Curr Pediatr Res 2022; 26 (7): 1501-1507 *ISSN 0971-9032*
www.currentpediatrics.com

Pattern and outcomes of neonates in a nursery care unit of Alwahda teaching hospital, Thamar university, Yemen.

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Received: *04 July, 2022, Manuscript No. AAJCP-22-67546;* ***Editor assigned:*** *05 July, 2022, PreQC No. AAJCP-22-67546(PQ);* ***Reviewed:*** *11 July, 2022, QC No. AAJCP-22-67546;* ***Revised:*** *18 July, 2022, Manuscript No. AAJCP-22-67546(R);* ***Published:*** *29 July, 2022, DOI:10.35841/0971-9032.26.7.1501-1507.*

Abstract

Background: The health of the infant has improved recently, but that of the newborn is not. Most causes of neonatal morbidity are preventable. Neonatal morbidity and mortality rates reflect the efficiency of health services in a country. The survival of newborns depends upon the care they receive. Advances in neonatal management have made considerable improvements in the survival of newborns but in developing countries, neonatal morbidity and mortality are still very high.

Aim: This study aimed to determine the disease patterns and outcomes of patients admitted to the nursery care unit of Thamar University Al-Wahdah teaching hospital, Ma'bar city, Dhamar governorate, Yemen. And to determine the main causes of neonatal morbidity and mortality.

Materials and Methods: A retrospective study conducted in the nursery care unit of Thamar university Al-Wahdah teaching hospital, Ma'bar City, Dhamar governorate, Yemen. The study was conducted through the period from the 1st of September 2019 to the 29th of February 2020. The data collected included: sex, gestational age, age at admission, weight at admission, place of delivery, final diagnosis, length of hospital stay, and the outcome.

Results: The number of neonates with complete data was 290 of the total admissions (305) to the unit during the study period. 196 (67.6%) were males while 94 (32.4%) were females. A total of 202 patients (69.7%) were born in the hospital while 88 (30.3%) were born at home. The most of cases were admitted during the first 24 hours of life (60.0%). Pneumonia, prematurity, neonatal sepsis, and neonatal asphyxia were the most common morbidities (24.1%, 21.0%, 19.7%, and 16.2%, respectively). The overall mortality was 22.1% (64 out of 290 babies). Prematurity was the most common cause of death.

Conclusion: Pneumonia, prematurity, and birth sepsis were the main causes of admissions (24.1%, 21.0%, and 19.7% respectively). The first step in improving neonatal survival is to document the number and rate of deaths and identify their common causes. We strongly recommend increasing the facilities and health care workers to decrease in neonatal mortality rate by providing better nursing care in the tribal regions.

Keywords: Asphyxia neonatorum, Infant, Low birth weight, Neonatal jaundice, Neonatal prematurity, Yemen.

Accepted on 14th July, 2022

Introduction

The health of the infant has improved recently, but that of the newborn is not. Most causes of neonatal morbidity are preventable [1]. Neonatal morbidity and mortality rates reflect the efficiency of health services in a country [2-4]. The survival in newborns depends upon the care they receive [5]. Advances in neonatal management have made considerable improvement in survival of newborns but in developing countries, neonatal morbidity and mortality both are still very high [6]. Nearly half of the infantile deaths occur within the neonatal period, neonatal disease pattern is a sensitive indicator of the availability, utilization, and effectiveness of mother and child health services in the community [7]. Since community based data are difficult and expensive to collect in face of lacking resources, hospital-based data, therefore, will reflect changes in the community as a whole. The most common diseases of the neonatal period are infections, followed by asphyxia and prematurity [8].

The neonatal disease pattern changes between different places and from time to time even in the same place [9]. Thus for the better neonatal status, we keep on reporting various causes of mortality and morbidity in the neonatal age group from time to time. Despite the decrease in neonatal deaths by 17% over the last decade, 3.1 million newborns died in 2010 most of them

belonging to developing countries [10,11]. In developing countries where budgetary constraints limit technological advances, the judicious implementation of nursery care measures can result in a reduction in morbidity and mortality. Therefore, this study was done to assess patients admitted to the nursery care unit and the factors that affected their outcomes.

