Mortality pattern at a children's emergency ward, University College Hospital, Ibadan, Nigeria

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Summary

A retrospective study of the pattern of paediatric deaths at the children's emergency room (CHER) of the University College Hospital, Ibadan revealed a steady decline from 208 per 1000 admissions in 1978 to 179 per 1000 admissions in 1986. The study, however, showed that one in every five children admitted to the CHER died over the study period 1978, and 1981-1986. Measles has the highest proportionate death rate of 13.1% and it shares the highest fatality rate of 32.6% with tetanus. Gastroenteritis and bronchopneumonia, which were major causes of deaths in the CHER in the early 1970s decline considerably in importance. Also noteworthy is low birth weight which was associated with the least fatality rate among the 10 leading causes of emergency admissions. The age distribution of the children who died shows that the highest proportion was in the age group 1-2 yr. The use of the proportion of deaths of children in the 1-2 yr age group as a more reliable index for assessing the health status of a community is discussed. Also discussed is the preponderance of males over females in emergency admissions.

Résumé

Une étude rétrospective du type de décès d'enfants au service des urgences pour enfants (CHER) du Complexe Hospitalier Universitaire d'Ibadan a montré une diminution régulière de ces décès, de 208 sur 1000 admissions en 1978 à 179 pour 1000 admissions en 1986. L'etude a mis en évidence, toutefois, qu'un sur cinq des enfants admis dans ce service est mort

Correspondence: Dr E. A. Bamgboye, Department of Preventive and Social Medicine, University College Hospital, Ibadan, Nigeria. au-delà de la période d'étude de 1978, et de 1981-1986. La rougeole a le taux de mortalité le plus élevé proportionnellement de 13.1% et partage avec le tétanos le taux de décès de 32.6%. L'importance de la gastro-entérite et de la bronchopneumonie, qui constituaient dans les débuts des années 1970s les causes principales de décès dans CHER, a diminué considérablement. Il convient aussi de noter le faible poids à la naissance qui a compté le taux de décès le moins élevé parmi les dix principales causes d'admissions d'urgence. On a analysé dans cet article la répartition par âge des décès chez les enfants qui semble suggérer que les décès chez les enfants dans le group d'âge de 1-2 ans pourrait être un signe plus sûr pour déterminer la situation de la santé dans une communauté. Il en est de même de la prépondérance des enfants de sexe masculin sur ceux de sexe féminin dans les admissions d'urgence.

Introduction

The World Health Organization (WHO) has stressed the need for constant evaluation of available health services as an integral part of the managerial process [1]. In this regard, the outcome of admissions to our health institutions could serve as an indicator of the quality of services given on the one hand, while on the other hand it would provide information on the relative importance of diseases in the population [2].

In two previous studies carried out at the University College Hospital (UCH) Ibadan, Hendrickse [3] and Adeyokunnu *et al.* [4] examined the pattern of paediatric deaths in the hospital. These studies which covered inpatients as well as emergency admissions found no remarkable changes in paediatric deaths between 1964–1966, the late 1960s and 1969– 1973. The mortality rates reported by these two studies were 130 per 1000 and 140 per 1000 admissions respectively.

The present study attempts to examine the pattern of paediatric deaths in the children's emergency room (CHER) of the University College Hospital, Ibadan between 1978 and 1986, and relates this to the admission diagnoses.

Subjects and methods

The facilities in the CHER of the University College Hospital, Ibadan consist of 12 large cots, seven serento cots and one incubator giving a total admission complement of 20, but up to 40 patients are sometimes admitted at a time. The initial decision was to study the mortality trends in children admitted into these facilities during the 10-year period between January 1977 and December 1986. As some of the admission registers were mutilated, it was only possible to retrieve adequate information for 7 years, namely, 1978 and 1981-1986. The outcome of admission for each patient was classified as either discharged home from the CHER, transferred to the main paediatric wards for further management, or died at the CHER. In the calculation of case fatality rates and proportional death rates, cases whose diagnoses or outcome were unknown were excluded from the denominator.

Results

A total of 17,033 children were admitted into the CHER during the period of study. These consisted of 9794 males and 7037 females. The sex of 202 children was not indicated. Three thousand, five hundred and seven patients were subsequently transferred to the paediatric wards for further care while the outcome of admissions of 2446 children at the CHER were unknown. Thus a total of 11,076 children had their complete admission records available.

Table 1 shows the annual admission pattern and proportional death rates for each year among children fully cared for in the CHER while the proportional death rates per month for the same group are presented in Table 2. These monthly and yearly mortality trends are also shown in Figs 1 and 2. The trend shows a progressive fall in death rates for each 1000 admissions over the year except for 1984 when there was a slight increase. However, the drop from 238 deaths per 1000 admissions in 1981 to 178 and 179 deaths per 1000 admissions in 1985 and 1986, respectively, are noteworthy. The result of the normal test (Z) used to compare the death rates in 1985 and 1986 with those of 1984 was statistically significant (P < 0.01).

