Morbidity and Mortality Pattern among 3869 Consecutive Admissions at Aminu Kano Teaching Hospital, Kano

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Abstract

Shehu UA, Hassan-Hanga F, Ibrahim M. Morbidity and Mortality Pattern among 3869 Consecutive Admissions at Aminu Kano Teaching Hospital, Kano. *Nigerian Journal of Paediatrics* 2008; 35: 67

Background: Childhood morbidity and mortality still pose serious challenges in developing countries. One of the Millennium Development Goals (MDG 4) is to reduce under-five mortality by two-thirds by the year 2015. Yet, because of the low level of primary health care delivery and late referrals to secondary and tertiary health facilities, morbidity and mortality continue to rise unchallenged.

Objective: To determine the morbidity and mortality pattern among children admitted to Aminu Kano Teaching Hospital (AKTH) over a two-year period.

Method: A prospective study of childhood morbidity and mortality was conducted over a two-year period (September 2005 to August 2007). For each child, age, sex, date of admission, diagnosis at presentation, final diagnosis, duration of hospital stay and outcome were recorded in the admission and discharge register by the managing teams.

Results: Three thousand, eight hundred and sixty nine children were admitted over the study period, of whom 2306 were males and 1563 were females (M: F ratio 1.5:1). Neonatal admissions constituted 43.9 percent, while post neonatal admissions comprised 56.1 percent. The main indications for neonatal admissions were septicaemia (26.1 percent), prematurity (20.2 percent), birth asphyxia (19.7 percent), congenital malformations (12 percent) and neonatal jaundice (9.7 percent). The main indications for post neonatal admissions were severe malaria (17.5 percent), acute respiratory infections (12.7 percent), sickle cell anaemia and its complications (11.4 percent), septicaemia (10.9 percent), diarrhoeal diseases (9.3 percent), protein energy malnutrition (6.5 percent), malignancies (6.0 percent), meningitis (4.8 percent) and HIV/AIDS (4.2 percent). There were 557 deaths, representing a 14.4 percent mortality. Neonatal mortality was 54.2 percent of all deaths, of which 58 (19.2 percent) were inborn and 244 (80.8 percent) were outborn.

Conclusion: The major causes of childhood morbidity and mortality in this study are mostly preventable. The study highlighted the contribution of neonatal deaths to childhood mortality and equally showed an increasing level of non communicable diseases like sickle cell anaemia as well as an increase in the incidence of childhood malignancies and HIV/AIDS. Emergence of malignancies as an important cause of mortality in our part of the world is likely to be a challenge to future health planning.

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Introduction

Childhood morbidity and mortality pose serious challenges to most developing countries. Childhood mortality is one of the basic indicators of health and socio-economic status of any nation. The burden of maternal, newborn and childhood morbidity and mortality falls disproportionately on the world's poorest countries and on the poorest segment of the population. Within most low income countries, child mortality rates for example, are several times higher in the poorest 20 percent of the population

than among the richest and yet access to care, such as skilled attendance is lowest for those most in need.[2]

There is a low level of primary health care delivery, poor health and poor general infrastructure as well as late referrals to secondary and tertiary facilities. Even when referred, less than 20 percent actually reach secondary facilities. The increasing level of poverty among ordinary citizens means that children are bound to suffer from lack of good nutritious food and shortage of parental disposable income to take care of them when they fall sick.

In Nigeria like many developing countries, health statistics are often estimates and do not accurately reflect the incidence of diseases. Despite the recognized limitations of hospital data however, morbidity and mortality pattern in children can be invaluable in gaining insight into childhood illnesses in the community. Data on the pattern of morbidity and mortality are useful for many reasons. It is important for primary care providers, for investigators as they design interventions for prevention and care and for decision makers who implement and evaluate health care programmes. It also assists acute care providers in identifying priority areas.[1]

It is against this background that we report the first audit of the morbidity and mortality pattern among children admitted to Aminu Kano Teaching Hospital over a two-year period.

Materials and Methods

Setting

Aminu Kano Teaching hospital is a tertiary fee-for-service institution. The department of paediatrics receives children who come directly or, are referred from other public and private hospitals in Kano and from neighbouring states like Jigawa, Katsina and Bauchi. The department has an 18-bed Emergency Paediatric Unit, a 30-bed Paediatric ward, and a Special Care Baby Unit (SCBU) equipped with 17 cots, 10 incubators, 11 phototherapy units and three infant resuscitaires. The SCBU is the only equipped neonatal unit serving Kano metropolis and neighbouring towns.

