ORIGINAL ARTICLE

Morbidity and mortality pattern in the Children Emergency Unit of the University of Nigeria Teaching Hospital Enugu

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ABSTRACT

Background: Efforts to improve child survival can only be effective if they are based on reasonably accurate information about the causes of death.

Objectives: To review the pattern of post-neonatal deaths among children admitted into the Children Emergency Unit of the University of Nigeria Teaching Hospital, Enugu, Nigeria.

Methodology: The records of all the children admitted into the Children Emergency Unit of the University of Nigeria Teaching Hospital, Enugu from January 2006 to December 2010 were reviewed. Neonates were excluded. Information extracted from the records included: age, sex, date of presentation, final diagnosis and duration of admission. Analysis was mainly descriptive, while frequency tables, graph and prose were used to present the results.

Results: A total of 6,816 admissions were recorded during the period. Cases of malaria, acute gastroenteritis, pneumonia and sepsis were the most commonly admitted. There were 267 deaths, with a mortality rate of 3.9%. Sepsis, malaria, and acute gastroenteritis accounted for 28.8%, 24% and 11.2% of deaths, respectively. More than 77% of the deaths occurred among children under 5years of age. Mortality was higher during the dry months of December to March, ($p=0.760$, $\chi^2=0.094$). More than 60% of the deaths occurred within 24hours of presentation, ($\chi^2=131.9$, $p=0.001$).

Conclusion: Mortality rate at the Children Emergency Unit of the University of Nigeria Teaching Hospital, Enugu was 3.9%. Infectious diseases were the major causes of mortality in these children. There is, thus, a need for goal-directed efforts towards reducing the mortality from these diseases.

Keywords: *Admission, disease, gastroenteritis, malaria, pneumonia, sepsis*

INTRODUCTION

The United Nations Millennium Development Goal No. 4 (MDG-4) is targeted towards reducing child mortality by two-thirds by the year 2015.[1] With concerted efforts towards achieving this goal, child mortality has been on the decline globally; from 10.8 million (under-5 mortality) in 2000 to 8.8 million in 2008.[1,2] However, many countries especially in sub-Saharan Africa and South Asia are not on target towards meeting the MDG-4.[1,2] The African region and South-East Asian region have the highest number of under-5 mortality.[1] Nigeria still ranks first in Africa and second behind India, worldwide, despite the efforts put in by past and present governments, at various levels, to combat childhood morbidity and mortality.[1,2]

Significantly, of note too, is that while regions recorded a preponderance of neonatal mortalities, the African region has a much greater proportion of post-neonatal deaths.[1]

Child survival efforts can only be effective if they are based on reasonably accurate information about the causes of death.[3] Information on causes of death is needed to assess the trends in disease burden in relation to national and international objectives, prioritize interventions, plan for their delivery, and ascertain the effectiveness of disease-specific interventions.[1,3]

In a country such as Nigeria, where data gathering is still rudimentary, especially in the primary and secondary health care facilities, aggregation of data from the tertiary hospitals scattered over the country may be the only source of reasonable information that will help in national planning.

This study was aimed at reviewing the pattern of morbidity and mortality in children who are older than one month in the Children Emergency Unit of the University of Nigeria Teaching Hospital, Enugu, Nigeria. Secondly, to compare the results with those of a similar study done in the same institution about 14years ago.[4] This will help in the assessment of the trend of the mortality from childhood diseases in the area and, as well, provide data for evaluation and introducing corrective interventions.

METHODOLOGY

This is a case series study conducted at the Children Emergency Unit of the University of Nigeria Teaching Hospital (UNTH), Enugu. The hospital located in the South-East Zone of Nigeria, is the largest hospital in the Zone and renders both basic and tertiary health services. The Children Emergency Unit is the first port-of-call for most of the paediatric patients, and opens for 24 hours, on all the days of the week. Medical and surgical cases referred from other health facilities from all parts of the Zone and beyond, as well as children from the institution's out-patient departments and direct presentations, are attended to in the unit. Neonates are received and transferred to the Newborn Special Care Unit for specialist management. The Children Emergency Unit is manned by all cadres of doctors, ranging from consultants to house officers, as well as nurses and other support staff.

