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Paediatric Emergency Admissions, Mortalities, and Unmet Intensive Care Needs at a Tertiary Hospital in Southern Nigeria

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Abstract

Background: The essence of seeking medical services is to be provided with essential medical care to prevent complications and possibly death from the illness.

Objective: To examine the pattern of admissions into the Children's Emergency Room and unmet intensive care needs in a tertiary health facility.

Methods: This prospective, cross-sectional study was conducted at the University of Benin Teaching Hospital (UBTH), Benin, Nigeria, over a 24-month period (2018 – 2019).

Results: A total of 10 138 children presented to the children's emergency room, and 2 914 children (28.6%) were admitted. There were 144 mortalities (4.94%) of the total admissions. Infectious diseases accounted for the Majority of the deaths. The commonest morbidity necessitating admission was meningitis, while the sickle cell crisis and oncologic pathologies contributed the least - most children presented with multiple morbidities. The under-5s made up 61.1% of deaths recorded. More deaths amongst males compared to female children (1.3:1.1). Majority of the deaths occurred within 12 hours of presentation. Of the 144 mortalities recorded, 140 (97.2%) required intensive care services, while four did not qualify for ICU care. Of the 140 children who qualified for ICU care, 17 (12%) were admitted into the ICU for further care, of which only 2 (12.3%) survived and were discharged home. The others died.

Conclusion: The persistently high contribution of infectious disease to infant and child mortality, coupled with an inability to offer intensive care services, should be an important consideration for health planners and administrators.

Keywords: Admissions, Intensive Care Services, Paediatric Emergency, Tertiary Hospital, Unmet needs.

Introduction

The essence of seeking medical services is to be provided with essential medical care to prevent complications and possibly death from the illness. The death of a child at the emergency ward is one of the most difficult problems that the clinicians attached to these wards have to deal with. The Sustainable Development Goals (SDGs) represent the transition from the Millennium Development Goals, and goal five has universal coverage of quality healthcare as a target, including the prevention and treatment of communicable and non-communicable diseases.[2] To achieve this goal, accurate information about the causes of morbidity and mortality within various populations is essential. [3]

Moreover, there are reports on the mortality and morbidity patterns at the paediatric emergency

units locally, [4,5]nationally [6-16] and internationally. [17-30] Still, there is no record of any study that examined the met or unmet intensive care needs in children hospitalized as emergencies, and their contributions to the mortality rate at the emergency rooms. This study examined the admission pattern into the paediatric emergency room and the unmet intensive care needs at the University of Benin Teaching Hospital in Southern Nigeria. Information from this study may provide insight into paediatric mortality rates, and baseline data of unmet intensive care needs essential to health care providers and administrators. This will help them in allocating resources, especially to paediatric intensive care units, and the development of interventions to reduce preventable childhood deaths in Nigeria.

Methods

This was a cross-sectional study conducted at the Children's Emergency Division [Children Emergency Room (CHER) and Children's Emergency Ward (CHEW)] of the University of Benin Teaching Hospital (UBTH), Benin City, Edo State, Nigeria. This is a tertiary health facility in the South-South region of Nigeria. It provides all health care services to children from under 24 hours to 18 years old and is open for 24-hour service delivery. This facility has 28 beds, comprising the 20-bed CHEW and 8-bed CHER.

This unit provides care for children who require prompt life-saving measures, after which they are discharged as soon as possible from the unit, preferably within 24 to 48 hours of admission, either by transfer to the main paediatric wards or home to continue treatment as outpatients. The attending paediatrician and nursing staff prioritize all patients according to the severity of their condition (Emergency Triage Assessment and Treatment; ETAT),[31] ensuring that the more critically ill child is attended to first. The unit is staffed by two consultants, seven resident doctors, eight medical house officers, four nursing interns and eighteen nurses.

The unit caters for children who present directly from home and referred cases from UBTH Consultant Outpatient Departments and General Practice Clinics. It also attends to referrals from other primary, secondary, and tertiary health care facilities in all parts of Edo State and the neighbouring States of Delta, Bayelsa, Kogi, Anambra, and Ondo, respectively.

