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Pattern of Morbidity and Mortality among Children hospitalized at the Obafemi Awolowo University Teaching Hospital, Ile-Ife

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Abstract

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Background: The achievement of the Millennium Development Goal, particularly as it relates to child health is desired. A periodic assessment will serve to evaluate performance and dictate our future pace.

Aim: To document the morbidity and mortality pattern among post-neonatal children managed at the Obafemi Awolowo University Teaching Hospitals Complex, (OAUTHC) Ile-Ife, over a one-year period.

Method: All the children admitted in the children's wards of the Ife hospital unit of the OAUTHC from May 1, 2006 to April 30, 2007, were prospectively studied for the pattern of morbidity and mortality.

Results: A total of 1082 children aged between 29 days and 14 years, were studied. Five hundred and ninety-nine (55.4 percent) were males. There were 283 (26.2 percent) infants; 501 (46.3 percent) others were aged between one and five years and 298 (27.5 percent) were older than five years. There were 97 (9.0 percent) deaths and 26 (2.4 percent) discharges against medical advice. The remaining 959 (88.6 percent) were discharged. The leading causes of morbidity were malaria (36.0 percent), septicaemia (11.0 percent), gastroenteritis (8.0 percent), road traffic injuries (8.0 percent), pneumonia (7.0 percent), and malignancies (5.0 percent). The leading causes of death were severe malaria (20.0 percent), meningitis (18.0 percent), septicaemia (14.0 percent), road traffic injuries (11.0 percent), and malignancies (8.0 percent).

Conclusions: This study shows that the mortality rate was high and that infectious diseases were the leading causes of morbidity and mortality in children in this centre during the period of study. Overhauling of the health care system of the country is desirable if the goal of the MDG is to be achieved. Perhaps a good starting point will be to make health care for children free and more easily accessible.

Introduction

DEVELOPING countries are bedeviled with poor vital statistics and despite various programmes to ameliorate these poor indices, there appears not to be much improvement over the years in several countries. Nigeria ranks among the countries with the highest infant mortality and under-5 mortality rates.[1] Under-5 mortality rate in Nigeria is estimated to be about 191/1000 live births whereas corresponding rates for Ghana, South Africa and Egypt, are 120, 69 and 35/1000 live births, respectively. Similarly, while the Infant Mortality Rate is estimated to be 99/1000 live births for Nigeria, it is 75, 56 and 29/1000 live births for Ghana, South Africa and Egypt, respectively.[1] In a bid to help facilitate development and help reverse this trend, the United Nations came up with the millennium development goals (MDGs)[2]

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in the year 2000; these goals are the world's time bound and quantified targets for addressing extreme poverty in its many dimensions. The MDG 4 particularly addresses reduction in child mortality with a target to reduce the under-five mortality rate by two thirds, between 1990 and 2015. If this is to be achieved, knowledge of the present situation of childhood illnesses and deaths half way in the period, will help in assessing performance and may identify key areas where urgent attention should be focused. Child mortality is a sensitive indicator of a country's development.[1]

Several reports[3-7] of morbidity and mortality from various parts of Nigeria have identified infectious and communicable diseases as major causes of childhood morbidity and mortality. These studies also reported very high mortality rates. However, there has not been any such report of the pattern of morbidity and mortality from our centre. This study thus aims to document the pattern of morbidity and mortality among children hospitalized at the Ife hospital unit (IHU) of the Obafemi Awolowo University Teaching Hospitals Complex (OAUTHC), Ile-Ife and to identify the major contributors to morbidity and mortality. This will add to the pool of knowledge on the pattern of morbidity and mortality among Nigerian children and may provide a framework for policy makers and health planners.

Patients and Methods

All the patients aged one month to 14 years admitted consecutively into the three children's wards of the Ife hospital unit (IHU) of the OAUTHC from May 1 2006 to April 30 2007, were prospectively studied. The following data were obtained and entered into a proforma: age, sex, duration of illness before admission, presumptive and definitive diagnosis, duration and outcome of admission. All the patients were monitored from admission to discharge or death and were managed according to standard management protocols as approved by the department.

