Original article

Pattern of admission and outcome of neonates admitted to tertiary care neonatal ICU

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ABSTRACT

Background: In the last two decades, the neonatal mortality and morbidity profile has reportedly improved due to better critical care facilities worldwide and neonatal mortality fell by 49%. However, in Pakistan, neonatal morbidity and mortality is still a major health problem and recent estimates has reported -0.33% per annum in Pakistan. It is important that the changed picture of neonatal morbidity and mortality should be determined. This study aims to assess the pattern of admission and outcome of neonates admitted to tertiary care neonatal intensive care unit of a tertiary care hospital in Rawalpindi.

Subjects and methods: A cross-sectional study was conducted at the Neonatal Unit of the Military Hospital, Rawalpindi from January till June 2018. All consecutive neonates admitted in neonatal unit irrespective of gender were enrolled. The outcome of the admission in terms of discharge, expired or Left against medical advice (LAMA) were noted along with the baseline characteristics like age, gender, weight, gestational age, mode and place of delivery of the neonates.

Results: Of 1922 neonates admitted in the study period, male preponderance was observed (63.2%). Most common reason for admission in neonates was preterm (n=445, 23.2%), followed by neonatal sepsis (n=405, 21.1%), and transient tachypnea of newborn in 248 (12.9%). Preterm was the most common diagnosis in both males and females, i.e. 265 (22%) and 180 (25%) respectively. Mortality was observed in 266 (13.8%) neonates while LAMA in 10 (0.5%) neonates. A significant difference in outcome was found with the diagnosis of the neonates (p-value <0.001).

Conclusion: The finding of this study has reported preterm, neonatal sepsis, and transient tachypnea of newborn as the most common reason for neonatal admission. Further studies are recommended to validate these findings and find out predictors of improved survival.

Keywords:

Indication, Outcome, Neonates, Intensive Care Unit

INTRODUCTION

Neonatal period, the first 28 days of life, is the most vulnerable time for the survival of newborn.[1] The efficient health care services of a country are categorized from neonatal morbidity and mortality.[2-4] Studies reported around 3 million mortality in neonates observed during this period, amounting to total of 45% of under-five deaths worldwide.[3,4] Development towards mitigating child mortality increased but remain inadequate to accomplish Millennium Development Goals since its establishment.[1,5] From a global perspective, an estimated 12.6 million children under 5 years died in 1990. However a marked reduction in these figures is noted by the international community on the Sustainable Development Goals with the end of Millennium Development Goals era in 2015.[3,6,7]

Moreover, it has been identified globally that reduction in mortality among children less than five-years is utmost important to achieve the sustainable development goals.[8,9]

Most studies reported that neonatal deaths are accounted to preterm births, birth asphyxia, and infections, globally.[1,3,6] Pakistan is included among countries experiencing significantly increased neonatal deaths.[3,4] In a recently published study reporting the national demographic health survey it was reported that the annual rates of reduction for child mortality among neonates was -0.33% per annum, 3.13% per annum among post-neonatal, 0.9% per annum for infant, 2.47% per annum for child, and 1.19% per annum for under five.[4] These figures point toward the relatively slow progress in improved maternal and child care and provision of better health care facilities in order to reduce under-five mortality.[4] Around 87% neonatal deaths in Pakistan are reported to be due to the asphyxia, infection, and prematurity.[3,4]

Conflict of interest: The authors declared no conflict of interest exist.

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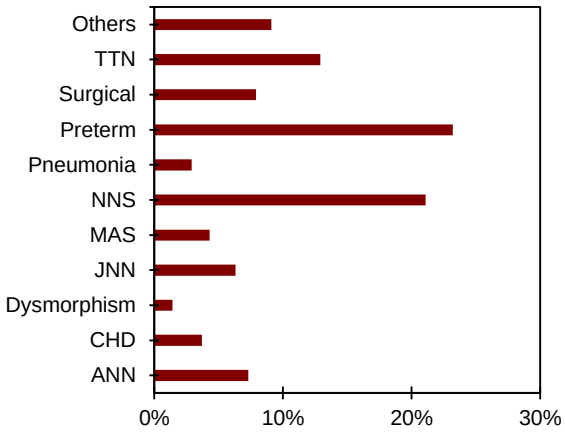

Figure 1. Frequency of diagnosis (n=1922)

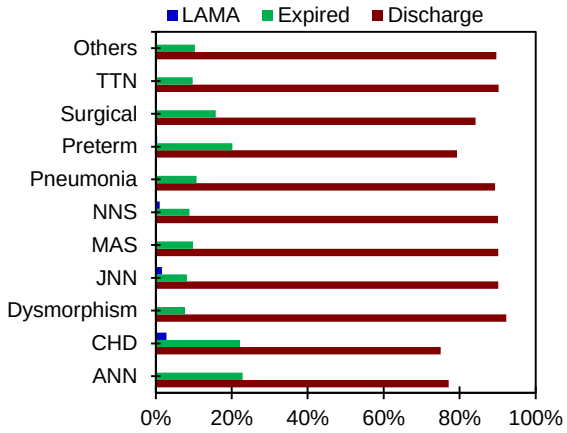

Figure 2. Comparison of diagnosis with the outcome of the neonates (n=1922)

This study aims to evaluate the pattern of neonatal admission to neonatal intensive care and outcome of admission. This will help to further analyze the findings of previous reports and encourage future researchers to perform large scale studies to find out the predictors of survival in neonatal intensive care admissions.