All children brought into the CHER of the UBTH were recruited into this study over two years, from January 2018 to December 2019. Ethical approval was obtained from the Ethics Review Committee of UBTH (Protocol number: ADM/E 22/A/VOL.VII/148301230) and the parental/caregivers` consent and patient's assent were obtained where applicable.

Data was collected from the patient's case notes only and the information recruited included age, gender, date of presentation, clinical diagnosis, duration of admission, outcome and time of death, where applicable. The diagnoses represent the final diagnoses reached mainly after review by the team of doctors working in the CHER and CHEW. The diagnosis was based on clinical features and relevant laboratory investigations, where possible. Diagnosis of sepsis and acute gastroenteritis were mainly clinical and supported by laboratory investigations, while malaria was diagnosed with microscopy or a rapid diagnostic test. In a few cases, no diagnosis was reached before the patient's demise. All children with a severe cardiopulmonary compromise for any reason qualified for paediatric intensive care services. All children brought-in-died (BID) were excluded from this study.

At the time of this study, there was no designated PICU at the study locale. The main hospital intensive care unit (ICU) was the only one available to offer intensive care services. Children needing intensive care were offered care subject to the availability of spaces and the

ability to settle the financial implications required for admission.

Data analysis was done with Statistical Package for the Social Sciences (SPSS), version 20.0 (IBM Corporation, Chicago, USA, 2011). Categorical data were summarized using proportions and percentages, while continuous data were summarized using mean and standard deviation for normally distributed variables and median for non-normally distributed variables. Statistical differences between the categorical variables were determined using the Pearson Chi-Square test of association, and $p<0.05$ at 95% confidence interval was considered as being statistically significant.

Results

As shown in Figure 1, a total of 10, 138 children presented to the children's emergency room over the 24 months of the study. The highest numbers of children were seen in September (1046; 10.3%) and May (1000; 9.9%), while January and December contributed the lowest proportions (3.7% and 6.4% respectively).

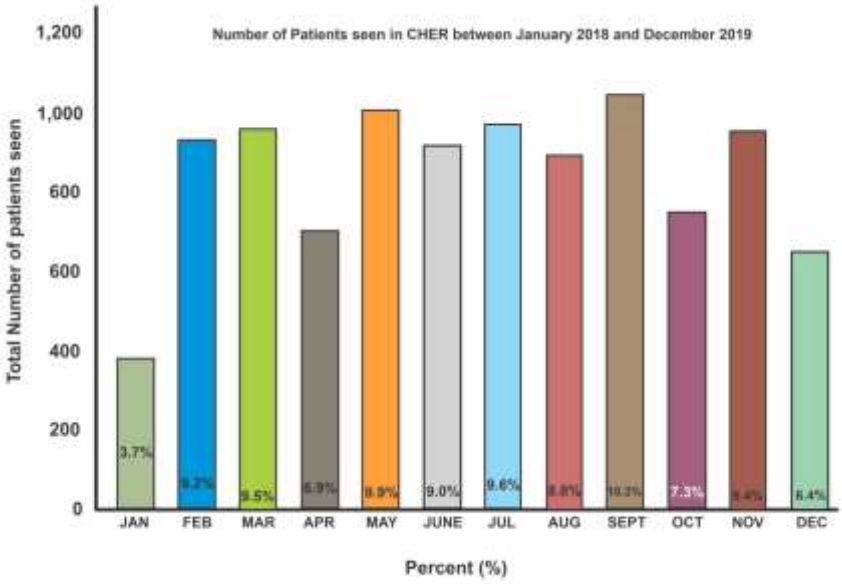

Figure 1: Monthly distribution of children presenting to the Emergency Unit

As shown in Figure 2, of the 10,138 children seen, 2, 914 (28.7%) were admitted; the last three months of the year contributed nearly half (40.1%) of the total number of admissions, while May and June contributed the lowest proportions, with 2.5% and 2.3% of the total admissions respectively. The admission rate was low at the start of the year and gradually rose through the course of the year.

