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ORIGINAL ARTICLE

Mortality Pattern within Twenty-Four Hours of Emergency Paediatric Admission in a Resource-Poor Nation Health Facility

Mortalité Pattern dans les vingt-quatre heures de l'admission d'urgence pédiatrique dans un Centre de ressources des pauvres nations de la santé

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ABSTRACT

BACKGROUND: **Mortality among emergency paediatric admissions within the first 24 hours is high in resource- poor nations. Measures to reduce the childhood mortality rate can only be effectively planned and implemented when the causes and magnitude of this problem are well defined.**
OBJECTIVE: **To determine the mortality pattern among emergency paediatric admissions within the first 24 hours in a health facility in Nigeria.**
METHODS: **The clinical state and progress of post-neonatal patients who presented alive and were admitted into the emergency paediatric room of the University of Ilorin Teaching Hospital, Ilorin, Nigeria were monitored over a period of six months. The monitoring included records of diagnosis and outcome of management.**
RESULTS: **A total of 606 children were admitted during the period of study out of which 51(8.4%) died. Twenty-nine (57%) of the deaths occurred within the first 24 hours of admission comprising 15 (51.7%) males and 14 (48.3%) females giving M:F ratio of about of 1:1. Majority of the deaths were among patients who reported late to the hospital. Loss of consciousness was a strong risk factor for mortality within 24 hours of admission. The highest mortality within the first 24 hours of admission was recorded among patients with malaria (89.0%) followed by protein energy malnutrition.**
CONCLUSION: **Majority of deaths among emergency paediatric admission occur within the first 24 hours of admission and are associated with clinical conditions such as malaria and protein-energy malnutrition for which sustained intervention strategies must be developed. WAJM 2010; 29(4): 249–252.**

Keywords: **Children; Mortality; malaria; emergency admissions.**

RÉSUMÉ

CONTEXTE: La mortalité chez les admissions en urgence pédiatrique dans les 24 premières heures est élevé dans les pays pauvres en ressources. Mesures visant à réduire le taux de mortalité infantile ne peut être efficacement planifié et mis en œuvre lorsque les causes et l'ampleur de ce problème sont bien définis.
OBJECTIF: Déterminer le schéma de mortalité chez les admissions en urgence pédiatrique dans les 24 premières heures dans un établissement de santé au Nigeria.
METHODES: L'état clinique et les progrès des patients post-néonatale qui a présenté en vie et ont été admis dans la salle d'urgence pédiatrique de l'Université d'Ilorin Teaching Hospital, Ilorin, Nigeria ont été suivis sur une période de six mois. Le suivi inclus dossiers de diagnostic et les résultats de la gestion.
RÉSULTATS: Un total de 606 enfants ont été admis au cours de la période d'étude à partir de laquelle 51 (8,4%) sont décédés. Vingt-neuf (57%) des décès sont survenus dans les 24 premières heures suivant l'admission composé de 15 (51,7%) hommes et 14 (48,3%) femmes donnant M ratio F: de l'ordre de 1:1. La majorité des décès ont été signalés chez les patients qui tardive à l'hôpital. Perte de conscience a été un important facteur de risque pour la mortalité dans les 24 heures suivant l'admission. La plus forte mortalité dans les 24 premières heures suivant l'admission a été enregistré chez les patients atteints de paludisme (89,0%), suivie par la malnutrition protéino-énergétique.
CONCLUSION: La majorité des décès chez l'admission d'urgence pédiatrique surviennent dans les 24 premières heures de l'admission et sont associés à des conditions cliniques telles que le paludisme et la malnutrition protéino-énergétique pour laquelle soutenue des stratégies d'intervention doivent être développés. WAJM 2010; 29 (4): 249–252.

Mots-clés: enfants, la mortalité, le paludisme; admissions d'urgence

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Abbreviation: EPU, Emergency Paediatric Unit.

