

Perinatal Characteristics and Outcome of Neonates at NICU of a Tertiary Level Hospital in Bangladesh

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Abstract

Background: One of the Millennium Development Goals (MDG-4) is to reduce child mortality up to two-thirds by 2015. In most developing countries, a higher proportion of neonatal deaths are observed. It has been recognized that without a substantial reduction in neonatal deaths, MDG-4 will not be met.

Objective: To assess the perinatal characteristics, pattern of admissions and outcome of neonates in a tertiary care centre in Bangladesh.

Methods: A retrospective review of consecutive neonatal admissions to Bangabandhu Sheikh Mujib Medical University, between January and December 2013, was conducted. Data were collected from the neonatal admission, discharge and death registers. Standard definitions of the conditions were used to diagnose the clinical conditions.

Results: Total 683 neonates were admitted to the NICU. Among them 56.1% were inborn and males were 56.8%. Total 61.3% neonates were low birth weight and 60.3% were preterm. The overall cesarean section rate was 61.9%. Total 35.3% neonates had sepsis and perinatal asphyxia was present in 16.8% neonates. Congenital anomaly was present in 17.6% neonates. The mean duration of hospital stay was 11.1 days and overall mortality rate was 14.9%.

Conclusion: Prematurity, neonatal infections, birth asphyxia and congenital anomalies were the main causes of neonatal hospital admission and neonatal deaths in this study.

Keywords: Perinatal characteristics, Neonates.

Introduction

Every year an estimated 4 million babies die in the first 4 weeks of life.¹ Almost all (99%) neonatal deaths occur in developing countries.¹ Globally, the main direct causes of neonatal death are estimated to be preterm birth (28%), severe infections (26%) and asphyxia (23%).¹ Neonatal mortality contributes

between 40-70% of infant mortality. Trends in mortality show neonatal mortality is declining less rapidly compared to infant and under 5 mortality.¹ It has been recognized that without a substantial reduction in neonatal deaths, MDG-4 will not be met. This has given renewed interest in neonatal care and measuring neonatal health problems and interventions thereof. Morbidity and mortality information from hospitalized patients may reflect the causes of major illnesses and the standard of care being provided.

In Bangladesh, neonatal mortality rate (NMR) is 32 per 1000 live births.² The main causes of neonatal death in Bangladesh were birth asphyxia (21%), low birth weight (11%), and severe infection (34%).² Perinatal and neonatal deaths in developing countries are known to occur primarily because of poor maternal health, adverse social conditions, and inadequate care during pregnancy, delivery, and the immediate postpartum period.¹

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In Bangladesh, a national policy of free maternal and child health care was implemented to improve care for pregnant mothers and children. Higher utilisation rates of health services for antenatal care and delivery services have been demonstrated from this population but the outcome of such care on perinatal morbidity and mortality is yet to be measured. It is thus important that the causes of perinatal morbidity and mortality are measured and monitored in order to develop strategies to improve perinatal health care at different levels (community and institutions). This study was designed to see the relative proportion of neonatal diseases and their outcomes observed in a tertiary care centre in Bangladesh. The objective of this study was to assess the perinatal characteristics, pattern of admissions and outcome of neonates in NICU.

Materials and Methods

A retrospective descriptive study was conducted targeting all neonates admitted to neonatal unit of Bangabandhu Sheikh Mujib Medical University during 2013 (January-December). Data were collected from the neonatal admission, discharge and death registers. The primary causes of admissions and deaths were defined as the underlying obstetric and neonatal factors or conditions, which resulted in the admission or death of the neonate. The register contained each neonate's date of admission and discharge or death, sex, weight at admission or at birth, gestation age at birth, mode of delivery, duration of stay at the hospital, diagnosis and outcomes. Standard definitions of the conditions were used to diagnose the above conditions. All medical and nursing staff working at the neonatal unit was oriented on recording of the neonatal admission, discharge and death registers, clinical guidelines of diagnosis and compilation of monthly summaries for presentation at monthly perinatal mortality meetings.

Relevant data of the study population were analysed using SPSS version 20. The analysis of patient demographics and baseline outcome variables were summarised using descriptive summary measures: expressed as mean for numerical variables and percent for categorical variables. Numerical parameters were analyzed with unpaired t-test and categorical data were analyzed using Chi squared test. All statistical tests were performed using two-sided tests at the 0.05 level of significance.

