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Retrospective assessment of neonatal morbidity and mortality in the special care baby unit of a private health facility in Benue State, North Central Nigeria

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Abstract: *Background:* Newborn morbidity and mortality have remained unacceptably high in developing countries despite consistent efforts at controlling the scourge. Unlike in developed countries where neonatal mortality rate ranges between 1 and 5 per 1000 live births, average neonatal mortality rate in Nigeria is 36 per 1000 live births. The majority of the causes of death are largely preventable with timely low cost interventions. This study was structured to determine the pattern of morbidity and mortality amongst babies admitted in the Special Care Baby Unit of Madonna hospital Makurdi, Nigeria.

Methods: The records of neonates admitted into the Special Care Baby Unit (SCBU) over a ten-year period (2005-2015) were retrospectively reviewed. Information obtained included the sex, age at admission, gestational age, birth weight, reasons for admission and outcome of treatment.

Results: A total of 1,121 babies were admitted during the period

under review. The male female ratio was 1.2:1. The majority of the babies were aged between 2-7 days with a mean 6.17 ± 7.01 . The mean weight on admission was 2807 ± 907 g. Neonatal sepsis, jaundice, low birth weight and birth asphyxia were the most common morbidities. The overall mortality rate was 14.1%; however, proportionate mortality due to low birth weight was highest (26.4%), followed by tetanus (23.5%), asphyxia (20.8%), Respiratory tract infection (13.8%), meningitis (13.3%), sepsis (10.3%), jaundice (9.6%), and diarrhoea (4.0%)

Conclusion: Neonatal mortality rate in the study was high. The major causes of admission are preventable. Strengthening perinatal care, emergency obstetric care services and neonatal resuscitation skills are necessary to reduce the neonatal mortality.

Key words: Neonate, Morbidity, Mortality, Nigeria

Introduction

The first 28 days of life (the neonatal period) represent the most vulnerable time for a child's survival and an essential part of reducing under five mortality rate.^{1,2} The goal 3 of the Sustainable Development Goals (SDGs) adopted by the United Nations in 2015 was to end preventable deaths of newborns and under-5 children and reduce neonatal mortality rate to at least as low as 12 per 1000 births in every country by 2030.³ Globally the neonatal mortality rate has declined in all regions, but more slowly than mortality in older children. There are approximately 7000 newborn deaths every day with about one third dying on the day of birth and close

to three quarters dying within the first week of life. Sub-Saharan Africa has the highest neonatal mortality rate with 28 deaths per 1000 live births.^{4,5} In Nigeria as at the end of 2018, neonatal mortality rate was 36 deaths per 1,000 live births.^{4,5}

The major causes of early neonatal deaths (0-7 days) are asphyxia, infection, complications of prematurity, and birth defects, while infections cause most late onset neonatal deaths (8-28 days). Intrapartum related complications (previously called birth asphyxia) dominate in the early neonatal period.

According to Okposio Mathias² in the Niger Delta region of Nigeria neonatal jaundice, prematurity and birth

asphyxia had the highest case fatality rate. Studies from tertiary hospitals in Nigeria suggested that significant proportion of newborns die before completing their neonatal life. However, because Nigeria operates a mixed economy, private providers of health care and traditional health practitioners still have a visible role to play in health care delivery as well. On that basis, data from government owned tertiary institutions may be skewed in reportage. Therefore, there is need for studies from the private sector to provide a balanced and holistic view of the problem. This study therefore presents a ten-year review of neonatal morbidity and mortality in the Special Care Baby Unit of a private health facility in Benue State, North Central Nigeria.

Methodology

Study Site

The study was conducted at the SCBU of Madonna Hospital, a private health facility in Makurdi, Benue State, Nigeria established in October 1978. The hospital is situated in the central area of the state capital. It provides health care services for people in the town and rural communities of neighboring local government areas of the State. The SCBU has facilities dedicated for out born and inborn care. The incubators and phototherapy units are locally designed and fabricated in the hospital.

Study Population

This comprised neonates admitted into the SCBU of the hospital over a ten-year period (2005-2015).

Study Design

This is retrospective and descriptive.

Data Collection

Information extracted from the medical records included gender, age at admission, gestational age, birth weight, and reasons for admission, length of stay and outcome of management. The hospital has a standard protocol for diagnosis and management of neonatal conditions. Sepsis was suspected on clinical grounds and confirmed by relevant investigations. Birth asphyxia and congenital anomalies were diagnosed on clinical grounds. Neonatal jaundice was diagnosed on clinical grounds and confirmed with relevant laboratory investigations. Information obtained were entered into a questionnaire adapted for the study.

Data Analysis

Data was analyzed using the Statistical Package for Social Sciences (SPSS) software, version 22 (IBM, Armonk, NY, USA).

Ethical Clearance

This was obtained from the Benue State University Teaching Hospital Health Research Ethics committee and the Chief Medical Director of Madonna Hospital where the study was conducted.

