

Original Article

Pattern of neonatal admissions and outcome in a tertiary institution in north central Nigeria

Bose O. Toma, Olukemi O. Ige, Ibrahim I. Abok, Carol Onwuanaku, Rose O. Abah, Amina Donli

Department of Paediatrics, University of Jos (UJ)/Jos University Teaching Hospital (JUTH), Jos, Plateau State, Nigeria

Abstract

Background/Purpose: Neonatal morbidity and mortality contributes significantly to under-five morbidity and mortality in sub-Saharan Africa accounting for 40% of under-five mortality. A substantial reduction in neonatal mortality is therefore necessary to achieve the Millennium Development Goal (MDG) 4 target by 2015. The aim of the study was to assess the pattern of neonatal morbidity and mortality in our environment which will help to identify interventions for better neonatal outcome.

Materials and Methods: The study is a review of cases admitted into the neonatal unit of the Jos University Teaching Hospital situated in the North Central part of Nigeria. The unit started operating from the permanent site of the hospital on 1 March 2010 after the relocation of the hospital from the previous site.

Data on all neonates admitted into the neonatal unit from 1 March 2010 to 28 February 2011 were obtained from the various registers/records and analyzed. Data extracted included biodata, gestational age, birth weight, main diagnosis, duration of admission, etc., In addition, the outcomes (discharged/died) were documented. All statistical analyses were performed using two-sided tests. A $P < 0.05$ was considered statistically significant.

Results: A total of 572 neonates were admitted, accounting for 54.6% of the 1047 pediatric medical admissions into the hospital. The main causes of admission were neonatal infections (37.1%), prematurity (20.1%), and birth asphyxia (11.5%). Out of the 572 neonates, 111 (19.4%) died. About three quarters (76.5%) of the mortalities occurred in the first week of life with 46.4% of these occurring in the first 24 hours ($\chi^2=20.2$, $P < 0.001$). The common causes of mortality were prematurity (43.2%), birth asphyxia (18.0%) and neonatal infections (17.1%)

Conclusion: There is a high burden for neonatal care at the institution. The three main causes of morbidity and mortality are prematurity, infections, and birth asphyxia. Hence, neonatal care/facilities need to be improved especially to care for the high risk neonate. Also, the importance of infection control cannot be overemphasized.

Key words: Admissions, morbidity, mortality, neonatal, outcome

Introduction

Neonatal mortality contributes to the overall under-five death rates, accounting for 40% of the under-five mortality rate worldwide.^[1] Two thirds (28%) of these neonatal deaths occur in sub-Saharan Africa.^[1] The Millennium Development Goal 4 (MDG-4) targets reduction of under-five mortality rate by two thirds by the year

2015.^[2] In order to achieve the MDG for child survival, there needs to be substantial reduction in neonatal mortality.^[3] Reduction in neonatal mortality can be achieved by determining the common neonatal health problems and identifying appropriate interventions.^[4]

In Nigeria, the largest country in West Africa, 241,000 children die in their first month of life and the country ranks highest in Africa in terms of the number of neonatal deaths.^[3] Many neonatal deaths are preventable and 75% of them occurs in the first week of life, with over half of these in the first 24 hours of life.^[3] Over the past 30 years, there has been a decline in under-five mortality in developing countries.^[5] This decline has however not been from neonatal causes but other causes of under-five mortality such as malaria, diarrheal diseases

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Address for correspondence:

Dr. Bose Toma, Department of Paediatrics, Faculty of Medical Sciences, University of Jos/Jos University Teaching Hospital, Jos, Nigeria.
E-mail: gabosetoma@yahoo.com

and pneumonia.^[5] Hence, urgent attention focusing on reduction of neonatal morbidity and mortality is needed to achieve MDG-4.

The pattern of neonatal diseases is a useful indicator of the availability, utilization, and effectiveness of maternal and child health care services,^[6] and varies from place to place and time to time even in the same locality.^[7] Information on admission and mortality patterns of hospitalized neonates should reflect the major causes of illnesses and standard of care provided to neonates in a particular locality.^[4] Such information will identify gaps and provide a basis on which interventions to improve neonatal outcomes will be designed. The study therefore aims to assess the pattern of neonatal morbidity and mortality in our environment which will help to identify interventions for better neonatal outcome.

Materials and Methods

Setting and Population

The study was a review of cases managed in the neonatal unit of the Jos University Teaching Hospital situated in North Central Nigeria. The hospital receives referral from within the state and other North-Central and Eastern states of Nigeria. The hospital moved to its permanent site in January 2010 which is about 14 KM away from the old site which was located in the central area of Jos town. The neonatal unit admitted its first patient there on 1 March 2010. The neonatal unit has a special care baby unit (SCBU) where neonates in need of intensive and special care are managed and two postnatal wards. Facilities available in the SCBU include 10 incubators, 2 resuscitaires, and 5 locally constructed phototherapy units. In the postnatal wards, babies who are ill but do not require intensive or special care are admitted with their mothers and managed. The SCBU has a bed capacity of 30, with a nurse: Patient ratio which varies from 1:7 in the morning shift to 1: 15 during the afternoon and night shifts. In addition, there are usually, 2 consultants, 1 or 2 senior residents, 2 junior residents, and 3 or 4 interns covering the neonatal unit depending on the rotations.