Figure 3 shows the distribution of mortalities per month. There were 144 mortalities, which comprised 4.94% of the total admissions. The months of June and September had the highest mortality rates at 12.5% each, while the lowest rates were reported in July and February at 2.8% and 5.6%, respectively. The mortality rate gradually increased towards the middle of the year and then declined again towards the end of the year.

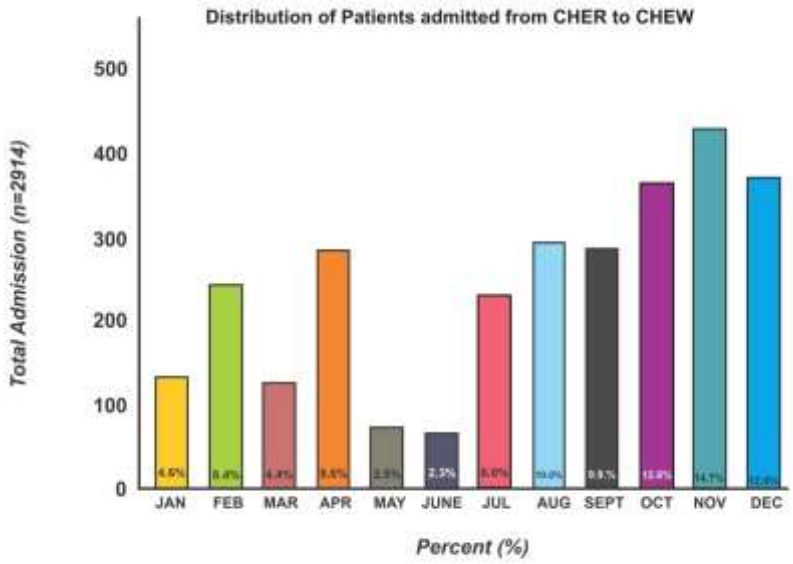

Figure 2: Monthly distribution of children admitted from CHER into CHEW

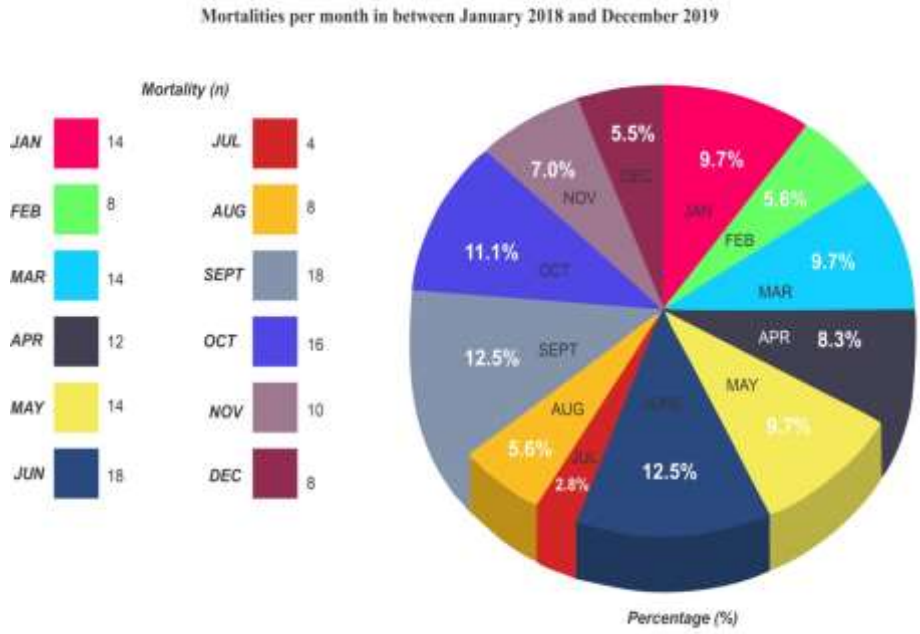

Figure 3: Monthly distribution of the mortalities recorded at the Emergency Unit

Mortality was highest in patients with meningitis, closely followed by those with sepsis/septic shock, severe malaria and anaemia with heart failure, as shown in Table I. The commonest morbidity necessitating admission was meningitis, while sickle cell crisis and oncologic pathologies constituted the least. The case fatality rate was highest amongst children with pneumonia compared to other illnesses. It is important to note that most children presented with multiple morbidities. Children within the first year of life contributed over a third of the mortalities within the two-year study period. As shown in Table II, the under-5s made up 61.1% of the total deaths reported. There were more male deaths, giving a male-to-female ratio of 1.3:1.