INTRODUCTION

In most developing nations, infant mortality rate (IMR) and under-five mortality rate (U-5MR) are very high; IMR and U-5MR in Nigeria are 100 and 194 per 1000 respectively. Nigeria ranks 14th among the countries with the worst IMR and U-5MR.[1] Factors responsible for these include poverty, ignorance and diseases.[2–4] Poor access to medical care, delay in presentation to health facility and socio-cultural beliefs that make mothers unable to take decision to seek health care all contribute to the high mortality.[2–5]

Nigeria is classified as a resource-poor nation by United Nations, being one of the countries with the poorest health indices as above. Between 61–80% of the population were said to be living on less than 1.25 dollars per day in the 2009 rating of all countries of the world.[6]

A high proportion of these mortalities is said to occur at home or in transit to the hospital which do not reflect in – hospital records.[2] Furthermore, among the patients presenting to the hospital, the rate of death varies over time. The first 24 hours of admission is critical in patient management since resuscitation and appropriate therapy is initiated within this period. It is therefore desirable to define the magnitude of mortality occurring within the first 24 hours of emergency paediatric admissions as a means of evaluating the emergency paediatric admission protocols and planning appropriate intervention strategies to further reduce the mortality rate within the first 24 hours of admission. This study therefore was designed to determine the magnitude and pattern of mortality within the first 24 hours of emergency paediatric admission at the University of Ilorin Teaching Hospital, Ilorin, Nigeria.

SUBJECTS, MATERIALS, AND METHODS

Patients admitted into the Emergency Paediatric Unit (EPU) of the University of Ilorin Teaching Hospital (UITH),Ilorin, Kwara state, Nigeria excluding neonates and patients brought in dead, were prospectively studied over a six-month period (February to July 2001).

The hospital is located in North central Nigeria and serves as a tertiary/referral centre to Kwara state at large and other neighbouring states such as Osun, Oyo, Ekiti, Kogi and Niger.

Characteristics such as age, sex, duration of illness, clinical presentation, results of laboratory investigations, diagnoses, duration of hospital stay, and time of death after admission were recorded on a proforma specially designed for this purpose. Some of the results were retrieved after the death of the patients.

RESULTS

A total of 606 children were admitted over the study period comprising 184 infants, 212 under-fives and 210 children older than five years (Table 1). Three hundred and forty-three (56.1%) of the emergency admissions were males, while 263 (43.9%) were females giving a male to female ratio of 1.3:1.

Two hundred and thirty-four (38.6%) of the cases had a diagnosis of malaria, nine (3.8%) of them died accounting for 17.6% of the overall mortality with 8(89%) deaths occurring within 24hours of admission. Seventy-six children (12.5%) had a diagnosis of pneumonia and four (5.3%)of them died. Out of these, three deaths (75%) occurred within the first 24 hours of admission. Sixty children presented with sickle cell anaemia with various crises; two of them died within 24 hours out of a total of four mortalities recorded in them. Six (60%) out of ten deaths in children with protein-energy-malnutrition occurred within 24hours of admission. The other contributors to the morbidity and mortality are as shown in Table 2 below.

There were 51 (8.4%) mortalities in all out of which 29 (56.9%) occurred within the first 24 hours of admission comprising 15 males and 14 females. There was no statistical significance ($\chi^2 = 2.0$, p

Table 1: Distribution of Deaths by Age Group

Age Group	Number of Cases	Total Mortality	Mortality (%)
29 days – 1 year	184	18	10(35.7)
>1 year – 4 years	212	14	9(39.1)
5 yrs and above	210	19	10(34.5)
Total	**606**	**51**	**29(100.0)**

Table 2: Distribution of Deaths by Clinical Diagnosis

Causes	Total number (%) of admissions	Mortality (%) of Total Mortality	Death within 24hours/Total mortality (%)
Malaria	234(38.6)	9 (17.6)	8(88.9)
Pneumonias	76(12.5)	4(7.8)	3(75.0)
Sickle cell disease	60(9.9)	4(7.8)	2(50.0)
Febrile convulsions	59(9.7)	1(2.0)	1(100.0)
Diarrhoeal disease	51(8.4)	6(11.8)	2(33.3)
Protein-energy Malnutrition	42(6.9)	10(19.6)	6(60.0)
Meningitis	33(5.4)	7(13.7)	3(42.9)
Typhoid septicaemia	14(2.3)	3(5.9)	1(33.3)
Measles	13(2.0)	2(3.9)	1(50.0)
Aspiration pneumonitis	7 (1.2)	2(3.9)	1(50.0)
Anal stenosis	1 (0.2)	1(2.0)	0(0.0)
Corrosive gastritis	3 (0.5)	1(2.0)	1(100.0)
Disseminated Tuberculosis	1 (0.2)	1(2.0)	0(0.0)
Others	12(2.0)	0(0.0)	0(0.0)
Total	**606**	**51**	**29**

= 0.16) in the mortality between males and females. All the other patients (n=555) were successfully managed and discharged.