Study justification

Although there are many neonatal care units in Dhamar governorate, Yemen, there are no official information and data about neonatal patterns and outcomes in Dhamar governorate, therefore, this study conducts on this important health problem. This study was done at Al-Wahdah teaching hospital to identify the major causes of neonatal morbidity and mortality as this hospital is one of the major neonatal care centers and most of the cases are coming from rural areas [12,13].

Study objectives

This study aims to assess the disease patterns and outcome of neonatal admission at a nursery care unit of Thamar university Al- Wahdah teaching hospital from the 1st day of September 2019 to the 29th of February 2020.

Material and Methods

Study area

This study was conducted in Thamar university Al-Wahdah teaching hospital, Ma'bar city, Dhamar governorate, Yemen (which is located about 69 km south of the capital city of Yemen, Sana'a) [14].

Study population

Neonates admitted to the nursery care unit in Thamar University Al-Wahdah teaching hospital, Ma'bar city, Dhamar governorate, Yemen.

Study design

The study was conducted at the nursery care unit through a retrospective study based on clinical data and investigation to confirm the diagnosis of each patient obtained from files of the unit [15].

Sample size

All neonatal cases admitted to the NCU at Thamar university Al-Wahdah teaching hospital, Ma'bar city, Dhamar governorate, Yemen. During the period between 1st of September 2019 to 29th February 2020, were 305. The number of studied cases was 290 [16].

Inclusion criteria

The inclusion criteria of the sample in this study were all neonates who attended AL-Wahdah teaching hospital during the data collection period their required data has been written sufficiently in their files.

Exclusion criteria

Those who had their files with insufficient or inappropriate data during the data collection period were excluded from this study.

Data collection

The data was collected from the selected case files that were in the unit.

Data extracted covered the socio-demographic data (age of neonate on admission, gestational age, sex, weight on admission, and place of delivery and patterns of disease (diagnosis of each case, duration of staying in hospital, and outcomes) [17].

Statistical analysis

The collected data were analyzed by the SPSS program using frequency and percentage tables and graphical presentation.

Ethical considerations

Approval was taken from the medical research center of the faculty of medicine and health sciences, Thamar university.

Results

Patients' characteristics

The total number of neonates admitted during the study period was 305, 15 cases of them are excluded due to insufficient and inappropriate data, so the number of all studied cases is 290 most of them 196 (67.6%) were males while 94 (32.4%) were females. About the outcome 66.6% of cases are improved, 22.1% deaths, 8.3% DAMA, and 3.1% are referred to the general pediatric ward or to other hospitals. The majority of neonatal patients admitted are in the first day of life. Of the 290 admitted, 202 (69.7) were born in the hospital while 88 (30.3) were born at home, and referred to the neonatal care unit of Al-Wahdah teaching hospital (Table 1) [18].

Variable	Frequency	Percent
Patient's age in days		
1 day	174	60
2 to 7 days	72	24.8

8 to 14 days	19	6.6
15 to 21 days	22	7.6
22 to 28 days	3	1
Sex of patient		
Male	196	67.6
Female	94	32.4
Gestational age		
Pre-term	88	30.3
Full-term	202	69.7
Weight of patient		
Extremely low weight	4	1.4
<1000 g		
Very low weight 1000 to 1499 g	31	10.7
Low weight 1500 to 2499 g	124	42.8
Normal weight 2500 to 4000 g	129	44.5
High weight >4000 g	2	0.7
Place of delivery		
Out-Hospital	88	30.3
In-Hospital	202	69.7

Table 1. Socio-demographic data of patients who were admitted to the nursery care unit of Thamar University Al-Wahdah Teaching Hospital, Yemen (n=290).