Results

Overall, 1,121 neonates were admitted during the period under review. Table 1 shows the baseline characteristics of study subjects. The male-female ratio was 1.22. Nearly three quarters of the babies were admitted in the first one week of life. Less than half 47.7 % were term babies of gestational age ≥ 37 weeks; 31.5 % weighed < 2500 g at the time of admission, while 7.9% were macro-somic (> 4000 g). The mean weight at admission was 2807 ± 907 g (Table 1).

Table 1: Baseline characteristics of study population (n=1121)

Variables	Frequency	Percent
<i>Sex</i>		
Male	617	55.0
Female	504	45.0
<i>Age at admission</i>		
< 24 hours	382	34.1
02 – 07 days	427	38.1
08 – 14 days	149	13.3
15 – 21 days	98	8.7
22 – 28 days	65	5.8
Mean 6.17 ± 7.01 (days)		
<i>Gestational age (weeks)</i>		
<28	21	1.9
28 – 32	129	11.8
33 – 36	423	38.6
37	522	47.7
<i>Weight at admission (grams)</i>		
<2500		
2500 – 3900	353	31.5
4000	679	60.6
Mean 2807 ± 907	89	7.9

The leading indications for admission were sepsis, jaundice and low birth weight which together constituted 84% of cases. (Table 2).

Table 2: Admission diagnoses of subjects (n=1121)

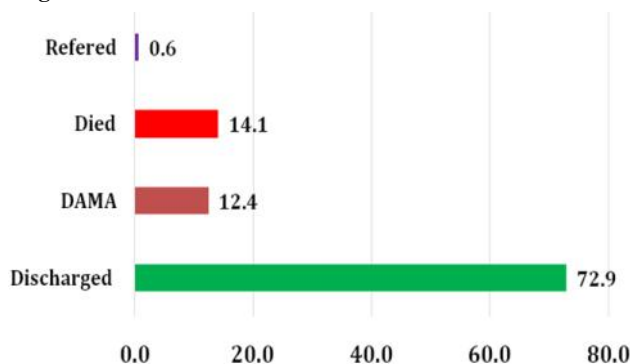
Diagnosis at discharge	Frequency	Percent
Sepsis	486	43.4
Jaundice	229	20.4
Low Birth weight	227	20.2
Asphyxia	48	4.3
RTI	29	2.6
Diarrhoea	25	2.2
Congenital Anomaly	19	1.7
Tetanus	17	1.5
Meningitis	15	1.3
Birth injury	5	0.4
Others	21	1.9

RTI = Respiratory Tract Infection

Others = Surgical conditions

Of the 1,121 neonates, 817 (72.9%) were successfully treated and discharged, 139 (12.4%) were DAMA and 0.7% were referred to other centres. There were one hundred and fifty-eight deaths giving a mortality rate of 14.1% – Figure 1.

Fig 1: Outcome of Treatment



More than two-third (78.0%) of the patients were hospitalized for less than 7 days, 17.4% for 7-14 days while 4.6% for more than 14 days. (Table 3)

Table 3: Duration of admission

Duration of stay (days)	Frequency	Percent
<7days	874	78.0
7 – 14 days	195	17.4
>14 days	52	4.6
Mean 4.95±5.63		

Table 4: Association of age at admission and outcome

Age at admission	Outcome				Total n (%)	P-value
	Discharge n=817 n (%)	DAMA n=139 n (%)	Died n=158 n (%)	Referred n=6 n (%)		
<24 hours	268(32.8)	46(33.1)	67(42.4)	1(16.7)	382(34.1)	0.109
2-7 days	327 (40.0)	50 (36.0)	48(30.4)	2(33.3)	427 (38.1)	
8-14 days	102 (12.5)	20 (14.4)	24(14.4)	2(33.3)	148 (13.2)	
15-21 days	67(8.2)	18 (12.9)	13(8.2)	0(0.0)	98(8.8)	
22-28 days	53(6.5)	5(3.6)	6(3.8)	1(16.7)	65(5.8)	

Amongst the diagnosis at discharge, proportionate mortality due to low birth weight was highest (26.4%), followed by tetanus (23.5%), asphyxia (20.8%), RTI (13.8%), meningitis (13.3%), sepsis (10.3%), jaundice (9.6%), and the least was diarrhoea (4.0%) (Table 5)

Table 5: Diagnosis at discharge and death rate

Diagnosis	Frequency (n = 1121)	Died (n = 158)	Diagnosis %	Deaths %
Sepsis	486	50	10.3	31.6
Jaundice	229	22	9.6	13.9
Low birth weight	227	60	26.4	38.0
Asphyxia	48	10	20.8	6.3
RTI	29	4	13.8	2.5
Diarrhoea	25	1	4.0	0.6
Congenital Anomaly	19	0	0.0	0.0
Tetanus	17	4	23.5	2.5
Meningitis	15	2	13.3	1.3
Birth injury	5	0	0.0	0.0
Others	21	5	23.5	3.2