The IHU of the department of paediatrics comprises four wards namely, the Children's emergency ward, the Children's wards 1 and 2, and the Neonatal ward. The three children's wards have a total of 47 beds. It is manned by six consultants, 12 residents and a number of house officers. The hospital also has a full complement of surgical, laboratory, pathological and radiological services. Patients admitted into the neonatal ward were excluded from this study. Data generated were entered into the computer using the Statistical Package for Social Scientists (SPSS) Version 15. Analyses were carried out with the SPSS and Computer Package for Epidemiological Analysis (CPEA) software. The subjects were categorized into less than 12 months, 12 months to five years and six years to 14 years. The morbidity and mortality pattern and mortality rates for each category were documented. The duration of hospitalization and time of death were also documented for each category. Univariate analyses were carried out for all major variables of interest and the chi-square($\div^2$) test was also used to compare statistical significance between variables where applicable. The significance level for each analysis was taken as $p < 0.05$.

Results

During the study period, a total of 1082 children comprising 599 males and 483 females were admitted into the wards. Two hundred and eighty three were aged below 12 months, while 501 were aged between 12 months and five years. Children less than five years old thus accounted for over 72 percent of the total (Table I).

Among the infants, severe malaria was the leading cause of morbidity, followed by bronchopneumonia, gastroenteritis, septicaemia and meningitis (Table IIa); all accounting for 73 percent of the morbidity in the group. Severe anaemia was the most common presentation of severe malaria followed by cerebral malaria. There were 25 deaths, resulting in a mortality rate of 8.8 percent in this category with 20 (80

Table I

Age and Sex Distribution of the Study Population

	Sex		
Age	*Male (%)*	*Female (%)*	*Total (%)*
< 12 months	164 (58.0)	119 (42.0)	283
12 months – 5 Years	267 (53.3)	234 (46.7)	501
6-14 years	168 (56.4)	130 (43.6)	298
Total	599 (55.4)	483 (44.6)	1082 (100)

Table IIa

Major Causes of Morbidity in Subjects aged less than 12 Months

Diagnosis	*Frequency (%)*
Severe malaria	72 (25.4)
Severe anaemia	55
Cerebral malaria	7
Febrile convulsion	5
Prostration	5
Bronchopneumonia	44 (15.5)
Gastroenteritis	40 (14.1)
Septicaemia	38 (13.4)
Meningitis	17 (6.0)
Measles	9 (3.2)
Hydrocephalus	9 (3.2)
Road traffic injuries	6 (2.1)
Congenital heart disease	5 (1.8)
Bronchiolitis	5 (1.8)

Other less common causes of morbidity included failure to thrive, Staphylococcal scaled skin syndrome, HIV infection, intussusception, spina bifida, pyloric stenosis, posterior urethral valve, and biliary atresia.

Table IIb

Major Causes of Morbidity in Subjects aged 12 Months to Five Years

Diagnosis	*Frequency (%)*
Severe malaria	258 (51.5)
Severe anaemia	150
Febrile convulsion	41
Cerebral malaria	36
Prostration	31
Septicaemia	47 (9.4)
Gastroenteritis	37 (7.4)
Road traffic injuries	29 (5.8)
Malignancy	15 (3.0)
Meningitis	10 (2.0)
Trauma	9 (1.8)
Burns	6 (1.2)
Measles	6 (1.2)

Other less common causes of morbidity included kerosene poisoning Surgical conditions, bronchial asthma, foreign body ingestion, sickle cell anaemia Crisis, acute renal failure, HIV infection, tetanus, acute glomerulonephritis, kwashiorkor, viral hepatitis, urinary tract infection, osteomyelitis, and tonsillitis.