Most of the neonates (44.5%) were of normal weight (2500-4000 grams). Neonatal jaundice 7.2% (n=21), neonatal infections (neonatal sepsis 19.7% (n=57), neonatal pneumonia 24.1% (n=70), gastroenteritis 0.7% (n=2), MAS 3.8% (n=11), perinatal asphyxia 16.2% (n=47), congenital anomalies 4.5% (CHD=2.8%, TEF=0.7%, Hydrocephalus=0.7%, gastroschisis=0.3%) and others (preterm=21.0% (n=61), neonatal seizures 0.7% (n=2) (Table 2). There is a great variation in neonatal mortality statistics between NCUs from different parts of the world. This variation probably reflects the difference in the attending population, antenatal care, admission criteria, specific exclusion and inclusion criteria and level of neonatal care (Table 3 and 4).

Variable	**Frequency**	**Percent**
Duration of admission		
Less than 5 days	187	64.5
5 to 9 days	78	26.9
10 to 14 days	18	6.2
15 to 19 days	7	2.4
Disease of patient		
Pre-term	61	21
Neonatal jaundice	21	7.2
Neonatal sepsis	57	19.7
Pneumonia	70	24.1
Abnormal movement	2	0.7
Low birth weight	5	1.7

Acute gastro-enteritis	2	0.7
Perinatal asphyxia	47	16.2
Congenital anomalies:	13	4.5
Congenital heart disease	8	2.8
Tracheo-esophageal fistula	2	0.7
Hydrocephalus	2	0.7
Gastroschisis	1	0.3
Meconium aspiration	11	3.8
Anemia	1	0.3
Outcome		
Improved	193	66.6
DAMA	24	8.3
Referred	9	3.1
Death	64	22.1

Table 2. Patterns of disease among patients admitted to nursery care.

Variables	**Out come**								X^2	**P***
	Improved		**DAMA**		**Referred**		**Death**			
	N	**%**	**N**	**%**	**N**	**%**	**N**	**%**		
Patient's age in days									**36.7**	**0.001**
1 day	105	60.30%	16	9.20%	2	1.10%	51	29.30%		
2 to 7 days	53	73.60%	6	8.30%	3	4.20%	1	13.9%		
8 to 14 days	16	84.20%	0	0.00%	0	0.00%	3	15.80%		
15 to 21 days	17	77.30%	2	9.10%	3	13.60%	0	0.00%		
22 to 28 days	2	66.70%	0	0.00%	1	33.30%	0	0.00%		
Sex of patient									2.568	0.494
Male	132	67.30%	15	7.70%	8	4.10%	41	20.90%		
Female	61	64.90%	9	9.60%	1	1.10%	23	24.50%		
Gestational age									8.694	0.030
Pre term	54	61.4%	7	8%	0	0.00%	27	30.70%		
Full term	139	68.8%	17	8.4%	9	4.5%	37	18.3%		
Weight of patient									22.44	0.049
Extremely low weight<1000 g	1	25%	0	0.00%	0	0.00%	3	75%		
Very low weight 1000 to 1499 g	15	48.4%	3	9.70%	0	0.00%	13	41.9%		
Low weight 1500 to 2499 g	86	69.4%	11	8.90%	3	2.40%	24	19.4%		
Normal weight 2500 to 4000 g	90	69.8%	9	7%	6	4.7%	24	18.6%		
High weight >4000 g	1	50%	1	50%	0	0.0%	0	0.0%		
Place of delivery									1.204	0.747

Out-hospital	58	65.9%	6	6.8%	4	4.5%	20	22.7%		
In-hospital	135	66.8%	18	8.9%	5	2.5%	44	21.8%		

Table 3. Factors associated with the outcome of patients who were admitted to the nursery care unit of Thamar University Al-Wahdah teaching hospital, Yemen.