The monthly mortality rates showed the lowest incidence in July, with a value of 183 deaths per 1000 admissions, while the highest incidence rate of 254 per 1000 admissions occurred in January. In general, lower mortality levels were recorded between June and September while January to April had the highest mortality levels. The period October to December falls in the intermediate level.

The age and sex distribution of all the paediatric emergency admissions who had complete records on age and sex showed that

Year Number of children Deaths Death rate (%) 1978 2483 516 20.8 23.8 1981 1752 417 1982 19.6 1690 332 1983 20.6 950 196 1984 1238 283 22.9 1985 1551 277 178 17.9 1986 1412 253 20.5 Total 11,076 2274

 Table 1. Proportional death rate of children by year in CHER, UCH, Ibadan, 1978 and 1981–1986

Month	fotal children	Death rate (%)
January	1198	25.4
February	884	21.5
March	741	21.3
April	1112	23.7
May	1169	19.7
June	1069	19.4
July	958	18.3
August	751	19.0
September	721	18.8
October	868	20.9
November	834	20.2
December	833	20.0
Total	11,076	20.5

Table 2. Proportional death rate of children by month over the years 1978 and 1981–1986



Fig. 1. Yearly proportional death rates in the CHER, UCH, Ibadan, 1978 and 1981–1986.

neonates accounted for 26.4% with an average of 53 per month, while children aged 1–12 months accounted for an additional 29.5%. Altogether therefore, infants (0–12 months) accounted for almost 56% of all admissions in this period. This means that an average of 111 infants are admitted monthly. Thirty point five per cent of the children were between 1 and 5 yr while only 13.4% were between 5 and 15 yr. The male to female ratio for all age groups taken together was 1.39 : 1.

The age-specific death rates for all admis-



Fig. 2. Monthly proportional death rates in the CHER, UCH, Ibadan, 1978 and 1981-1986.

sions whose records were complete for outcome during this period are shown in Table 3. While 20.6% of all neonatal admissions died, the agespecific death rates were much higher for children aged 7–12 months and 13–24 months where 24.7% and 27.2% of admissions, respectively, died. However, the mortality rate in children 2 yr and above was considerably lower than those of the other age groups.

The commonest diagnoses on admission were examined in relation to their case fatality rates in Table 4. The case fatality rate is shown in the last column of this table while the numbering of the diagnosis shows the ranking in terms of frequency. Measles and tetanus, which ranked fourth and eleventh among the major diagnoses, had the highest fatality rates of 32.6% each. (Sixty-one point six per cent of the tetanus cases were among the neonates and the case fatality rate of the latter group when considered separately from the other tetanus cases comes top with 36.4%.) This was followed by nutritional diseases - mainly, marasmus. kwashiorkor, and marasmic kwashiorkor with a fatality rate of 27.3%. Jaundice (of which 94%) were neonatal) and bronchopneumonia which ranked first and third, respectively, among all admissions were both less fatal than meningitis which had a fatality rate of 20.1%. Septicaemia (64% due to neonatal sepsis) had a fatality rate of 14.6% while gastroenteritis including

Age (months)	Total children	Total dead	ASDR
0-1	2641	545	20.6
2-6	1505	233	15.5
7-12	1975	488	24.7
13-24	1898	516	27.2
25-60	1670	237	14.2
61-180	1225	214	17.5
>180	4	1	25.0
All ages	10,918	2234	20.5

 Table 3. Age-specific death rate (ASDR) of children in emergency admissions in UCH, 1978 and 1981–1986 by sex

 Table 4. Proportional case fatality rates of major childhood diseases in CHER, UCH, Ibadan, 1978 and 1981–1986

Major diagnosis	Total cases	Proportionate death rate (%)	Case fatality rate (%)
Jaundice	1827	9.7	14.8
Gastroenteritis	1606	7.8	13.1
Bronchopneumonia	1231	8.1	18.1
Measles	1078	13.1	32.6
Anaemia	959	3.9	10.9
Septicaemia	866	4.8	14.6
Meningitis	748	5.6	20.1
Febrile convulsion	687	3.8	14.6
Nutritional diseases	634	7.5	27.3
Low birth weight	509	1.3	6.1
Tetanus	414	5.0	32.6
Heart failure	349	2.5	20.4
Malaria	313	0.7	5.1
Tuberculosis	72	0.7	20.8

diarrhoea, which constitutes the second commonest cause of admission, had a lower fatality rate of 13.1%. Low birth weight which was the least frequent of the 10 commonest causes of admission was also the least fatal.

An examination of the death rate by place of residence indicated the highest death rates were for children who came from areas outside Ibadan (22.3%) and the least among those from the periphery of Ibadan (18.0%). Among the 6835 cases from the core of Ibadan 1480 died, giving a residence-specific death rate of 21.6%. The result excluded those whose outcome were unknown and those transferred to the main paediatric ward from the calculation of the proportional death rates. While only 610 cases came from areas outside Ibadan a larger number (3528) came from the periphery.