Table IIc

Major Causes of Morbidity in Subjects aged Six to 14 Years

Diagnosis	*Frequency (%)*
Severe malaria	59 (19.8)
Severe anaemia	27
Prostration	25
Cerebral malaria	7
Malignancy	42 (14.1)
Road traffic injuries	34 (11.4)
Septicaemia	32 (10.7)
Gastroenteritis	10 (3.4)
Nephrotic syndrome	10 (3.4)
Meningitis	9 (3.0)
Trauma	6 (2.0)
Bronchial asthma	6 (2.0)
Chronic renal failure	5 (1.7)
Burns	5 (1.7)

Other less common causes of morbidity included acute surgical abdomen, foreign body ingestion, acute renal failure, HIV infection, tuberculosis, rheumatic heart disease, osteomyelitis, rabies, tetanus, tonsillitis, and Guillain Barre syndrome.

percent) of the deaths occurring within the first 48 hours of admission (Table III). The leading causes of death among the infants were meningitis (32 percent) followed by severe anaemia (20 percent) and septicaemia (16 percent), the three accounting for 68 percent of the mortality (Table IV). Meningitis ($\chi^2 = 17.28$; $P = 0.01$) and severe anaemia ($\chi^2 = 12.05$; $p = 0.01$) were significant causes of mortality in this age group.

In the age group, 12 months to five years, severe malaria was still the leading cause of morbidity, followed by septicaemia, gastroenteritis, pneumonia, road traffic injuries, malignancy and meningitis (Table IIb); all accounting for 85 percent of morbidity in the group. Similarly, severe anaemia was the most common presentation of severe malaria followed by febrile convulsion. There were 39 deaths giving a mortality rate of 7.8 percent in this category, with 30 (76.9 percent) of the deaths occurring within the first 48 hours of admission (Table III). The leading causes of death in the age group were severe anaemia (23 percent) and septicaemia (23 percent) followed by road traffic injuries (10 percent) and meningitis (10 percent), all accounting for 63 percent of the mortality (Table IV). Compared with the infants, there was no statistically significant difference in the causes of mortality but severe anaemia ($\chi^2 = 11.6$; $p = 0.01$) and septicaemia ($\chi^2 = 34.8$; $p = 0.01$) were

Table III

Outcome of Admission and Duration of Hospitalization in Various Age Groups
Duration of Hospitalization

Outcome	*<48 hours*	*48-120 hours*	*>120 hours*	*Total*
*Aged <12 months**				
Alive	14	123	117	254
Died	20	2	3	25
DAMA	2	1	1	4
Total	36	126	121	283
Aged 12 mon-5 yrs+				
Alive	39	254	164	457
Died	30	3	6	39
DAMA	2	2	1	5
Total	71	259	171	501
*Aged 6-14 yrs***				
Alive	36	77	135	248
Died	15	9	9	33
DAMA	5	5	7	17
Total	56	91	151	298

DAMA = Discharges against medical advice
** Mortality of 8.8%; (9.0%, excluding cases DAMA)*
+ Mortality of 7.8%; (7.9%, excluding cases DAMA)
*** Mortality of 11.1%; (11.7%, excluding cases DAMA)*

Table IV

Leading Causes of Mortality in the Various Age Groups

Age Groups					
< 12 months		*12 mons-5 Years*		*6-14 Years*	
Diagnosis	*Frequency (%)*	*Diagnosis*	*Frequency (%)*	*Diagnosis*	*Frequency (%)*
Meningitis	8 (32)	Severe anaemia	9 (23.1)	Road traffic injuries	
Severe anaemia	5 (20)	Septicaemia	9 (23.1)	Malignancy	6 (18.2)
Septicaemia	4 (16)	Road traff. injuries	4 (10.25)		5 (15.1)
Marasmus	2 (8)	Meningitis	4 (10.25)	Meningitis	3 (9.1)
Burns	2 (8)	Pneumonia	3 (7.7)	Burns	2 (6.1)
Bronchopneumonia	2 (8)	Malignancy	2 (5.1)	Cerebral malaria	2 (6.1)
		Measles	2 (5.1)	Severe anaemia	-
Others	2 (8)	Others	6 (15.4)	Others	8 (24.2)
Total	25 (100)		39 (100)		33 (100)

significant causes of mortality in this age group compared with the older age group.