SUBJECTS AND METHODS

A cross-sectional study was conducted at the Neonatal Unit of the Military Hospital, Rawalpindi from January to June 2018. This tertiary care unit with adequately supplied advanced electromedical equipment such as up-to-date mechanical ventilation methods, HFOV, Tecotherm machine, Surfactant availability and monitoring devices. This unit is '70 'bedded and is being run by multidisciplinary team of well qualified doctors and highly trained nursing staff and medics. The major number of neonates referred to this unit belong to the associated 300 bedded Gynecology and obstetrics department of same hospital which receives almost 60 admissions per day. The approval from the institutional review board of the hospital was obtained prior to the initiation of the study. The study included consecutive neonates irrespective of gender that were hospitalized. All the information was collected from admission register of the unit. Diagnosis of all variables were based on radiological, clinical and laboratory findings. Live born infants delivered before 37 weeks from first day of last menstrual period were termed as premature. The delayed cry at the time of birth was used for the diagnosis of birth asphyxia. Comprehensive blood count with platelets, urine or cerebrospinal fluid, urine culture, C-Reactive Proteins and positive blood culture were used to diagnose sepsis. The history, examination, X-ray and echocardiography were used for congenital heart disease. Loose watery stools described acute watery diarrhea. In addition, the history of being born through meconium stained amniotic fluid, chest radiograph, and respiratory distress were used to diagnose meconium aspiration syndrome. Clinical and radiological findings were used to diagnose pneumonia. The diagnosis of neonatal jaundice was made on the basis of age, weight, gestation specific range after evaluation of serum bilirubin in pathological zone. Neonates with different syndromic features and anomalies were included in congenital malformations. Data were analyzed using SPSS v. 22. Frequencies and percentages were used to present qualitative variables like age categories, gender, weight categories, gestational age, diagnosis, mode of delivery, and place of delivery. Chi-square test was also applied to see the association of outcome with diagnosis. A p-value of <0.05 taken as significant.

RESULTS

Of 1922 neonates, the mean age of the neonates was 3.03 ±4.96 days. Majority of the neonates (n=1362, 70.9%) were presented with ≤1 day, 394 (20.5%) with 2-10 days, and 166 (8.6%) with >10 days of age. Majority of the neonates (n=1214, 63.2%) were males as compared to females (n=708, 36.8%). The median weight of the neonates was 2.51 ±0.74 kg. Most of the neonates were presented with ≤2.5 kg of weight (n= 1018, 53%). The median gestational age was 34.78 ±3.51 weeks. There were 1064 (55.4%) neonates with ≤35 weeks of gestational weeks.

The commonest causes of admission were preterm (n=445, 23.2%), followed by neonatal sepsis (n=405,

Table 1. Descriptive analysis of the neonates (n=1922)

Characteristics	*n* (%)
Age (days [mean ±SD])	3.03±4.96
≤1	1362 (70.9)
2-10	394 (20.5)
>10	166 (8.6)
Gender	
Male	1214 (63.2)
Female	708 (36.8)
Weight (kg [mean±SD])	2.51±0.74
≤2.5	1018 (53)
>2.5	904 (47)
Gestational age (weeks [mean ±SD])	34.78±3.51
≤35	1064 (55.4)
>35	858 (44.6)

21.1%), transient tachypnea of newborn in 248 (12.9%), surgical 152 (7.9%), neonatal jaundice in 122 (6.3%), meconium aspiration syndrome in 82 (4.3%), congenital heart disease in 72 (3.7%), pneumonia in 56 (2.9%), dysmorphism in 26 (1.4%), while 174 (9.1%) neonates had miscellaneous reasons for hospital admission (Figure 1). The lower segment caesarean section delivery mode was observed in majority of the neonates, i.e. 1284 (66.8%) while spontaneous vaginal delivery was observed in 638 (33.2%) neonates. The mortality was observed in 266 (13.8%) neonates while LAMA in 10 (0.5%) neonates.