Discussion

The neonatal mortality rate of 14.1% reported in this study is comparable to figures of 13.3% to 17.5% from Enugu,⁶ Kano⁷ and Irrua.⁸ This is somewhat lower than 20.3% from Benin⁹ and much lower than the national average of 39/1000. It is however higher than 9.5% reported by Ochoga et al¹¹ in Makurdi also in Northern Nigeria and 13.3% by Okechukwu et al¹², in Abuja Nigeria. Several reasons have been reported by Gerald Dafere et al⁸ for this high neonatal mortality rates and they include delayed presentations after complications have set in, in which case they must have received treatments from other caregivers like trado-medical practitioners, patent medicine dealers, unqualified health providers and spiritual homes. The environment of poverty, poor infrastructure, and insufficient health education has also contributed to the patronage of quacks before coming to the hospital.⁸ Inadequate facilities and manpower have been implicated in the high mortality rates reported in the resource limited countries like ours.¹³ Omoigberale et al⁹ also reported that the high cost of caring for a newborn may have been responsible for the delay in presentation, delay in administering care resulting in poor neonatal outcome. All these might have contributed to the high mortality rates observed in neonates in Nigeria.⁹

There were more males (55%) than females (45%) in this study which is similar to what is reported in literature by other workers Ochoga et al⁹, Okechukwu et al⁷, Mukhtar -Yola et al⁹, Omoigberale et al⁹, and Ekwochi et al.^{17,9,11,12} This may be a reflection of some cultural believes in which the male child is preferred to the female child and is more likely to be brought to hospital when he is ill.¹⁴ Although males are said to be more vulnerable biologically to diseases than females.¹⁵ It is also possible that since 52% of the deliveries in this study were males, it is therefore not surprising that 55% of the remaining admission are boys.

The commonest indications for neonatal admission in the study were sepsis, jaundice and low birth weight. This finding is in keeping with the report of Omoigber-

ale et al in Benin city Nigeria⁹ but contrasts with reports of Ekwochi et al⁶ in Enugu and Mukhtar-Yola et al⁷ in Kano where asphyxia was reported as the commonest cause of neonatal admission. It is also different from the report of Okechukwu et al¹² in Abuja in which low birth weight was reported as the commonest cause of neonatal admission. The absence of birth asphyxia among the top three causes of neonatal admission in this study may be attributed to the fact that this study was carried out in a private health facility probably with more facilities and skilled personnel trained to carry out neonatal resuscitation at birth. Also, the absence of neonatal tetanus among the top three causes of neonatal admission may be a reflection of increased uptake of tetanus toxoid by mothers during pregnancy in this region. Although neonatal tetanus was not among the top three causes, its persistence calls for further intervention and utilization of the services among pregnant women. The persistence of this scourge has been reported in other studies by Ogunlesi et al¹⁶, Oruamabo¹⁷ and Omoigberale et al⁹ in Nigeria. Improved use of antenatal services, Tetanus toxoid immunization uptake and the hygienic delivery services offered by the traditional birth attendants have been suggested as ways of reducing the incidence or possibly eliminating it.^{16,17,18}

Forty-two-point four percent (42.4%) of babies who required admission within the first 24 hours of life died. Delay in presentation to the hospital is said to be a leading cause of early deaths among hospitalized children, especially within the first 24 hours of admission¹⁹. Late presentation may result from short nature of the disease and quick onset of adverse effects as often occurs in childhood diseases, financial constraints on the part of caregivers, long distance to a health facility, and non-existence of public ambulance services have been attributed to the cause of mortality in children.⁶ Absence of vital equipment and functional laboratory services are other contributing factors to childhood mortality.⁶

Low birth weight was the third commonest cause of neonatal admissions in this study 31.5% and this is

higher than the low birth rate of 27.8% reported by Omoigberale et al in Benin⁹. But the salvage rate of 83% is higher than 68.9% obtained by Omoigberale et al in Benin⁹. Deterioration in infrastructure was reported by Omoigberale⁹ as a reason for the low salvage rate. Improvement in use of antenatal care, improved referral system would impact positively on outcome of very small babies⁹. Incubator nursing and state of the arts neonatal intensive care units are the best practice in managing very sick and small babies. However, for resource poor settings like ours Kangaroo Mother Care has been promoted for managing stable very low birth weight babies.^{20,21} As a country we should strive towards best practice in order to reduce our neonatal mortality rate.

The commonest causes of mortality in this study was low birth weight, sepsis and neonatal jaundice. In contrast, other workers in Enugu, Abuja and Irrua reported birth asphyxia as the commonest cause of death. Our finding is also in contrast to that of Omoigberale⁹ in Benin City, Nigeria in which neonatal sepsis was the commonest cause of neonatal deaths. This might be due to lower patient turnover and higher staff-to-patient ratio in private settings. Consolidating perinatal care, emergency obstetric services, and improvement of neonatal resuscitation skill are vital tools to improved neonatal survival.

Conclusion

Neonatal morbidity and mortality was high. The results from this study provide additional information which can be used by the concerned authorities in planning intervention programs for neonatal survival in Nigeria and other low-income countries with similar demographic.

Conflicts of interest: None

Funding: None

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