Among the subjects aged six years to 14 years, severe malaria remained the leading cause of morbidity, followed by malignancy, road traffic injuries, septicaemia, sickle cell anaemia, gastroenteritis, nephrotic syndrome and meningitis (Table IIc); all accounting for 70.5 percent of the morbidity in the group. Severe anaemia remained the most common presentation of severe malaria followed by prostration. There were 33 deaths, resulting in a mortality of 11.1 percent in this category and 15 (45 percent) of the deaths occurred within the first 48 hours of admission (Table III). Leading causes of

death among the age group were road traffic injuries (21 percent), followed by malignancy (18 percent), meningitis (15 percent) and burns (9 percent), all accounting for 63 percent of the mortality (Table IV). Malignancy ($\chi^2 = 8.3$; $p = 0.01$) and road traffic injuries ($\chi^2 = 4.6$; $p = 0.01$) were significant causes of mortality in this age group.

Overall, the commonest causes of morbidity were severe malaria (36 percent), septicaemia (11 percent), gastroenteritis (8 percent), road traffic injuries (8 percent), pneumonia (7 percent) and malignancy (5 percent). A total of 97 patients died, resulting in a mortality rate of nine percent. The leading causes of death among the study population were severe malaria (20 percent), meningitis (18 percent), septicaemia (14 percent), road traffic injuries (11 percent), and malignancy (8 percent). There was no significant difference in the mortality rate among the three age categories ($\chi^2 = 3.2$; $p = 0.19$) but children in the age group 6-14 years were more likely to die between 48 and 120 hours of admission ($\chi^2 = 10.5$; $p = 0.01$).

Discussion

This prospective study of morbidity and mortality pattern of children admitted into the IHU of the OAUTHC, has shown like similar studies from other parts of the country, the prevalent causes of admissions and deaths among children in our environment. Malaria, septicaemia, gastroenteritis and pneumonia were the leading causes of morbidity in our children. This pattern is similar to findings in Ilorin,[4] Benin,[5] Ibadan,[6] and Lagos[7] as reported 13 to 20 years ago and also with more recent studies from Ibadan[8] and Sagamu.[9] This shows that not much has changed in the past decades with regard to the pattern of morbidities among Nigerian children. In a similar study from Kenya, malaria was also the leading cause of admission and together with pneumonia, gastroenteritis and measles accounted for three-fourths of all admissions.[10]

In the present study, malaria with its many complications accounted for more than a third of the cases seen and was the leading cause of morbidity in all the groups. Severe anaemia was the leading presenting feature of severe malaria in all the groups. Similarly, other studies from Nigeria,[9,11] Mozambique,[12] and The Gambia[13] have also documented malaria as the leading cause of childhood mortality, as it was in the present series. There is thus a need for concerted effort at tackling this scourge if there is to be a significant reduction in childhood morbidity and mortality among children in sub-sahara Africa. Improved environmental sanitation and increased availability of, accessibility to and the use of insecticide treated materials by the vulnerable groups may also help. The global efforts and advances in malaria vaccine development also offers a ray of hope in combating this one scourge too many.[14,15] However, there still remain a lot of obstacles and uncertainties as to the effectiveness, application, practicability and applicability of the various candidate vaccines so far tried.[16,17] The efforts at vaccine production are being challenged by the complexity of Plasmodium's life cycle, its ability to parasitize and hide within the host cells, and its masterful ability to avoid clearance by the innate and adaptive host immune responses.[16]

Ojukwu *et al*[3] have adduced the difficulty with eradicating preventable diseases to deteriorating environmental conditions, ignorance and poor socio-economic situation of the country. It is worthy of note that while infectious diseases were the major causes of morbidity among children aged less than five years in the present series, non-infectious diseases were prominent causes of morbidity in subjects aged above five years. Septicaemia, gastroenteritis and pneumonia combined, accounted for about 20 percent of the causes of childhood mortality in the present study.