The admission records of all the children that were admitted into the Children Emergency Unit of UNTH from January 2006 to December 2010 were reviewed. Data extracted from the records included age, sex, date of presentation, final diagnosis and duration of admission. Neonates were excluded from the study as they were cared for in a separate unit. Statistical analysis was done using the Statistical Package fr Social Sciences (SPSS) version *19 (IBM Inc. Chicago Illinois, USA, 2010).* The analysis was mainly descriptive. Percentages, ratios and case fatality rates calculations were done. Test of significance for discrete variables was done using the Chi-square test. A *p-value <0.05* was regarded as significant. Frequency tables mainly, graph and prose were used to present the results.

RESULTS

A total of 6,816 post neonatal admissions were recorded during the period. These were made up of 3,754 males and 3,062 females with a male:female ratio of 1.2:1. Admission was highest in the month of January and least in April (*Figure 1*). About 40.3% of the admissions occurred during the dry months of December to March. Malaria, gastroenteritis, pneumonia and sepsis were the most common reasons for admission, with malaria constituting nearly 40% of the admissions (*Table 1*).

Twenty-nine (0.4%) children did not have any recorded diagnosis. The childhood malignancies admitted included leukaemias, Burkitt's lymphomas, nephroblastomas, neuroblastomas, retinoblastomas, Hodgkin's and non-Hodgkin's lymphomas, osteosarcomas, hepatoma and brain tumours.

Renal diseases included acute glomerulonephritis, nephrotic syndrome, acute renal failure, chronic renal failure and urinary tract infections.

Table 1. Causes of admission into the Children Emergency Unit

Diagnosis	Frequency	% of Total
Malaria	2618	38.4
Acute gastroenteritis	957	14.0
Pneumonia	587	8.6
Sepsis	512	7.5
Acute Asthma	316	4.6
Sickle cell anaemia crises	268	3.9
Meningitis	177	2.6
Surgical emergencies	166	2.4
Seizure disorder	121	1.8
Enteric fever	110	1.6
Malignancies	108	1.6
Bronchiolitis	104	1.5
Renal diseases	97	1.4
URTI	91	1.3
Severe Malnutrition	79	1.2
Measles	52	0.8
HIV/AIDS	46	0.7
Congenital heart diseases	27	0.4
Acquired heart diseases	18	0.3
Foreign body aspiration	38	0.6
Childhood poisoning	31	0.5
Tetanus	11	0.2
Others	253	3.7
No diagnosis	29	0.4
Total	**6816**	**100**

A total of 3,242 patients were discharged home from the emergency room, while 3,251 were transferred to the main ward, and 56 discharged against medical advice (DAMA).

Two hundred and sixty-seven deaths (137 males and 130 females) were recorded within the given period with a mortality rate of 3.9% and a male:female mortality ratio of 1.1:1. These deaths occurred across all age groups admitted into the emergency unit, (median age = 14 months). More than 77% of the deaths occurred among children under 5years of age.

Sepsis, malaria, and acute gastroenteritis accounted for 28.8%, 24% and 11.2% of deaths, respectively with sepsis having the highest case fatality rate (CFR) of 15% (*Table 2*). Of the 64 deaths from malaria, 39 (61%) were due to severe anaemia. The other 11 deaths were due to measles, foreign body aspiration, tetanus, tuberculosis, rabies, gastrointestinal bleeding, carbon monoxide poisoning, drug reaction and acute surgical abdomen.