Results

Total 683 neonates were admitted to the NICU between January 2013 and December 2013. Overall 383 (56.1%) neonates admitted were inborn. Male outnumbered female newborns (56.8% vs 43.2%). The distribution of all admitted infants by birth weight is shown in figure 1. Total 419 (61.3%) neonates were <2500 g of birth weight. Overall 188 (27.5%) neonates admitted were SGA. Among them 140 (74.5%) were preterm and 48 (25.5%) were term. The distribution of all admitted infants by gestational age (GA) is shown in figure 2. Total 412 (60.3%) neonates were preterm (<37 weeks' GA).

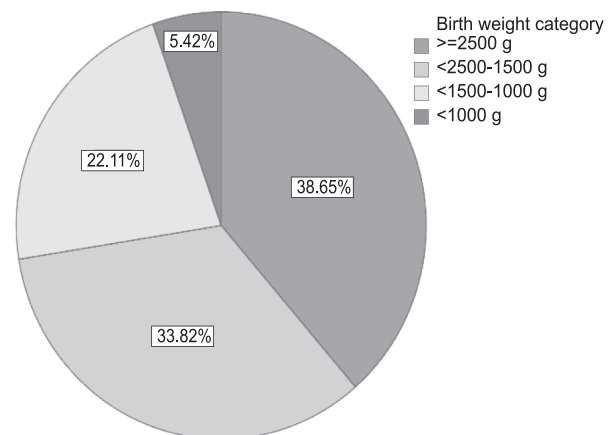


Fig. 1: Distribution of NICU patients by birth weight

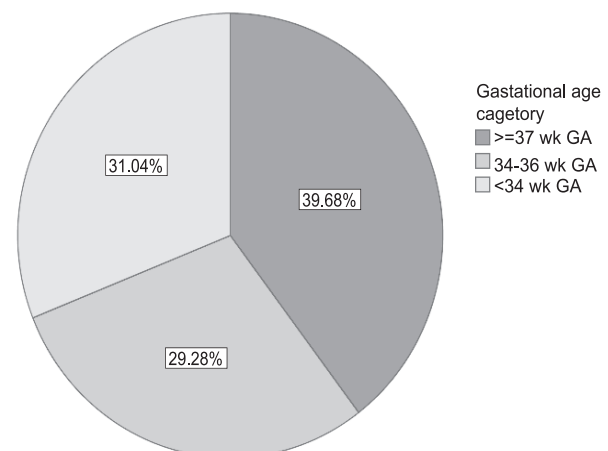


Fig. 2: Distribution of NICU patients by gestational age

Maternal illness during gestational period was reported in 275 (46.8 %) neonates admitted to the NICU. Maternal hypertension and diabetes mellitus were present in 168 (61 %) of neonates. Risk factors for sepsis were present in 202 (34.4 %) of infants admitted to the NICU.

The overall cesarean section rate was 61.9%. Cesarean section was the mode of delivery for neonates in the gestational age between 34 and 36 weeks (75.5%). On the other hand 58.3% of term and 54% of <34 weeker neonates were delivered by cesarean section.

Total 146 (21.4%) infants had Apgar scores <7 at 5 minutes who required some degree of resuscitation just after birth. The prevalence was highest among term infants 73 (26.9%), 34-36 weeks' GA 38 (19%) and <34 weeks' GA 35 (16.5%).

Total 241 (35.3%) infants had at least one episode of sepsis. Among them 81 (33.7%) were diagnosed as early onset sepsis (EOS) and 159 (66.3 %) were late onset sepsis (LOS). Sepsis was common among preterm (p value 0.00), small for gestation (p value 0.037) and outborn (p value 0.00) infants (Table-I).

Perinatal asphyxia with different grades of HIE was present in 115 (16.8%) admitted neonates. Perinatal asphyxia was common in term (p value 0.00) and outborn (p value 0.00) infants (Table-II).

Total number of infants with congenital anomalies was 120 (17.6%). The predominant system involved was nervous system (21.6%) followed by cardiovascular system (19.1%) and gastrointestinal system (19.1%) (Figure-3). Neural tube defect (NTD) was found to be the commonest anomaly.