Of the six killer diseases of childhood preventable by the Expanded Programme of Immunization (EPI), neonatal tetanus for which there were 261 cases over this period has the highest case fatality of 36.4%; others are measles (32.6%), tuberculosis (29.8%), diphtheria (18%) and pertussis (16.3%). There were no deaths recorded among the two cases of poliomyelitis seen at the children's emergency room over the period under review although an average of 400–500 new cases of the disease attend the neurology clinic and the physiotherapy department annually [5].

Discussion

Hospital data may not accurately represent national health statistics, yet they provide useful indicators of the health status of the community and particularly of the childhood population [6]. Teaching hospitals are expected to provide services mainly at the tertiary level; the UCH has an open-door policy and offers primary to tertiary care without discrimination. The CHER is always open for the care of acutely ill children and even at the general outpatient clinics, where doctors screen patients to select those suitable for teaching, all children who attend are treated. The diversity of cases seen in the CHER is therefore fairly representative of paediatric emergencies in Ibadan and surrounding areas [2].

The steady decline in the death rate of admissions at the CHER during the study period is noteworthy. The 179 deaths per 1000 admissions recorded in 1986 is a great improvement over the 238 per 1000 recorded in 1981 and the 208 per 1000 in 1978. This may be partly explained on the basis of improved services and partly to reduced work load because the number of admissions also declined progressively during the period while the medical staff remained almost constant. The overall 20.5% mortality observed in the present study is paradoxically higher than the previous findings of 13% and 14% by Adevokunnu and Hendrickse 10 years and 20 years earlier, respectively [3,4]. Our data are, however, not strictly comparable with those of Adeyokunnu and Hendrickse since their analyses were not confined to emergency admissions, but included non-emergency admissions into the paediatric wards and postnatal admissions into the nursery. It therefore seems likely that the improvement indicated by our data is real.

A review of the major causes of paediatric death shows that measles is the most significant. The proportion of death (13.1%) due to measles in this study is the highest of any disease and measles also has the highest case

fatality rate along with tetanus, whereas tetanus was responsible for only 5.0% of all deaths in the present series. A comparison with previous studies indicates that the proportional death rate from tetanus has declined progressively over the years. Another fatal disease is jaundice (of which 94% are neonatal) and its proportionate death rate of 10% makes it rank second among all the diseases, although its case fatality rate of 15% is much lower than for measles and tetanus. Gastroenteritis and bronchopneumonia which both accounted for 30.7% of all deaths in the early 1970s have declined considerably in importance and had a combined proportional death rate of 16% in the present series. When compared with a previous review of 13.0% in 1966, 9.3% in 1973 and 7.5% in the present study, the proportion of deaths due to malnutrition (mostly marasmus and kwashiorkor) seems to follow a progressive decline.

The most impressive improvement in proportional death rate is in babies with low birth weights (LBW). In the present study, LBW has the least case fatality rate and is responsible for only 1.3% of all paediatric deaths, whereas in the study by Adeyokunnu et al. [4] 13.6% of all deaths were due to low birth weight. The normal test for proportions (Z) shows this to be statistically significant (P < 0.001). Also compared with previous reviews, the proportions of deaths due to febrile convulsion, tuberculosis and meningitis have not changed significantly, but a slight decline is evident in the importance of malaria as cause of death. The declining importance of malaria may be a result of health education and improved environmental sanitation and perhaps better prophylaxis and prompt home-based therapy against the disease.

Despite some changes of emphasis over the years, infectious diseases, especially measles, tetanus, pneumonia, meningitis, gastroenteritis as well as nutritional deficiencies continue to be major causes of paediatric deaths in Nigeria [3,4,7]. With the significant exception of gastroenteritis, at least one in every five children affected by any of these diseases died. The significant drop in the proportional mortality rate of gastroenteritis in the present series may be attributed to efforts of government and international agencies to provide good water supply and oral rehydration therapy [8].

The fact that the majority of paediatric

admissions and deaths were in children who live in the high density core area of Ibadan, indicates that there is an urgent need to decongest this area. Available statistics indicate that less than 50% of the total population of Ibadan live in this area, yet the area accounts for about 60% of admissions and more than 70% of deaths. There is no doubt that this is due to the overcrowding and very poor environmental sanitation conditions that prevail in the area.

A remarkable finding in the present study is the age distribution of the paediatric deaths. It is customary to think of the infant mortality rate as the most reliable index of the health status of a community because children are said to be most vulnerable during infancy. As expected, infants in the present study constitute the largest age group of sick children (56% of total). With regards to age-specific death rates. however, infants fared better than children between the age of 1 and 2 yr who had an agespecific death rate of 272 per thousand compared with infants who had a mortality rate of 207 per 1000. If this finding is confirmed by community-based studies, it may become necessary to include mortality rates during the second year of life as another sensitive index for measuring the health status of children in the community.

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