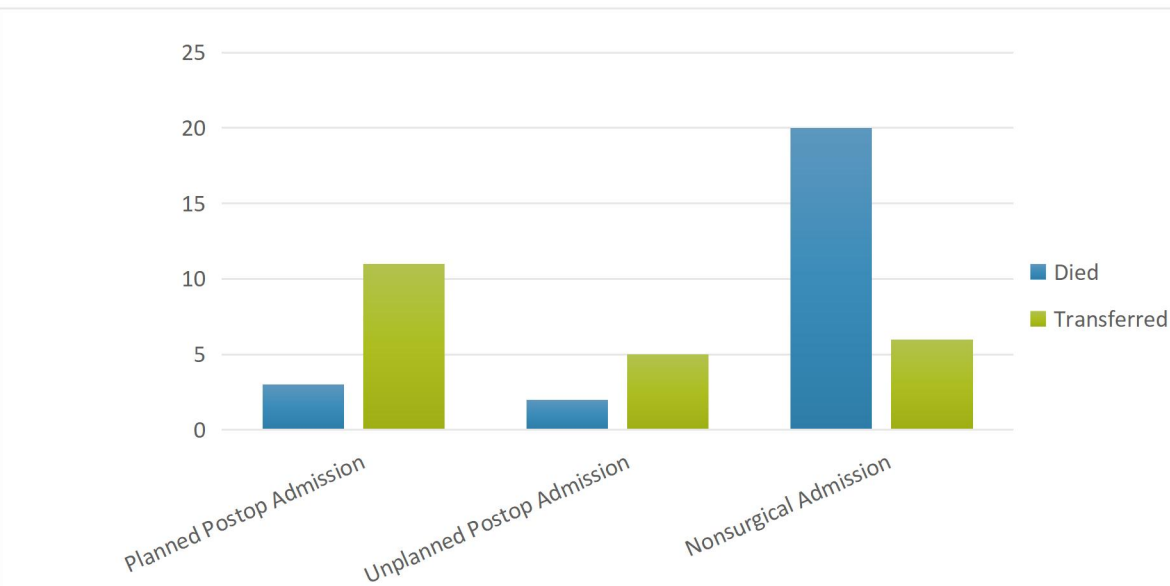

Figure 4: Nature of postoperative and nonsurgical ICU admission and final outcome

CONCLUSION

Critical postoperative care was commonest indication for children's admissions into our general ICU. It was associated with a better outcome compared with admissions following CNS/Neuromuscular pathologies which constituted the commonest non-surgical reason for admissions and with the highest mortality.

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Conflicts of interest: There are no conflicts of interest.

REFERENCES

1. Ojiakor S, Nkwerem S, Ushie S, Emejulu J, Obidike A, Ugwunne C, et al. A Review of Admission Pattern in Intensive Care Unit in a Tertiary Health Institution in Southeast Nigeria. Trop J Med Res [Internet]. 2022 Apr. 16 [cited 2025 May 1];21(1):21-6. Available from: https://tjmr.org.ng/index.php/tjmr/article/view/5
2. Isamade ES, Yiltok SJ, Uba AF, Isamade EI, Daru PH. Intensive care unit admissions in a university teaching hospital. Nig J Clin Practice 2007;10:156-61
3. Embu HY, Yiltok SJ, Isamade ES, Nuhu SI, Oyeniran OO, Uba FA. Paediatric admissions and outcome in a general intensive care unit. Afr J Paediatr Surg 2011;8:57-61
4. Taylor KL, Frndova H, Szadkowski L, Joffe AR, Parshuram CS. Risk factors for unplanned paediatric intensive care unit admission after anaesthesia-an international multicentre study. Paediatr Child Health. 2022 Jul 5;27(6):333-339. doi: 10.1093/pch/pxac041. PMID: 36200107; PMCID: PMC9528790.
5. Abubakar AS, Saad YM, Ahmed HG, Wabada S, Jika M. An Audit of Paediatrics Admissions and Outcomes into a General Intensive Care Unit at a Tertiary Teaching Hospital: A Five-Year Review. SOJ Anesthesiol Pain Manag. 2017; 4(2): 1-4.
6. Kim J, Kim YD, Lee DR, Kim KM, Lee WY, Leeet S. Analysis of the characteristics of unplanned admission to the intensive care unit after general surgery. Anesth Pain Med 2019; 14(2): 230–5
7. Almossawi O, Friend A, Palla L, Feltbower RG, Sardo-Infiri S, O'Brien S, et al. Is there a sex difference in mortality rates in paediatric intensive care units?: a systematic review. Front Pediatr. 2023;11:1225684
8. Dendir G, Awoke N, Alemu A, Sintayhu A, Eanga S, Teshome M, et al. Factors Associated with the Outcome of a Pediatric Patients Admitted to Intensive Care Unit in Resource-Limited Setup: Cross-Sectional Study. Pediatric Health Med Ther. 2023 Mar 2;14:71-79. doi: 10.2147/PHMT.S389404.
9. McCrossan L, Bickerstaffe W, Mostafa SM, et al. Referrals to intensive care: a region-wide audit. Crit Care. 2007;11(1):403.
10. Gabriel-Job N, Wobo KN. Clinical Characteristics and Outcome of Children with Non-Traumatic Coma: Experience from a Tertiary Hospital in Rivers State, Nigeria. Niger Med J 2025; 66 (3): 990-1001.https://doi.org/10.71480/nmj.v66i3.761.
11. Mato CN, Onwuchekwa AC, Aggo AT. Pattern of admissions to the University of Port Harcourt Teaching Hospital intensive care unit – a 10-year analysis. SAJCC. 2009; 25:1.