Methods

A prospective study of childhood morbidity and mortality was conducted over a two-year period from September 30/2005 to August 31/2007 at AKTH, Kano. At the point of admission into the emergency paediatric unit, paediatric medical ward or special care baby unit, the patients' biodata (name, age, sex, hospital number, address and also place of delivery for the neonates), and initial diagnosis at presentation were recorded by the admitting team into a special register. Subsequently, the final diagnosis, duration of hospital stay and outcome of care (discharge, death or discharge against medical advice) were also recorded. At the end of the two-year period, the total number of admissions, diagnoses and the outcome of care were analyzed. From the data obtained, comparisons were made of the morbidity and mortality among newborn babies according to the place of delivery. Chi square test was used for statistical analysis. P-value of < 0.05 was considered as being statistically significant.

Results

During the study period, 3869 children were admitted to the paediatric emergency unit, special care baby unit and general paediatric ward. Of these,
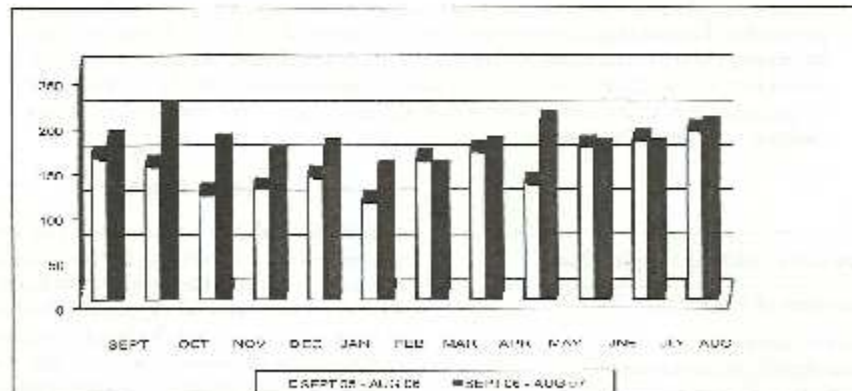

Fig. 1: Average monthly admissions (September 2005 to August 2007)

2306 were males and 1563 females, giving a M: F ratio of 1.5:1. Neonatal admissions numbered 1697 (43.9 percent). Six hundred and six (35.7 percent) of the neonates were inborn, while 1091 (64.3 percent) were born elsewhere. Post neonatal admissions comprised 2172 (56.1 percent) children. The cumulative monthly admission (Fig.1) showed that admissions were higher in the second year of the study.

Table 1 compares the main indications for 1697 neonatal admissions. Prematurity (8.5 percent) and birth asphyxia (7.1 percent) were the main indications for admission among the inborn neonates. On the other hand, septicaemia (21.0 percent) was the major indication for admission among the outborn neonates followed by birth asphyxia (12.6 percent), prematurity (11.7 percent), congenital malformations (11.3 percent) and jaundice (8.0 percent). Some patients had multiple diagnoses; however, the main diagnosis at presentation was used to avoid duplication of data.

Table II shows that the main indications for post neonatal admissions were severe malaria (17.5 percent), acute respiratory infections (12.7 percent), sickle cell anaemia (11.4 percent), septicaemia (10.9 percent), diarrhoeal diseases (9.3 percent), malignancies (6.0 percent), protein energy malnutrition (PEM 6.5 percent), meningitis (4.8 percent) and HIV/AIDS (4.2 percent).

Outcome of care

There were 557 deaths which represent a 14.4 percent mortality. Neonatal mortality was 54.2 percent of all deaths. The main causes of neonatal deaths (Table III) were prematurity (34.1 percent), birth asphyxia (20.9 percent), septicaemia (14.9 percent) and congenital malformations (anorectal malformations, spinal dysraphism, omphalocele, gastrochisis, Hirsphrung disease and multiple congenital malformations; 13.9 percent) and neonatal tetanus (6.3 percent). Further analysis of the neonatal deaths showed that 244 (80.8 percent) neonates that died were born outside the hospital and were brought to the unit for care. Only 58 (19.2 percent) of the neonatal mortality were among the inborn babies. Mortality was significantly higher among outborn

Table I

Diagnoses in 1697 Inborn and Outborn Neonates admitted to the Special Care Baby Unit