Variables	**Outcome**								**X^2**	**P***
	Improved		**DAMA**		**Referred**		**Death**			
	N	**%**	**N**	**%**	**N**	**%**	**N**	**%**		
Duration of admission									21.838	0.003
Less than 5 days	112	59.90%	16	8.60%	5	2.70%	54	28.90%		
5 to 9 days	62	79.50%	7	9%	3	3.80%	6	7.70%		
10 to 14 days	14	77.80%	0	0.0%	0	0.00%	4	22.2		
15 to 19 days	5	71.4	1	14.3%	1	14.3%	0	0.0%		
Disease of patient									86.169	<0.01
Pre-term	36	59.0%	4	6.6%	0	0.00%	21	34.4%		
Neonatal jaundice	17	81.0%	1	4.8%	2	9.50%	1	4.8%		
Neonatal sepsis	38	66.7%	9	15.8%	3	5.30%	7	12.3%		
Pneumonia	53	75.7%	4	5.7%	1	1.40%	12	17.1%		
Abnormal movement	2	100.0%	0	0.0%	0	0.00%	0	0.0%		
Low birth weight	3	60.0%	1	20.0%	0	0.00%	1	20.0%		
Acute gastro-enteritis	2	100.0%	0	0.0%	0	0.00%	0	0.0%		
Perinatal asphyxia	29	61.7%	3	6.4%	0	0.00%	1	31.9		
Congenital anomalies										
Congenital heart disease	5	62.5%	1	12.5%	1	12.5%	1	12.5%		
Tracheo-esophageal fistula	0	0.0%	0	0.0%	1	50.0%	1	50.0%		
Hydrocephalus	2	100.0%	0	0.0%	0	0.00%	0	0.0%		
Gastroschisis	0	0.00%	0	0.0%	1	100.0%	0	0.0%		
Meconium aspiration	5	45.5%	1	9.1%	0	0.00%	5	45.5%		
Anemia	1	100.0%	0	0.0%	0	0.00%	0	0.0%		

Table 4. Factors associated with the outcome of patients who admitted to nursery care unit of Thamar University Al-Wahdah Teaching Hospital, Yemen.*: Fisher exact test.

Discussion

Accurate data on neonatal disease volume and pattern are useful for many reasons. It is important for the providers of care makers to design interventions for prevention and treatment and to implement and evaluate health care programs. The data from NCU of Thamar University Al-Wahdah teaching hospital, Yemen, is very limited. This is a hospital-based study and may not present what is going on in the community.

The study revealed a male predominance for admissions (67.6%) while a female predominance for death (24.5%). The male predominance for admission raises the issues of biological vulnerability of male neonates to infection which was found in some studies [19,20]. Also, this may be due to cultural and social factors, where male children are more likely to receive more medical care compared to females in the Yemeni society. Most admissions were during the first day after delivery (60.0%) and most deaths occurred in those cases,

which was 29.3% and decrease with increasing age. In this study, it was found that pneumonia, prematurity, and neonatal sepsis were the main causes of admissions (24.1%, 21.0%, and 19.7% respectively) [21,22].

The overall mortality in this study was 22.1%, which is nearly the same as what was reported in a local study by Banajeh et al. (20.4%) [23]. And another local study in Al-Gumhouri teaching hospital, Sana'a (23.2%) [15], and similar studies from Pakistan (23.6%) [17] and Nigeria (20.3%) [20]. However, this result is comparatively higher when compared to 4.7%, 15%, and 16.9% in studies carried out in Oman, Burkina Faso, and Nigeria, respectively [24]. The high mortality in this study could be attributed to many factors such as the fact that in current hospital services a largely rural population where traditional birth practices are still very common with improper birth care and a lack of well-trained staff. In addition, the lack of a referral system and delayed presentation of a pregnant mother for labor, and delayed presentation of a baby who needs admission after delivery to the hospital may be other factors that might lead to high mortality.

Prematurity, perinatal asphyxia, pneumonia, and neonatal sepsis were found to be the most common causes of mortality in this study. Similar findings were reported in a study from AL-Gumhouri teaching hospital, Sana'a, [15] and in a study from Pakistan by Manzar et al. [18], as well as that from South Africa by Hoque et al. [20]. Prematurity was the major health problem observed in our setting as is the case in many other developing countries [16]. It was the leading cause of admission (34.4%). This can be attributed to many causes such as poor maternal health status, poor antenatal care, and low socioeconomic status of the families. Appropriate antenatal care, good obstetric practices, proper 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 [25].