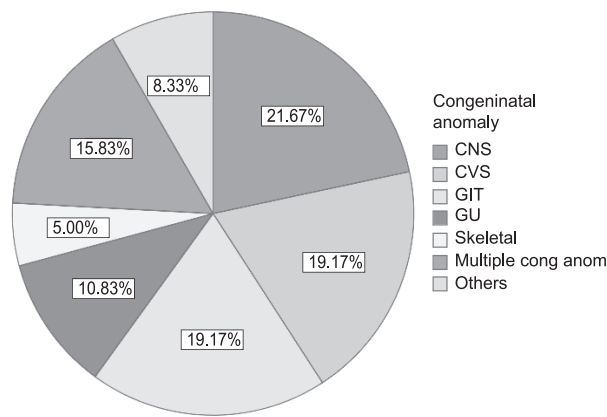


Fig. 3: Distribution of neonates by congenital anomaly

The mean duration of NICU stay was 11.1 days. Duration of stay of Preterm and SGA infants were longer than term and AGA infants (Figure 4).

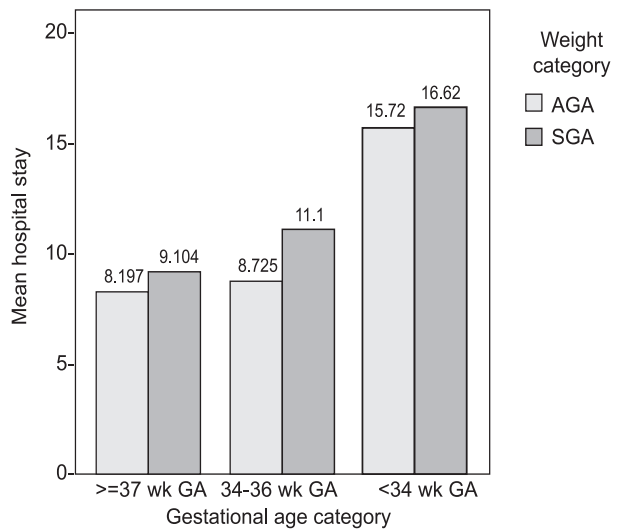


Fig. 4: Distribution of neonates with different gestational age by hospital stay

Total 102 patients (14.9%) died during this study period. Mortality rate was higher among lower gestational age infants (Figure 5). Mortality rate was 25.1% and 48.6% among very low birth weight (VLBW) and extremely low birth weight (ELBW) neonates respectively (Table-III). Prematurity and low birth weight contributed 74.5% and 78.4% of death respectively (Table 4). Other clinical parameters and mortality rates are shown in table 3 and 4.

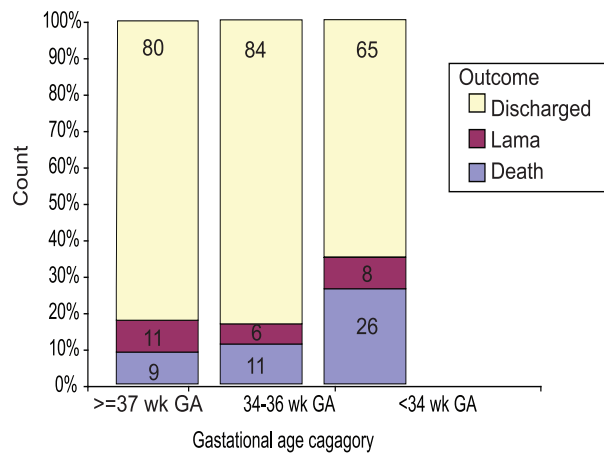


Fig. 5: Outcome of admitted infants by gestational age

Table I
Distribution of neonates with sepsis by clinical characteristic

Characteristic of neonates	Neonatal sepsis		P value
	Yes (n=442)	No (n=241)	
Prematurity	186 (77.1%)	225 (50.9%)	0.00
SGA	78 (32.3%)	110 (24.8%)	0.037
Outborn	129 (53.5%)	171 (38.6%)	0.00

SGA Small for gestation

Table II
Distribution of neonates with perinatal asphyxia by clinical characteristic

Characteristic of neonates	Perinatal asphyxia		P value
	Yes (n=568)	No (n=115)	
Term	66 (57.3%)	206 (36.2%)	0.00
SGA	31 (26.9%)	157 (27.6%)	0.88
Outborn	75 (65.2%)	225 (39.6%)	0.000

Table III
Clinical characteristic of admitted neonates and mortality rate of neonates