Diagnosis	Frequency*		
	Inborn No. (%)	Outborn No. (%)	Total No. (%)
Neonatal sepsis	86 (5.1)	357 (21.0)	443 (26.1)
Prematurity	145 (8.5)	198 (11.7)	343 (20.2)
Birth asphyxia	121 (7.1)	213 (12.6)	334 (19.7)
Congenital malformations	12 (0.7)	192 (11.3)	204 (12.0)
Neonatal jaundice	30 (1.8)	135 (8.0)	165 (9.7)
Neonatal tetanus	0 (0)	30 (1.8)	30 (1.8)
Infants of diabetic mothers	16 (0.9)	14 (0.8)	30 (1.8)
Neonatal conjunctivitis	6 (0.4)	18 (1.1)	24 (1.4)
Meconium aspiration syndrome	9 (0.5)	13 (0.8)	22 (1.3)
Others	20 (1.2)	45 (2.7)	65 (3.8)

*Some patients had multiple diagnosis

Table II

Main Indications for 2172 Post-neonatal Admissions.

Diagnosis		Frequency	Percentage
Severe malaria		380	17.5
Acute respiratory infections		276	12.7
Sickle cell anaemia and its complications		247	11.4
Septicaemia		236	10.9
Diarrhoeal diseases		202	9.3
Malignancies		131	6.0
Burkitt lymphoma	40		
Retinoblastoma	21		
Nephroblastoma	15		
Acute lymphoblastic leukemia	14		
Non-Hodgkin lymphoma	12		
Neuroblastoma	9		
Acute myeloid leukemia	7		
Hodgkin's Lymphoma	6		
Rhabdomyosarcoma	3		
Others (CNS, Ovarian)	4		
Protein energy malnutrition		141	6.5
Kwashiorkor	11		
Underweight	18		
Underweight kwashiorkor	12		
Marasmus	53		
Marasmic kwashiorkor	47		
Meningitis		104	4.8
HIV/AIDS		91	4.2
Fever with convulsions		69	3.2
Poisoning		41	1.9
Renal diseases		38	1.7
Others		216	9.9
Total		2172	100.0

Table III

Causes of Deaths in 302 Neonates admitted to the Special Care Baby Unit.

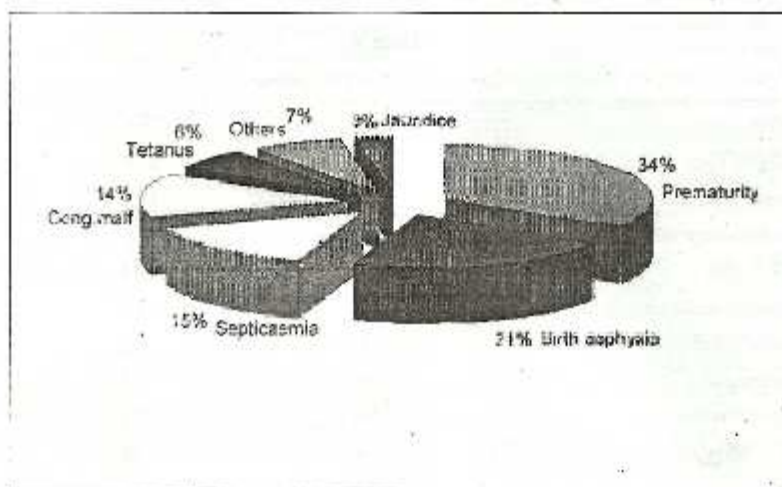| Causes	Inborn		Outborn		All
	Males	Females	Males	Females	
	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)
Prematurity	19 (6.3)	18 (6.0)	39 (12.9)	27 (8.9)	103 (34.1)
Birth asphyxia	6 (2.0)	7 (2.3)	32 (10.6)	18 (5.0)	63 (20.9)
Septicaemia	1 (0.3)	0 (0)	24 (7.9)	20 (6.6)	45 (14.9)
Cong. malformations	0 (0)	2 (0.7)	25 (8.3)	15 (5.0)	42 (13.9)
Tetanus	0 (0)	0 (0)	12 (4.0)	7 (2.3)	19 (6.3)
Jaundice	0 (0)	0 (0)	8 (7.6)	1(0.3)	9 (3.0)
Meconium aspiration	1 (0.3)	0 (0)	1 (0.3)	0 (0)	2 (0.6)
Others	4 (1.3)	0 (0)	9 (3.0)	6 (2.0)	19 (6.3)
Total	31 (10.3)	27 (8.9)	150 (49.7)	94 (31.1)	302 (100)