Table I: Frequencies of admission diagnoses, mortality rates and case fatality rates (CFR)

	Number of cases	*Number of deaths*	*CFR (%)*
Meningitis	707 (24.3)	68	9.6
Sepsis/Shock	603 (20.7)	58	9.6
Severe malaria	542 (18.6)	52	9.6
Anaemia/Heart Failure	395 (13.5)	38	9.6
Pneumonia	369 (12.7)	36	9.7
SCA	164 (5.6)	12	7.3
Cancer	134 (4.6)	7	5.2
Total	2914 (100)	253*	

***Some cases had more than one diagnosis *Sickle Cell Anaemia (SCA)**
Numbers in parentheses are percentages of the total

Table II: Sex and age distribution of mortalities

	Sex			
	Male	Female	Total	Male-to-Female ratio
1-12months	30 (58.8)	21 (41.2)	51 (35.4)	1.4:1
>12months – 59 months	20 (54.1)	17 (45.9)	37 (25.7)	1.2:1
>59months	31 (55.0)	25 (45.0)	56 (38.9)	1.2:1
Total	81 (56.3)	63 (43.7)	144 (100.0)	1.3:1

A quarter died within 6 hours of presentation, while 75% were early mortalities (between the 7th and 48th hour of presentation). Of the 144 critically ill children admitted, 140 (97%) required intensive care (ICU) services. In contrast, 4 (3%) did not qualify for intensive care as they were brought in actively dying (resuscitated but died within an hour of presentation).

Intensive Care Services Unmet, Offered and Outcome

Of the 140 children who qualified for ICU care, only 17 (12%) were admitted into the ICU, while the remaining 123 (88%) did not receive the needed intensive care, and all of them died. Of the 17 (12%) children that were admitted into the ICU, only 2 (12.3%) survived and were discharged home, while the remaining 15 children died (87.7%).

Duration of illness, use of native herbs, over-the-counter drugs and treatments received at referring hospital/chemist shops

The duration of illness among the mortalities ranged from a few hours to months before presentation at our facility. The majority (97%) of the mortalities presented late with complications of the illnesses. Of all the mortalities recorded in this study, 98% of the children received medications bought from patent medicine stores or native herbs administered by caregivers. In contrast, others had intravenous or oral drugs at the referral facilities prior to presentation at UBTH. All these interventions outside the hospital setting delayed the time of proper medical evaluation and prompt treatment. The researcher could not ascertain the method of care cost payment.

Discussion

The admission rate in this study is much higher than that reported from similar studies like

those from tertiary facilities within the south-south and southwestern regions of Nigeria[7,8] and the report by Cui-ping Zhu in China.,[30] The high admission rate may be due to the failure of the primary and secondary levels of health services in the study locale and environs resulting in over patronage of the tertiary health care system.

The number of participants and the admission rate in this study are much higher than the values reported from similar studies in other parts of the country [7-9,16,30] The higher number obtained in this study is reflective of the fact that UBTH is one of the busiest tertiary facilities in the country and serves as a referral centre for several neighbouring states. Edo State, being a confluence state, also has a heavy population of people going through and residing transiently for business and pleasure.

The months that reported the highest mortalities had conversely low admission rates. Of note is that these months witnessed industrial actions by various healthcare worker unions. These periods would have adversely affected the quality of care given to the patients, resulting in poorer outcomes. It is also reflective of the fact that periods of reduced staff strength per patient have a significant negative impact on the quality of clinical outcomes. Similar findings were noted by Agbesanwa *et al.* [8] in southwestern Nigeria. A mortality rate of 4.9% of admissions observed in this study compares favourably with findings from similar studies in this region by Ibeziako and co-workers [32] and the previous report from the study locale.[5] Other researchers have reported higher mortality rates; Agbesanwa *et* a*l.* [8] in Ekiti State, an earlier study in Benin City,[4] the study conducted at the children's emergency room of the Abia State University Teaching Hospital (9.6%) [33] and previous Nigeria studies, showed mortality rates of 11.1%, 12.6%, 9.5%, 10.0%, 14.3%, and 15.1% [11, 34-38] Conversely, Enyuma and colleagues[9] reported a mortality rate of 0.5% which is especially low in comparison to findings from other facilities in the region. The finding in this study suggests that mortality rates have not significantly changed over the last two decades.