Unlike in the earlier Nigerian studies, severe protein energy malnutrition, tetanus and measles were not major contributors to morbidity or mortality in our study, accounting for only about two percent of the total admissions. These were similar to the findings in recent reports from Ibadan[8] and Sagamu.[9] Although the role of intermediate forms of malnutrition in the fatal cases were not analyzed by us, this shows that immunization efforts, and perhaps health education are at least, yielding some positive results.

Contrary to findings in previous studies from Nigeria, injuries from road traffic accidents accounted for as high as eight percent of admissions, an almost equal proportion of cases of gastroenteritis and pneumonia and were more prevalent than malignancies. Similar reports of increasing morbidity and mortality from road traffic injuries have been reported from both Nigeria[18,19] and other developing countries.[20,21] This double jeopardy of persistently high prevalence of communicable diseases and increasing incidence of non-communicable diseases in sub Saharan Africa has been described as double burden of disease.[22]

The mortality rate of nine percent in the current study is comparable to the 10 percent reported from Benin,[5] and 11.6 percent from Ilorin,[4] but is slightly lower than the 12.2 percent obtained from Abakaliki,[3] the 14 percent obtained in Ibadan,[6] and the 12.6 percent from Sagamu.[9] These studies spanned more than three decades and it is appalling that not much

has changed significantly. Malaria, meningitis, septicaemia and pneumonia were responsible for close to 60 percent of the causes of mortality. This is not different from what has been documented from other centres across the country. In a study from Mozambique,[12] 73.6 percent of the mortalities were from communicable diseases and a mortality rate of 8.2 percent was documented from Kenya.[10] It is however worthy of note that deaths from road traffic injuries accounted for 11 percent of total mortality.

Almost 70 percent of the deaths in this study occurred in children less than five years, a finding that is similar to that of 71.2 percent mortality in the same age group by Ojukwu in Abakaliki.[3] Thus any programme planned to bring about a reduction in mortality among Nigerian children must target this highly vulnerable group. Sixty-five percent of the deaths occurred within the first two days of admissions; this as pointed out by Ojukwu[3] and Fetuga *et al*[9] might be due to delay in seeking medical attention which might be consequent on poor accessibility especially in terms of cost. Common structural and underlying causes of under-five mortality identified by UNICEF include poorly resourced, unresponsive and culturally inappropriate health and nutrition services, food insecurity, inadequate feeding practices, lack of hygiene and access to safe water and adequate sanitation, female illiteracy, early pregnancy, discrimination and exclusion of mothers and children from access to essential health and nutrition services and commodities due to poverty and geographic or political marginalization.[23]

This study like many others from other centres in Nigeria, has again documented the prevalent causes of morbidity and mortality among Nigerian children. If deaths from malaria, meningitis, septicaemia and pneumonia could be controlled, then it would seem possible that the MDG 4 target would be achievable in the country. This however, will require the highest level of commitment and dedication by all stakeholders. Ability to wholeheartedly and faithfully translate policy to action will be needed. The primary health care (PHC) system holds the key to this realization as previously suggested.[4,6,7] We suggest the transfer of management and control of the PHC to the Federal government level from the existing local government level or at least, give adequate incentive to health workers at this level. As health in children is linked to several other factors, holistic approach aimed at achieving the other MDGs will also be necessary. Sustained immunization coverage, improved environmental sanitation, health education, provision of potable water, and improved socioeconomic condition of the general populace have all been suggested in the past as key to achieving a reduction in childhood morbidity and mortality. Making health care and treatment for children less than five years free, available, accessible and compulsory may be useful. This will demonstrate the highest level of commitment to the survival of the future of the nation. Strengthening and widening the scope of the recently introduced Nigerian National Health Insurance Scheme where patients will not have to make out-of-pocket payment for health services might also help in the achievement of this all important target.

It is concluded that infectious diseases remained the leading causes of morbidity and mortality in children in our centre. The mortality rate was also high. We suggest an overhauling of the health care system of the country if the goal of the MDG is to be achieved. Perhaps a good starting point will be to make health care for children free and accessible.

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