Twenty-one (72.4%) of those who died within the first 24 hours of admission did so within the first 12 hours contributing 41.2% of the total mortality. A further breakdown showed that 37.9% of the deaths within 24 hours were actually within the first 6 hours, by 12 hours, it rose to 72.4% and by 18 hours, rose to 86.2% as shown in the Table 3. On monthly basis, the proportion of mortality within 24 hours of admission ranged between 40.0 and 90.9% of the total admissions.

With regards to onset/duration of illness, 97 (16%) of the children presented early (within the first 24 hours of onset of symptoms). Of these, one death was recorded within the first 24 hours and none thereafter, whereas 239 children presented within day one to seven of onset of symptoms, 11 (61.1%)deaths were recorded within 24 hours of admission and seven(38.9%) thereafter. Those who presented one to four weeks of onsets of illness were 197 in number; and 23 (11.8%) deaths were recorded in this category with 12 (52.2%) of them occurring within the first 24 hours of

admission. Among those who presented with duration of symptoms in excess of four weeks, nine deaths were recorded and five (55.6%) were within 24 hours of admission, (Table 2).

Based on the level of consciousness at admission, 51 (8.4%) patients were unconscious, out of which a total of 22 (43.1%) deaths were recorded, 16 (72.7%) of which occurred within the first 24 hours. This finding was statistically significant with $\chi^2 = 57.33, p = 0.00$.

DISCUSSION

This study revealed a mortality rate of 8.4%. This demonstrates a changing childhood mortality pattern over the years in various parts of Nigeria. In the early 1970's Ransome-Kuti[2] reported 4% in Lagos, Abdurrahman[3] in Kaduna reported 12.1% in early 80's, Aikhionbare et al[4] in late 80's reported 9.9% in Zaria, Ighogboja[5] in early 90's reported a rate of 9.4% in Jos. Fagbule et al[7] reported a rate of 11.6% about two decades ago from Ilorin. This finding however compares favourably with the findings of Ayoola et al[8] from Ibadan where a rate of 8.2% was reported and also with other ones except for with Ransome-Kuti which probably reflected the period of the early oil boom. Also in contrast to this study

Wammanda and Ali[9] reported 15.1% in Zaria. The gender distribution of mortalities is similar to a number of other reports.[3, 4, 8]

As significant number of deaths occurred within 24 hours of admission. Fifty seven percent of the mortalities recorded in this study were within 24 hours of admission which is similar to the reports of Aikhionbare et al of 57.6% mortality. Menge et al[10] from Kenya reported 64.9% ,while Wammanda and Ali[9] from Nigeria and Chawla et al[11] from Zimbabwe reported 40.1% and 43.7% respectively. In Jos[5], 48.5% was reported. The least rate reported was by Fabgule et al[7] where death within 24 hours of admission was 33% of the total. Even though this was found in the same centre where this study was conducted, probably, the socio-economic conditions were likely better about two decades ago, hence early presentation for medical attention was recorded during the period of the earlier study.[7] Another posssible explanation could be that the same tertiary institution that served a smaller population about 20 years ago is what is currently serving the same community with an entirely different population dynamics and strength in the face of minimal upgrading.