Study Design, Sample Selection and Data Collection

It was a retrospective descriptive study of records of neonates admitted into the neonatal unit between 1 March 2010 and 28 February 2011. Data on all neonates admitted into the neonatal unit were collected from the admission, discharge, and death registers. The registers kept by the doctors as well as those of the records clerk and nurses were used to ensure completeness and reliability. Where information was inconclusive, the relevant file was retrieved and data obtained. Data extracted included: The age of neonate on admission, sex, gestational age at birth, weight on admission or at birth, duration of hospital stay, main final diagnosis, and outcomes (discharge, death or

left against medical advice). Approval for the study was obtained from the hospital's ethical committee.

Data Analysis

The relevant data was entered into Epi info3.5.1 and analyzed. Percentages and ratios were derived where appropriate. All statistical tests were performed using two-sided tests at the 0.05 level of significance.

Results

A total number of 1047 pediatric medical patients (aged 0-18 years) were admitted, out of whom 572 (54.6%) were neonates. Among the neonates admitted, there were 299 males and 273 females with a male to female ratio of 1.1: 1. In total, 128 (22.4%) neonates were low birth weight (LBW). Out of these 128 LBW babies, 100 (78.1%) of them were preterm while 28 (21.9%) were term small for gestational age (SGA). There were a total of 115 preterm babies, 100 were LBW while 15 had normal birth weights. Other variables related to admission are shown in Table 1.

The main causes of admission were neonatal infections (37.1%), prematurity (20.1%), and birth asphyxia (11.5%). Others included neonatal jaundice (11.0%) and congenital anomalies such as intestinal atresia, omphalocele, myelomeningocele, and encephalocele which accounted for 8.2% of total admissions. Almost 80% of the preterm infants admitted were appropriate for gestational age (AGA). The other causes of morbidity included macrosomia, hemorrhagic disease of the newborn, and aspiration syndromes [Table 2].

Of the 572 neonates, 111 (19.4%) died; 64 (57.7%) males and 47 (42.3%) females giving a male to female ratio of 1.4: 1. This difference was however not statistically significant ($\chi^2=1.36$, $P = 0.24$).

Prematurity was the most common cause of mortality (43.2%), followed by birth asphyxia (18.0%), neonatal infections (17.1%), and congenital anomalies (13.5%) [Table 3].

About three quarters (76.5%) of the mortalities occurred in the first week of life with 46.4% of these occurring in the first 24 hours ($\chi^2=20.2$, $P < 0.001$).

Discussion

This study demonstrates the high demand for neonatal healthcare at the Jos University Teaching Hospital, as it accounted for 54.6% of the total pediatric medical admissions into the hospital. This could be attributed to the fact that the hospital is one of the three main

Table 1: Demographic characteristics of the neonates

	Number	Percentage
Sex		
Male	299	52.3
Female	273	47.7
Birth weight		
Low birth weight	128	22.4
Preterm	100	
Term SGA	28	
Normal birth weight	404	70.6
Macrosomia	40	7.0
Gestational age at birth		
Term	414	72.4
Preterm	115	20.1
Post-term	43	7.5
Duration of stay		
<24 hours	59	10.3
1-7 days	271	47.4
8-30 days	230	40.2
>30 days	12	2.1

SGA - Small for gestational age

Table 2: Frequency of neonatal diagnosis

Diagnosis	Number	Percentage
Neonatal infections	212	37.1
Prematurity	115	20.1
SGA	21	
AGA	91	
LGA	3	
Birth asphyxia	66	11.5
Neonatal jaundice	63	11.0
Congenital anomalies	47	8.2
Others	69	12.1
Total	572	100.0

SGA - Small for gestational age, AGA - Appropriate for gestational age, LGA - Large for gestational age

Table 3: Frequency of neonatal mortalities

Mortality	Number	Percentage
Prematurity	48	43.2
Birth Asphyxia	20	18.0
Neonatal infections	19	17.1
Congenital anomalies	15	13.5
Neonatal jaundice	6	5.4
Others	3	2.7
Total	111	100.0

referral centers for neonatal cases in the state as well as neighboring states in North-Central Nigeria. It may also suggest the burden of neonatal morbidity in the community. Provision of more neonatal care centers will decrease this burden, increase access, and possibly improve outcome. Regionalization of good quality perinatal care has been found to improve outcome as a result of better access to quality care antenatally, natively, and in the immediate postnatal period.^[8]

