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Assessment of the Recorded Causes of Neonatal Hospitalization and the Related Factors in Neonatal Wards and NICUs in Bojnord

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ABSTRACT

Introduction: According to Millennium Development Goal (MDG) number 4, child mortality should be reduced by two thirds by 2015. The focus has been on decreasing neonatal deaths in high-mortality countries. In this study, we assessed the recorded causes of neonatal hospitalization in the neonatal intensive care unit (NICU) and infant care wards.

Methods: The present cross-sectional study was carried out in two hospitals (Bentolhoda hospital and Emam Reza hospital) of North Khorasan University of Medical Sciences, Bojnord in 2011-2012. We assessed different variables such as maternal age at infant's birth, gestational age, first and fifth minute Apgar scores, and hospitalization etiology. Chi-square and Kruskal-Wallis tests were used for the statistical analysis.

Results: In this study, the most common cause of neonatal admission was icterus. Most of the infants' birth weight was higher than 2,500 gr. There was a relationship between Apgar score in the first and fifth minutes and causes of hospitalization (P<0.001). Infants' gender and maternal mode of delivery had no significant relationship with the cause hospitalization (P<0.06). However, birth weight and gestational age were significantly related to the causes of admission in hospitals (P<0.0001).

Conclusion: Identifying the factors which influence the hospitalization of infants can help control these risk factors. It can also lead to the decrease of neonatal mortality, which is a reflection of nations' socio-economic status.

Keywords: Disease, Etiology, Infant, Maternal, Neonatal hospitalization

Introduction

Of the estimated 130 million infants born each year worldwide, 4 million die in the first 28 days of life (1). Neonatal mortality is used as a standard index of developing health care systems. Also, neonatal morbidity and mortality rates reflect a country's socio-economic status, and the efficiency and effectiveness of health care services (2). Mirza Rahimi *et al* (2009) showed that causes of neonatal mortality are HMD (hyaline membrane disease), sepsis, pneumonia, congenital anomalies, asphyxia and aspiration syndrome (3). Also, in a study by Nayeri *et al* (2007), results revealed that causes of neonatal death were preterm birth, RDS (respiratory distress syndrome), IVH (intraventricular hemorrhage), septicemia, and air leak syndrome (4). In the study by Fallahi *et al* (2009), the most common causes of the infants' deaths were RDS, sepsis, congenital anomaly, asphyxia, metabolic disorder, lung hemorrhage and necrotizing enterocolitis (5). Therefore, the first step to decrease neonatal mortality can be raising awareness regarding the causes of mortality (1).

United Nations Millennium Development Goal number 4 calls for the reduction of child mortality by two thirds by 2015. The focus has been on decreasing neonatal deaths in high-mortality countries (1, 4). Eighty seven percent of neonatal mortality worldwide is due to infection (36%), preterm birth (28%) and birth asphyxia (23%) (3, 4). In this study, we attempted to investigate the recorded causes of hospitalization and mortality of neonates in the NICU and infant care wards.

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Materials and Methods

The present cross-sectional study was conducted between October 2011 and July 2012. The study was carried out in two hospitals of North Khorasan University of Medical Sciences. We assessed 260 out of 1,710 and 150 out of 1,569 medical records in the two hospitals, respectively. In total, the sample size was calculated as 415 infants who were admitted to the hospitals.

We used random sampling method and researcher-made checklists for gathering the data. The checklist consisted of the following variables: maternal age, parity, gravidity, maternal history of diseases, number of fetuses, gestational age, infant's birth date, infant's gender, time interval between birth and hospitalization, birth weight, first and fifth minute Apgar scores, time interval between amnion membrane rupture and infant's birth, and hospitalization etiology.

Table 1. Maternal and neonates characteristics

Characteristics	Frequency	Percent	Valid percent
Maternal age, years (n=415)			
<20	51	12.3	19.4
20-35	179	43.1	68.1
>35	33	8	12.5
Total	236	63.4	100
Missing system	152	36.6	
Mean(SD)	26.96(6.23)		
Parity (n= 415)			
1	62	14.9	50.4
2	30	7.2	24.4
3	19	4.6	15.4
>4	12	2.9	9.8
Total	123	29.6	100
Missing system	292	70.4	
Mode delivery (n=415)			
CS	124	29.9	47.1
NVD	139	33.5	52.9
Total	263	63.4	100
Missing system	152	36.6	
Gestational age, weeks (n=415)			
<35	39	9.4	15.4
35-37	33	8	13
>37	182	43.9	71.7
Total	254	61.2	100
Missing system	161	38.8	
Mean(SD)	37.59(3.38)		
Gender(n=415)			
Male	225	54.2	56.3
Female	175	42.2	43.8
Total	400	96.4	100
Missing system	15	3.6	
Birth weight, grams (n=415)			
<1500	17	4.1	6.5
1500-2500	56	13.5	21.4
>2500	189	45.5	72.1
Total	262	63.1	100
Missing system	153	36.9	
Mean(SD)	2858.01(776.03)		
Preterm rupture of membrane, hours(n=415)			
<12	230	55.4	89.8
12-24	18	4.3	7
>24	8	1.9	3.1
Total	256	61.7	100
Missing system	159	38.3	
Mean(SD)	4.53(8.57)		
Maternal history disease (n=415)			
Yes	15	3.6	5.7
No	249	60	94.3
Total	264	63.6	100
Missing system	151	36.4	
Apgar			
1 minute(mean(SD))	7.72 (1.73)		
5 minute(mean(SD))	8.81 (1.48)		

SPSS (version 16) was utilized for entering and analyzing the data, and descriptive and analytic measures were used for data analysis. Statistical tests included chi-square and Kruskal-Wallis.