Prolonged duration of illness prior to presentation was found to be a very important risk for death. Mortality was recorded in 1% of those with duration of illness of equal to or less than one day. Wammanda and Ali[9] found no statistically significant difference as regards the duration of illness vis-à-vis mortality. This could most probably be due to their means of grouping of the timing. Two categories of timing were used, those in whom duration of illness was 7 days or less and those in whom the duration of illness was more than 7 days. However, further splitting of the timing gives clearer picture as demonstrated in this study. Early presentation was associated with significantly low mortality rate (1%) while late presentation was associated with significantly high mortality rate. Ransome-Kuti[2] summarised this with his caption ".....Paediatrics in many developing countries will continue to be in a perpetual state of emergency. Gravely iII and dying children will continue to

Table 3: Duration of Illness in Relation to Mortality

Duration of Illness (days)	No. of Patients	Death within 24 hours	Death after 24 hours	Contribution to Total Mortality by deaths within 24 hours
< 1	97	1	–	1
1 – 7	239	11	7	4.6
8 – 28	197	12	11	6.1
>28	73	5	4	6.9
Total	**606**	**29**	**22**	**4.8**

< 1 vs 1 – 7 days, $\chi^2 = 4.31$, p = 0.037, < 1 vs 8 – 28 days, $\chi^2 = 8.45$, p= 0.004, and < 1 vs > 28 days, $\chi^2 = 7.67$, p = 0.005.

Table 4: Mortality in Relation to Duration of Admission

Hours	No. of Death	Cumulative %	% Contribution to Overall Mortality
0 – 6	11	37.9	21.6
7 – 12	10	72.4	41.2
13 – 18	4	86.2	49.0
19 – 24	4	100.0	56.9

flock the emergency room daily and many of whom die within 24 hours of their arrival".

Infant and under five mortalities have significant contributions to the overall childhood mortality.[8] This study revealed that 63% of overall childhood mortality was contributed by infant and under-five mortalities (with the exclusion of neonatal deaths). Ighogboja et al[5] reported mortality of 52.3% among children less than two years.

Distribution of the admissions by gender revealed 343 males and 263 females with a total of 29(8.5%) and 22(8.4%) deaths respectively. Deaths within 24 hours were 15(51.7) and 14 (63.6%) among the male and female respectively.

Loss of consciousness was a significant risk factor for death within 24 hours of admission and beyond. This is similar to the submission of Wammanda and Ali,[9] and Marsh et al[12]. This may be due to neuroglycopenia, hypoxaemia or respiratory distress which were often end points of cerebral malaria, meningitis and severe anaemia to which the most susceptible ones are the under fives.[9,12,13] Over 70% of the deaths within 24 hours of admission were accounted for by those with loss of consciousness in this study. Marsh et al[12] reported that of the 64 children who died, 54 (84.4 %) were among those with impaired consciousness.

The commonest causes of mortality generally as well as death within the first 24 hours of admission were largely similar across the decades, and are preventable.[4–5,7–9] In the present study, case fatality rate for malaria was 3.8 percent out of which 88.9 percent occurred within 24 hours. This was similar to the findings of Marsh et al[12] who reported that mortality rate of 3.5 percent, and 84 percent of the deaths occurred within 24 hours of admission in their study of 1844 children with a primary diagnosis of malaria. Severe malaria – as cerebral malaria, severe anaemia, and protein energy malnutrition, measles, meningitis, pneumonia and gastro-enteritis have not changed significantly as contributors to hospital admission and mortality prior to the onset of the efforts to achieve the millennium Development Goals (MDGs) and thus far.[12–14] This study though conducted at the inception of the MDGs era has shown that these burdens of morbidity and mortality remain identical.

In conclusion, most deaths in the emergency room occur within the first 24 hours of admission with no peculiar gender differentiation. Loss of consciousness and prolonged duration of symptoms prior to presentation are major risk factors for mortality. The commonest causes of mortality are preventable. This calls for evaluation of our strategy and policy implementations of health care delivery. Using the words of Ransome-Kuti,[2]"…the first line of defense against diseases, (also the best and the cheapest line) is preventive medicine".

We hereby recommend that all opportunities the health workers have to provide heath education on the common causes of childhood morbidities and mortalities within the first 24 hours of admission should be maximally utilized to include advice on early reporting, immunization and provision of good and nutritious diet for their children and wards, prevention of malaria such as use of long lasting insecticidal nets amongst others. We urge all stakeholders to further strengthen the primary health care programmes, intensify provision of basic amenities such as accessibility to portable water, provision of free essential emergency drugs in the hospitals, sustain the gains on immunization etc, and be more committed in community health education as regards these common causes of preventable mortalities.

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