Table 2. Causes of mortality in the Children Emergency Unit

Diagnosis	Frequency Admissions	Mortality	CFR (%)	Percentage of total mortality
Sepsis	512	77	15.0	28.8
Malaria	2618	64	2.4	24.0
Acute gastroenteritis	957	30	3.1	11.2
Meningitis	177	23	13.0	8.6
Pneumonia	587	17	2.9	6.4
Sickle cell anemia complications	268	13	4.9	4.9
HIV/AIDS	46	5	10.9	1.9
Childhood malignancies	108	5	4.6	1.9
Protein energy malnutrition	79	5	6.3	1.9
Congenital heart diseases Cardiac disorders	27	4	14.8	1.5
Acquired heart diseases	18	1	5.6	0.4
Renal diseases	97	2	2.1	0.7
Others	253	11	4.3	4.1
No/ unclear diagnosis	29	10	34.5	3.7
Total	**6816**	**267**	**3.9**	**100**

Ten children who died within a few hours of presentation had no diagnosis recorded.

When the causes of mortality were analyzed by age group, sepsis was the highest in the infants and also, in children 5years and above, whereas severe malaria caused the highest number of deaths in the age group 1year to less than 5years (*Table 3*).

Table 3. Aetiological factors of death

Diagnosis	29days - < 1yr	1-<5 yrs	5-<10 yrs	≥ 10 yrs	Total
Sepsis	44	17	7	9	77
Severe Malaria	13	44	4	3	64
AGE	15	12	3	0	30
Meningitis/ Encephalitis	13	8	1	1	23
Pneumonia	8	7	2	0	17
SCA complications	1	3	5	4	13
HIV/AIDS	2	1	1	1	5
Childhood malignancy	0	1	2	2	5
Severe Malnutrition	4	1	1	0	5
Cardiac diseases	1	1	0	3	5
Renal disorders	0	0	1	1	2
Drug reaction	0	0	1	1	2
Others	1	4	2	2	9
No diagnosis	3	3	0	4	10
Total	**105**	**102**	**29**	**31**	**267**

Figure 1. Distribution of mortalities by month of presentation

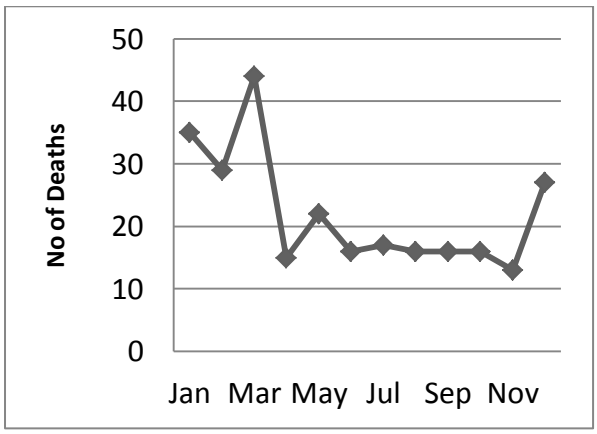

Table 4. Duration of admission in relation to mortality

Duration (hrs)	Frequency	Percentage
≤24	168	62.9
>24 - 72	84	31.5
>72	15	5.6
Total	**267**	**100.0**

χ^2 =131.9, (p=0.001)

Mortality was highest during the dry months of December to March (*p=0.760, χ^2 =0.094*), *see Figure 1.* More than 60% of the deaths occurred within 24 hours of presentation, (*p=0.001, χ^2 =131.9*), *Table 4.*

DISCUSSIONS

Infectious diseases constitute the major cause of morbidity in the Children Emergency Unit of the University of Nigeria Teaching Hospital, Enugu. This means that the pattern of morbidity has remained unchanged over time as it is similar to the findings by Ibeziako and Ibekwe in the same centre, about 14 years earlier.[4] A similar pattern was documented in various parts of Nigeria, an indication that the major problem of children in this country still remains infectious diseases, which of course, are preventable.[5,6,7,8]

The mortality rate of 3.9% in this review is an improvement when compared to the 5.1% mortality rate documented 14years ago in the same unit.[4] The previous study, however, included neonates. With neonates excluded, the mortality still stood at 4.8%. The reason for this improvement may not be obvious, but an improvement in the number and cadre of doctors working in the emergency unit cannot be ignored. In some other part of the country, an increase in mortality was actually recorded.[9]