Neonatal sepsis is one of the main causes of neonatal morbidity and mortality in developing countries. In the current study, neonatal sepsis accounted for 57 (19.7%) and 7(12.3%) of neonatal morbidity and mortality, respectively. These findings are consistent with recent studies from the year 2010 and from developing countries such as those Nigeria, Burkina Faso, and India [15,21,25]. However, a higher incidence of neonatal morbidity and mortality, due to sepsis, has been observed in a study from Pakistan by Manzar et al. [18]. Home deliveries, poor obstetric care, and un-sterile delivery practices could be responsible for high morbidity and mortality from sepsis in most developing countries [21]. Also, the lack of some investigations in our hospital such as metabolic screening and diagnostic facilities may affect the diagnosis of neonatal sepsis.

Perinatal asphyxia remains an important cause of neonatal morbidity and mortality in developing countries, a fact which this study also confirms where perinatal asphyxia was the fourth most common cause of admission 16.2%, and was the second common cause of death (31.9%). The same result has been reported from Pakistan by Seyal et al. and the second most common cause of death in another study from Pakistan by Tasneem et al. [17]. However, a study from Nigeria showed that the main cause of admission (27%) was perinatal asphyxia. Basic training on newborn resuscitation skills and proper newborn resuscitation immediately after birth has proven to reduce mortality among babies born with perinatal asphyxia by up to 40%.

Of the 64 deaths in this study, 61 (24.8%) occurred during the first week of life, with 51 (29.3%) of them occurring during the first 24 hours. This is consistent with several studies which were done in our country and in several countries [15,16,18,22,25]. This could be due to the critical condition of these admissions at the time of presentation to the hospital. In addition, this period is a highly vulnerable time for the neonate who is completing many of the physiological adjustments required for extra uterine existence. Because this study was done during the cold weather, the admission cases due to neonatal pneumonia represent the most common cause of admission (24%) and the third most common cause of mortality (17.1%).

The weight of patients has an important role in mortality as most death occur in extremely low weights (<1000 g) which was 75% of this group. For more than 25 years, LBW has been observed to be one of the major risk factors for neonatal admissions in multiple studies conducted in many developing countries [14]. In comparison between the delivery in hospital and out hospital regarding neonatal mortality rate, the mortality was higher among those born at home (22.7%). This is consistent with what was reported by many other studies that included both inborn and out born neonates. This is because most of the deliveries are usually carried out by unskilled persons under unhygienic conditions, as well as the delay in reaching the health facility. The independent risk factors of neonatal mortality were age at admission, out born delivery, low birth weight, and preterm delivery and were found to be significant independent risk factors of mortality in this study. These factors can be avoided by through improving the quality of antenatal care, maternal nutrition, and health awareness among families. As well as promotion of institutional delivery with good intrapartum and postpartum care.

Conclusion

According to this study, Pneumonia, prematurity, and neonatal sepsis were the main causes of admissions (24.1%, 21.0%, and 19.7% respectively) to NCU. Most of the deaths in this study occurred during the first week of life, with most of them occurring during the first 24 hours. The first step in improving neonatal survival is to document the number and rate of deaths and identify their common causes.

Most of the morbidities and subsequently the mortalities can be prevented by improving and effective implementation of important preventive services like maternal care and IMNCI, timely interventions, and timely referral to nursery care centers for high-risk pregnancies and care of neonates in high-risk situations.

Recommendation

There is a necessary need to increase the facilities and health care workers to decrease in neonatal mortality rate by providing better nursing care in the tribal regions.

Acknowledgments

The authors would like to thank all study participants and health staff at TUWTH in Dhamar governorate for their active cooperation during the entire study.

Funding

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit section.

Conflicts of interest

The authors declare that there are no conflicts of interest.

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