Results

The findings of the present study are presented in Table 1. The results showed the most common cause of admission was related to icterus (46.2%). The birth weight of most infants was more than 2500 gr, and in 89.8% of cases, the interval between membrane rupture and delivery was less than 12 hrs.

Most of the infants were born through normal vaginal delivery (52.9%). The mean of the gestational age in the two hospitals was 37.59±3.38 (range: 26-42 weeks). Also, the mean birth weight of hospitalized infants was calculated as 2851.14±791.46, with minimum of 720 gr and maximum of 4600 gr; eight percent of births were multiple gestations.

Etiology of hospital admissions is presented in Tables 2 and 3, based on neonates' birth weight. There was a relationship between the first and fifth minute Apgar scores and causes of hospitalization (P<0.001). Also, birth weight and gestational age were significantly related to causes of admission (P<0.001).

However, there was no statistical relationship between causes of hospitalization and infant's gender and mode of delivery (P<0.06). Moreover, we didn't find any statistical relationship between causes of hospitalization and type of delivery (P<0.07).

Table 2. Hospitalization causes in neonates

Hospitalization causes	Frequency	Percent	Valid percent
Icter	190	45.8	46.2
HMD	8	1.9	1.9
Preterm	21	5.1	5.1
MAS	17	4.1	4.1
Sepsis	32	7.7	7.8
Asphyxia	9	2.2	2.2
Others	134	32.3	32.6
Total	411	99	100
Missing system	4	1	

Table 3. Hospitalization causes based on birth weight

Hospitalization causes	N(%) birth weight<2500	N(%)Birth weight≥2500
Icter	8(10.5%)	68(89.5%)
HMD	8(100%)	0(0%)
Preterm	18(94.7%)	1(5.3%)
MAS	0(0%)	16(100%)
Sepsis	4(22.2%)	14(77.8%)
Asphyxia	1(11.1%)	8(88.9%)
Others	39(33.6%)	77(66.4%)
Total	78(29.8%)	184(70.2%)

Discussion

In our study, the most common reasons for hospitalizing infants were icterus, sepsis, preterm birth, and meconium aspiration syndrome (MAS), while in the study by Mukasa (1992), the results showed that birth injuries and transient tachypnea of the newborn were common causes for hospitalization (6). Kasirye-Bainda *et al* (1992) also demonstrated that the major reasons for neonatal morbidity and mortality are immaturity, respiratory distress, infections and perinatal asphyxia (8), which are not similar to the findings of the present study.

In the studies by Okechukwu *et al* (2009), Udo *et al* (2008), Ahmed *et al* (2004), and Simiyu (2003, 2004), the results showed that the major reasons for the admission of neonates were as follows: low birth weight, neonatal sepsis (NNS), severe birth asphyxia (SBA), icterus, infections, low birth weight, very low birth weight, sepsis, pneumonia, omphalitis, dehydration, apnea attack and hypothermia, prematurity, respiratory distress, hyperbilirubinemia, respiratory distress, apnea attack, suspected sepsis, icterus, hypothermia and anemia, birth asphyxia, neonatal sepsis and prematurity (7, 9-13). In our study, the most common cause of hospitalization was to some extent similar to the aforementioned studies.

Khalili *et al* (2005) demonstrated that respiratory distress syndrome is more common than other causes of admissions (14); the results were similar to Simiyu's study (2004) (12).

Hotrakitya *et al* (1993), in an evaluation regarding early neonatal mortality and causes of death in Ramathibodi Hospital in 1981-1990, showed that the most common causes of neonatal mortality were congenital malformation, immaturity, asphyxia, respiratory distress syndrome (RDS), and infection (15). In the present study, we couldn't assess mortality etiologies of the neonates due to the unavailability of infants' death records in one of the hospitals.

In the present study, male infants outnumbered the females, same as the studies by Mirza Rahimi *et al* (2009), Fallahi *et al* (2009) and Mukhtar-Yola (2007) (3, 5, 13). In the study by Fallahi *et al*, most of the deliveries were cesarean section (59%), however in our study, normal vaginal delivery was more frequent. In the mentioned study, in 63% of cases, the Apgar score was less than 7 and the majority of infants weighed 1000-1499 gr (50%) (5). However, in the present study, the birth weight of most of the infants was over 2500 gr (72.1%).

Conclusion

Immaturity is the most common cause of infants' hospitalization which can be due to differences in socioeconomic status and health care services in various countries. This study helps us identify and control the risk factors involved in neonatal morbidity and mortality.

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