Deaths were mostly from infective causes which reflects the fact that infection still remains the bane of healthcare delivery for Nigeria and most developing countries.[1] Sepsis, severe malaria, acute gastroenteritis (AGE), and meningitis have remained important causes of mortality in children <5years of age admitted into the Children Emergency Unit of the University of Nigeria Teaching Hospital, Enugu, Nigeria. When compared to an earlier study, pneumonia appeared to be the only disease which mortality had lowered considerably.[4] Studies from other parts of Nigeria, also, noted that severe malaria, sepsis, gastroenteritis, and pneumonia are the major causes of mortality

among Nigerian children, especially the under-fives.[5,6,7,8,9]

Severe malaria, causing a high number of deaths, pointed to the need for an evaluation of the malaria control strategies and their implementation in Nigeria such as insecticide treated nets and home treatment with a view to improving them or adopting better control measures. Also, rapid response to blood transfusion in patients requiring blood might have significantly improved the rate of mortality from malaria since a large proportion was due to severe malaria anaemia.

Acute gastroenteritis still remained an important cause of mortality despite the wide use of oral rehydration therapy. This portrayed a probable lack of application of the methods of diarrhoea control. Since the rotavirus accounts for majority of the cases of severe acute gastroenteritis globally, methods to reduce the incidence of acute gastroenteritis by this organism must target the reduction in the load or virulence of the microbe.[10] Vaccination had been shown to be more effective than other control measures such as improvement in water supply, sanitation and hygiene.[11] Thus, inclusion of a rotavirus vaccine in the routine national immunization schedule might reduce the mortality from this disease.

Although, pneumonia continues to be one of the highest causes of mortality in children globally, in comparison to the study by Ibeziako and Ibekwe in the same centre, pneumonia caused relatively less mortality in the present study despite its persisting high morbidity.[1,4] The recent introduction of *Haemophilus influenza type b* vaccine as a component of the pentavalent vaccine which also contains diphtheria, pertussis, tetanus and hepatitis B vaccines into the nation's routine immunization schedule is a good effort towards further reducing the mortality from pneumonia and meningitis.

Non-communicable diseases played a major role in the morbidity and mortality of children aged ≥5 years, with sickle cell anaemia being a significant contributor to mortality among these children. This underlines the importance of routine follow-up care in order to detect those at risk and those with complications early for prompt intervention. There is also a need to explore newer concepts in the management of sickle cell anaemia; and more importantly genetic counseling to reduce the incidence of sickle cell anemia.

Deaths occurred more during the dry season. This is in contrast to the findings by Aikhionbare, *et al*, in Zaria, North Central and George, *et al,* in Port Harcourt, South-South Zone of Nigeria, both of which recorded more deaths during the wet season.[12,13] This may be related to the high number of admissions during the same period. The high incidence of acute gastroenteritis in the dry season with the corresponding increased mortality may, also, be a contributing factor.

More than 60% of deaths occurred within 24hours of admission. Other workers had also recorded rates ranging from 40.1% to 64.9% within the first 24hours.[4,8,14,15,16] This may be attributed to late presentation, which in our environment may be due to delay in seeking medical care, or delayed referral from lower health facilities. Adeboye, *et al,* in Ilorin adduced late presentation as one of the strong risk factors for mortality within 24hours, with complicated malaria accounting for most of the deaths.[15]

CONCLUSION

There is an urgent need for goal-directed efforts towards further reducing the mortalities from sepsis, severe malaria, gastroenteritis, meningitis and pneumonia. With the knowledge of the major causes of death among children in Enugu, combined with the causes from other parts Nigeria, a more goal-directed effort towards the control of these diseases should be instituted at all levels.

Efforts at malaria control should be re-evaluated as it appears that the current methods are not very effective. The gains made with immunization, in curbing immunizable, diseases should be sustained and improved on.

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