The spread of morbidities and mortalities by age, as recorded in this study, is consistent with the high mortality rate in under-5s reported in other studies [32, 39-41] and especially within the first year of life. Most of the children admitted were under-5, with children within the first 12 months of life having the largest contribution. This finding further highlights the vulnerability of children in these age groups to communicable diseases. Similar findings were noted by other researchers reporting admission patterns from children's emergency rooms in Nigeria. [5,7,9,16,42]

As observed in this study, males presented more in CHER, in keeping with previous studies. [7, 43-45] This observation could be buttressed by the family's male sex preference attitude in Nigeria[34,35] and certain parts of Africa and Asia, whereby families seek health care earlier and more frequently for their male children than for their daughters. Families in Nigeria and certain parts of Africa and Asia preferring males over female children, both in education and health care seeking behaviours' is a documented observation in literature. [44-46] Generally, the male-to-female ratio of the study participants was skewed in favour of the males; mortality was slightly higher among males compared to females. This is in tandem with other studies in Nigeria, as reported by Agbesanwa and colleagues[8] in Ekiti state, Duru *et al.* [7] in Bayelsa, and Njoku *et al.* [16] from the Southeastern part of Nigeria for reasons earlier stated above.

Case fatality was highest in patients who were diagnosed with pneumonia, closely followed by those with meningitis, sepsis and septic shock, severe malaria and anaemia with heart failure. The pattern of infectious diseases among the mortalities is similar to the findings in other tertiary facilities within the country. [4,5,7,8,16] Although these conditions were treatable, late presentation and indiscriminate use of over-the-

counter antibiotics have contributed to delayed presentation and treatment with worsening prognosis at the time of presentation. Other Nigerian researchers have reported similar trends. [7,8,16] It would be safe to imply that late presentation with more severe illness may be a significant contributor to the high case fatality reported, especially with cases with respiratory difficulties, requiring mechanical ventilation.

Only a small proportion of the children in need of intensive care were admitted into the intensive care unit. This was mainly due to the unavailability of space in the ICU and caregivers' inability to pay the admission deposit. These reflect the healthcare finance method in the study locale and the country in general, where out–of–pocket payment accounts for most of the payments made for healthcare services. Similarly, the mortality recorded in this study of patients admitted into ICU is markedly higher than reported from another centre in China.[30] Other Nigerian studies on the pattern of admission in the children's emergency room did not report any met or unmet ICU admissions and outcomes. The abysmally small number that survived in the ICU in this study may be due to late presentation into the unit and possibly sub-optimal medical care received prior to presentation at our facility. All these may have also negatively impacted survival. The absence of a designated Paediatric Intensive Care Unit (PICU) at the study locale may have greatly impacted the ease of admission compared to sharing an ICU with adult patients. Also, the lack of staff with paediatric critical care training at the main ICU may have adversely affected the quality of care and in turn, the clinical outcomes.

Conclusion

Infectious diseases are the leading causes of paediatric emergencies and the most typical causes of death in CHER, especially among under-five children in our facility. The high contribution of infectious disease to infant and childhood mortality would suggest that health promotion and disease prevention programs must be further strengthened. The majority of the children requiring ICU care did not get it, but amongst those opportune, the majority eventually died. The need for a functional, well-manned and equipped Paediatric Intensive Care Unit (PICU) cannot be over-emphasized. More research is needed on the extent of met and unmet intensive care services at paediatric emergency rooms in tertiary hospitals in Nigeria. Healthcare policymakers should also consider the provision and efficient operation of Paediatric Intensive Care Units (PICUs) at tertiary health facilities in Nigeria.

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Conflicts of Interest: None declared.

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