Fig. 2: Pie-chart showing percentages of major causes of neonatal mortality

Table IV

Comparison of Case Fatality Rates (%) of the Five Leading Causes of Deaths in Inborn and Outborn Babies

Diagnosis	Inborn N = 606	Outborn n-1091	Total	P value
Prematurity	37	66	103	< 0.001
Asphyxia	13	50	63	< 0.001
Septicaemia	1	44	45	< 0.001
Congenital malformation	2	40	42	< 0.001
Tetanus	0	30	30	< 0.001
Total	53	230	283	

Table V

Causes of Death in 255 Children

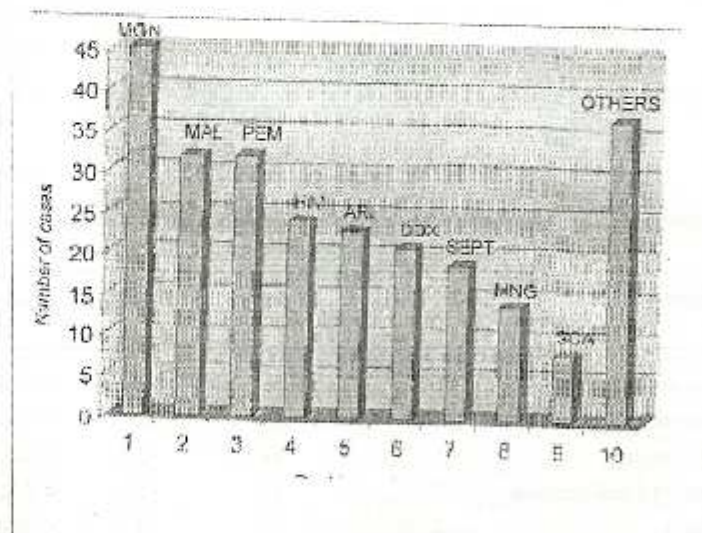| Causes	Frequency	Percentage
Malignancies	45	17.6
Severe malaria	32	12.6
Protein energy malnutrition	32	12.6
HIV/AIDS	24	9.4
Acute respiratory infections	23	9.0
Diarrhoeal diseases	21	8.2
Septicaemia	19	7.5
Meningitis	14	5.5
Sickle cell anaemia & its complications	8	3.1
Others	37	14.5
Total	255	100.0

Fig 3. Bar-chart of causes of post neonatal deaths in 255 children

MGN-malignancies, MAL-malaria, PEM-protein energy malnutrition, ARI-acute respiratory infection, DDX-Diarrhoeal disease, SEPT-septicaemia, MNG-meningitis, SCA-sickle cell anaemia.

neonates (Table IV). Figure 2 shows that three conditions/diseases namely, prematurity, birth asphyxia and infections including tetanus together, accounted for 76 percent of all neonatal deaths.

The major causes of post neonatal deaths (Table V) were malignancies (17.6 percent), severe malaria (12.6 percent), PEM (12.6 percent), HIV/AIDS (9.4 percent), and acute respiratory infections (9.0 percent). These were followed by diarrhoeal diseases (8.2 percent), septicaemia (7.5 percent), meningitis (5.5 percent), and sickle cell anaemia & its complications (3.1 percent).

Discussion

The findings in this study show that the major indications for admission both in neonatal and post-neonatal periods were infection related and are mostly preventable. In the neonatal period, the main causes of admissions were sepsis which accounted for 26.7 percent, birth asphyxia, and prematurity each accounting for 20 percent of neonatal admissions. Some patients had multiple diagnoses; for example, some preterm neonates developed jaundice or sepsis while on admission while some neonates with septicaemia had associated jaundice. In such cases, the main diagnosis at presentation was used, in order to avoid duplication.

The present study highlights the important contribution of neonatal deaths to overall childhood mortality. The leading causes of newborn deaths in this series were prematurity and neonatal infection including tetanus. A vast majority of the neonatal deaths from infections occurred in outborn babies. Harmful traditional practices like traditional uvulectomy and female genital mutilation carried out on the third day of life by traditional barbers with crude, non-sterile instruments, poor handling of umbilical stump, unsterile delivery techniques at home and inadequate facilities to prevent the spread of infection, were responsible for these infections and subsequent mortality.