Low birth weight which has been a major contributing factor to neonatal morbidity and mortality especially in

developing countries was also the case in this study.^[9] Twenty-two percent of the total neonatal admissions were low birth weight babies. This prevalence is similar to 25.7% documented by Ibe and colleagues^[10] in Enugu in 1994. Muktar-Yola *et al.*^[11] in Kano in 2007 found a slightly higher prevalence of 32.1% which may be because their study covered only the SCBU, while the present study as well as that in Enugu included all neonatal admissions. This may also be due to differences in the socio-demographic make-up of the people. In addition, the majority of the LBW babies in the present study were preterm, most of whom (79.1%) were AGA. This is consistent with reports from other parts of the country.^[12,13] This finding is similar to recent reports from developing countries where the majority of the low birth weight babies are preterm,^[13] but in contrast to older studies where term SGA was the more common cause of low birth weight.^[14] Whether due to prematurity or due to term SGA, low birth weight as an independent factor has been found to contribute significantly to neonatal morbidity and mortality in developing countries.^[3,8]

Prematurity accounted for almost half (43.2%) of neonatal deaths in this study which is similar to 43% and 40% reported by Ibe *et al.*^[10] and Parkash *et al.*,^[15] respectively. Therefore, prevention of morbidity and mortality related to prematurity will significantly reduce the overall neonatal morbidity and mortality. Appropriate antenatal care, good obstetric practices, proper two-way referral systems, improvement of facilities for caring for preterm babies, as well as proper newborn care practices have been found to reduce morbidity and mortality from prematurity.^[16] In addition, some selective feeding practices like feeding of mother's hind milk which had been found to increase rate of weight gain and therefore reduce length of hospital stay in preterm low birth weight babies can be employed. This feeding option however is subject to availability of electric breast pumps and electricity for ease of implementation.^[17] Incubator recycling may also be a cost-effective method of re-equipping hospitals to manage preterm babies in low-income countries like ours with scarce resources as proposed by Amadi *et al.*^[18]

In this study, the most common indication for neonatal admissions were infections, prematurity, and birth asphyxia. This is similar to reports from other parts of the country and other developing countries.^[4,10-12] However, in most of the other reports birth asphyxia topped the list unlike in the present study where it ranked third.^[10-12] This may be because asphyxiated babies die at home or do not make it to the hospital considering the long distance of travel with the recent relocation of the hospital to its permanent site. Severe birth asphyxia contributed to 18.0% of the overall mortality being second only to prematurity, a prevalence that is similar to that reported by Okechukwu *et al.* in North-Central Nigeria.^[12] Hence,

Table 4: Case fatality rates of the common causes of neonatal morbidity and mortality

Diagnosis	Admissions	Mortality	Case fatality rate (%)
Prematurity	115	48	41.7
Congenital anomalies	47	15	31.9
Birth asphyxia	66	20	30.3
Neonatal jaundice	63	6	9.5
Neonatal infections	212	19	9.0

the importance of public enlightenment on the need for optimal patronage of antenatal care clinics as well as the attendance of trained skilled birth attendants at all deliveries cannot be overemphasized.

The prevalence of neonatal infections is similar to studies in other developing countries and is similar to a previous report from the unit which found a prevalence of 34.4%.^[4,12,19] The fact that majority of deliveries in Nigeria still take place outside the health facilities with questionable environmental conditions may have contributed to the high prevalence of sepsis noted in this study.^[3] The present study however did not determine what percentage of neonates admitted for sepsis were born outside an appropriate health facility. The case-fatality rate for neonatal infections in this study was however low (9.0%) [Table 4].

Congenital anomalies in the present study contributed significantly to neonatal deaths with the case-fatality rate being second only to prematurity. Other authors had documented various congenital anomalies from the center many of which were not detected antenatally.^[20-22] Optimal antenatal care, prenatal diagnosis as well as early neonatal diagnosis and appropriate multidisciplinary interventions will reduce morbidity and mortality from these anomalies in our setting.^[23]

Similar to other studies,^[16] about three quarters of neonatal deaths in this study occurred within the first week of life, with 46.4% of total deaths in the first 24 hours. Identifying risk factors for these deaths and prompt institution of appropriate and optimal interventions may prevent some of these deaths.

It is noteworthy that no case of neonatal tetanus was reported during the 1 year period covered by this study. This could be as a result of a successful immunization program among pregnant women, or that these cases presented elsewhere and never made it to the hospital. A community-based study will however better demonstrate the prevalence of neonatal tetanus in the community as these cases may not present to the hospital before demise.

Conclusion

The three main causes of morbidity and mortality

were prematurity, infections, and birth asphyxia. These conditions will therefore have to be reduced in order to achieve a significant drop in our neonatal mortality rate.

Recommendations

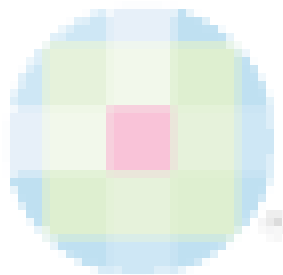
1. Public enlightenment on the need to patronize quality health care delivery systems.
2. Improving facilities for neonatal care especially care of the preterm neonate.
3. Further studies to evaluate the risk factors and causes of neonatal infections in our environment will assist in appropriate interventions to bring about a reduction in these cases.

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