Characteristics	No. of admissions (n=683)	Deaths
Gestational age		
≥37 wk	271 (39.7%)	24 (8.8%)
34-36 wk	200 (29.3%)	22 (11%)
<34 wk	212 (31.0%)	56 (26.4%)
Birth weight		
≥2500 g	264 (38.7%)	22 (8.3 %)
<2500-1500 g	231 (33.8%)	24 (10.3 %)
<1500- 1000 g	151 (22.1%)	38 (25.1 %)
<1000 g	37 (5.4%)	18 (48.6%)
SGA	188 (27.5%)	44 (23.4%)
Sepsis	241 (35.3%)	53 (21.9%)
Perinatal asphyxia	115 (16.8%)	28 (24.3%)
Congenital anomaly	120 (17.6%)	37 (30.8%)
Inborn	383 (56.1%)	47 (12.2%)

Table IV
Clinical characteristics contributing mortality rate

Characteristics	No. of Deaths (n=102)
Sex	
Male	59 (57.8%)
Inborn	47 (46.0%)
Gestational age	
≥ 37 wk	24 (23.5%)
34-36 wk	22 (21.6%)
<34 wk	56 (54.9%)
Birth weight	
≥ 2500 g	22 (21.6%)
<2500- 1500 g	24 (23.5%)
< 1500- 1000 g	38 (37.3%)
<1000 g	18 (17.6%)
SGA	44 (43.1%)
Sepsis	53 (51.9%)
Perinatal asphyxia	28 (27.4%)
Congenital anomaly	37 (36.2%)

Discussion

This report presents the 2013 status of mortality and morbidity among admitted neonates cared for at a tertiary center in Bangladesh. This study attempts to identify the problems of admitted neonates in Bangabandhu Sheikh Mujib Medical University. These findings probably apply to many other similar resourced settings in developing countries.

The predominance of males for both admissions (56.8%) and deaths (57.8%) in our study raises the issues of biological vulnerability of male neonates as it is found universally in other studies.^{3,7,8} Prematurity and low birth weight continue to be the major public health problems observed in our setting as is the case in many other developing countries.^{3,9,10} Considering the gestational age, preterm birth resulted in a higher rate of admission (40.3%) and deaths (76.5%). Similarly, low birth weight of the neonates (LBW, <2,500gm) accounted for higher rates of hospitalisation (61.3%) and deaths (78.4%). More than half of all deaths in this hospital occurred among the VLBW babies (<1,500 g). These findings are similar to other studies of low resource countries.^{1,3-5,11,12} All these studies identified that malnutrition, lack of nutritional education and lack of early antenatal care are significant risk factors for low birth weight babies.

Neonatal infection is one of the leading causes of hospitalisation (35.3%) and the death rate was 21.9%. The known predisposing factors for neonatal infections are poor obstetric care and un-sterile delivery practices in resource poor settings where most of deliveries are conducted at home and outside health facilities.¹ A significant proportion of neonatal admission (16.8%) and death (24.3%) was associated with birth asphyxia in this hospital. Hospitalisation and death rates due to birth asphyxia have been reported as even higher (up to 41%) from other developing countries.^{13,14} Antenatal and intrapartum monitoring of high risk pregnancies, timely referral and resuscitation at the time of birth at all health facilities should be mandatory to reduce the high case fatality and morbidity related to birth asphyxia. Congenital abnormalities were one of the major causes of admission (17.6%) and accounted for a higher rate (30.8%) of death.

The overall neonatal mortality rate was 14.9% which is consistent with the findings from some developing countries.^{3,7} The most common causes of neonatal morbidity and mortality in our findings were birth asphyxia, prematurity, neonatal infection and

congenital abnormality and are consistent with other findings.^{1,3,6-8}

More than half of the neonates admitted were delivered by Caesarean section. This mode of delivery is for the benefit of mothers (maternal condition) or fetal conditions. Maternal conditions contributing neonatal admission and mortality, e.g. hypertension, diabetes, antenatal risk factors for neonatal sepsis were recorded in this study. Perinatal risk factors in our study (maternal hypertension, diabetes, risk factors for sepsis) were found to be high when compared with the other reports.^{3,15}

This study provides a view to assess the care and outcomes in our unit and can provide an insight for improving our clinical practices with the existing evidence. National Neonatal Perinatal Database which was recently launched in different institutes of the country including BSMMU will be a useful tool in analyzing newborn morbidity and mortality and also in the overall improvement of neonatal care.

Conclusion

Prematurity, neonatal infections, birth asphyxia and congenital anomalies were the main causes of neonatal hospital admission and neonatal deaths in this study. Mortality rate was higher among the preterm and low birth weight neonates.

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