Birth asphyxia accounted for 21 percent of neonatal deaths. Most of these infants were born outside the hospital with traditional birth attendants supervising the delivery, or were born in poorly equipped hospitals or private clinics after the mother had been in prolonged labour at home. Widespread poverty prevents many pregnant women from attending government or private healthcare facilities, where fee for service is the rule. It has been stated that nearly 70 percent of Nigeria's population live in abject poverty, with more than 54 percent living below the poverty line (less than one US dollar a day).[11] Education on the general care of newborn babies including the importance of breast feeding, hygiene and cord care should drastically reduce the

high incidence of neonatal morbidity and mortality in resource poor setting like Nigeria. To achieve this, investment in primary health care, particularly in human resource development is imperative. Empty buildings without committed trained personnel, will never alter the status quo. Because of the shortage of trained midwives nationwide, and the insistence by some regulatory body that prospective midwives seeking recertification should obtain high grades in school certificate examinations, the nation's goal will remain a mirage. Planners can borrow a leaf from a recent Bangladesh experience, where a home-care strategy to promote an integrated package of preventive and curative newborn care was effective in reducing neonatal morbidity and mortality in communities with a weak health system, low health-care use, and high neonatal mortality.[12]

The findings in the present prospective study are similar to those reported in earlier retrospective studies from the same neonatal unit[9] and from other newborn units in Nigeria.[1] The pattern is also similar to that reported from Sokoto in northern Nigeria a little over a decade ago, with the exception of neonatal tetanus which was reportedly lower in Sokoto.[13]

In the post neonatal period, severe malaria accounted for 17.5 percent of total admissions and 13.3 percent mortality. Most of these children had received some form of anti malarial treatment elsewhere. The treatment was often inappropriate or suboptimal in the light of current knowledge of malarial chemotherapy. Unfortunately, many general practitioners and other paramedical and quack operators in the medical field are oblivious of the changes that had taken place. Environmental sanitation and eradication of breeding places for mosquitoes, the use of insecticide treated bed nets (ITNs) and regular clinical updates (for health care providers outside the tertiary health facilities) on national anti malarial treatment policy and malaria control will help in reducing the frequency of childhood morbidity and mortality due to severe malaria.

Morbidity and mortality due to acute respiratory infections and diarrhoeal diseases can be reduced by encouraging mothers to exclusively breast feed their babies for the first 4-6 months of life. There is evidence that the practice of oral rehydration therapy and regular training of primary health care workers to recognize the main danger signs in acute respiratory infections and diarrhoeal diseases and to apply appropriate treatment, can drastically reduce morbidity and mortality from these two conditions.[3] Morbidity due to sickle cell anaemia accounted for 11.4 percent of total admissions and accounted for 3.1 percent of post neonatal mortality. Regular sickle

cell clinic attendance, use of prophylactic 7-valent pneumococcal vaccine (*Prevnar*), 23-valent pneumococcal vaccine (*Pneumovax*), oral penicillin, H. influenza B vaccination and malaria prophylaxis with appropriate introduction of hydroxyurea therapy have been shown to reduce the frequency of morbidity and mortality in children with sickle cell anaemia.[13] More importantly, prospective counseling to would-be couples and encouraging them to undergo genotype testing can reduce the prevalence of sickle cell anaemia in the long term. Childhood malignancies accounted for 6.0 percent of post-neonatal admissions and contributed 17.6 percent of the post-neonatal deaths in the present series. This comes as a surprise as this is the first time that childhood cancer is being reported as a prominent cause of death in children in the country. Aminu Kano Teaching Hospital is the only tertiary teaching hospital in Kano state equipped to handle oncology cases. Of recent, the hospital has been receiving increasing number of cases of childhood malignancies from government and private hospitals in the locality and from neighboring states. Most of these patients present late with advanced disease to the hospital. Moreover, their parents are most often extremely poor and cannot afford the cost of chemotherapy. Resurgence of malignancy as a major cause of childhood deaths calls for planning to face the challenges of childhood cancer. Policy makers should aid the poor by making drugs and supportive care for cancer patients, free.

The present data on post-neonatal morbidity and mortality have some similarity to the data reported from other centres[3,7] in Nigeria. However, the major childhood morbidity in this study showed an increase in the incidence of non communicable diseases like sickle cell anaemia and childhood malignancies. Based on the findings in this study, it is concluded that most causes of neonatal and childhood morbidity and mortality are infection related and can effectively be prevented. Millennium Development Goal 4 may be achieved only if close attention is paid to causes of morbidity and mortality in our country and taking measures emanating from local experience to address these issues.

Acknowledgements

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