The comparison of diagnosis with general characteristics showed that majority of the neonates with ≤1 day of age had preterm and neonatal sepsis, i.e. 296 (21.7%) and 306 (22.5%) respectively. Preterm was the most common diagnosis in both males and females, i.e. 265 (22%) and 180 (25%) respectively. Similarly, other variables like weight, gestational age, and mode of delivery was also found higher in neonates having preterm diagnosis (Table 1). A significant difference of outcome was found with diagnosis of the neonates (p-value <0.001) (Figure 2).

DISCUSSION

In this study, reasons for hospital admission in majority of the neonates was preterm, followed by neonatal sepsis, transient tachypnea of the newborn, surgery, neonatal jaundice, meconium aspiration syndrome, congenital heart disease, pneumonia, and dysmorphism. Various other studies have also reported preponderance of preterm as the leading cause of admission.[10-14] Qaddusi and associates and Ali and coauthors reported that preterm comprised of on average 20% of neonatal admissions.[15,16] However, in contrast to these findings, Shakya and coworkers and Narayan and group reported lower number of preterm neonates, i.e. 10.8% and 13% respectively.[12,17]

Neonatal sepsis is found higher among neonates in this study. Neonatal sepsis is said to have always been a significant task for caregivers, particularly in low and middle income countries.[18] In a study conducted by Kanodia and group, neonatal sepsis is reported as 35%, Bucens and coauthors reported 38% whereas Seoud and colleagues reported 23% frequency of neonatal sepsis.[19-21] These percentages are somewhat higher as compared to the current study.

The mortality was observed in 14% of the neonates in this study. In particular, mortality was observed higher among neonates with birth asphyxia, followed by congenital heart disease, and preterm. Yasmeen and coworkers also revealed similar figures of neonatal mortality.[22] However, prematurity was the leading cause of death among preterm neonates, followed by asphyxia, and sepsis in their study.[22]

Left again medical advice cases were observed in ten neonates which constitutes less than one percent. Studies conducted by Al-Turkistani and coworkers, Quddusi and associates and Aijaz and coauthors have revealed minimum proportion of Left again medical advice cases as 1.6% and maximum proportion as 25.4%.[15,23,24] This proportion of Left again medical advice cases may depend upon the availability of healthcare resources, services and socioeconomic circumstances. Studies have reported varying reason for discontinuation of medical treatment against medical advice which may include personal, dissatisfaction with healthcare services, another hospital preference, bad hospital environment, and lack of communication/mistreatment/negligence by healthcare staff. Moreover, financial constraint could also be the reason in low- and middle-income countries. Higher proportion of males were observed in this study, which is comparable to previous reports.[15,22] In addition to this, Yasmeen and colleagues also reported two times more male admission than that of females. This may be hypothesized that male babies are given more importance and thus seek more medical care and ultimately a higher chance of reporting as neonatal admission. The exact reason for the higher proportion of males remain unclear and needs to be further elucidated.[22] Findings of this study have the limitation that certain important variables were not included in this study. It includes; socio-economic circumstances. Furthermore, this study also failed to collect data ventilator support finding. Lastly, no follow-up was conducted after discharge in the study.

Table 2. Comparison of diagnosis with general characteristics of the neonates (n=1922)

	ANN (n=140)	CHD (n=72)	Dysmorphism (n=26)	JNN (n=122)	MAS (n=82)	NNS (n=405)	Pneumonia (n=56)	Preterm (n=445)	Surgical (n=152)	TTN (n=248)	Others (n=174)
Age, days											
≤1	96 (7)	44 (3)	16 (1)	80 (6)	68 (5)	296 (22)	36 (3)	306 (22)	102 (8)	190 (14)	128 (9)
2-10	36 (9)	18 (5)	2 (0.5)	36 (9)	12 (3)	69 (18)	10 (3)	101 (3)	34 (9)	42 (11)	34 (9)
>10	8 (5)	10 (6)	8 (5)	6 (4)	2 (1)	40 (24)	10 (6)	38 (23)	16 (10)	16 (10)	12 (7)
Gender											
Male	106 (9)	48 (4)	8 (1)	68 (6)	52 (4)	259 (21)	34 (3)	265 (22)	106 (9)	160 (13)	108 (21)
Female	34 (5)	24 (3)	18 (3)	54 (8)	30 (4)	146 (21)	22 (3)	180 (25)	46 (7)	88 (12)	66 (9)
Weight, kg											
≤2.5	52 (5)	32 (3)	18 (2)	52 (5)	26 (3)	186 (18)	12 (1)	410 (40)	54 (5)	108 (11)	68 (7)
>2.5	88 (10)	40 (4)	8 (1)	70 (8)	56 (6)	219 (24)	44 (5)	35 (40	98 (11)	140 (16)	106 (12)
Gestational age, weeks											
≤35	70 (7)	42 (4)	8 (1)	76 (7)	62 (6)	202 (19)	26 (2)	234 (22)	84 (8)	170 (16)	90 (9)
>35	70 (8)	30 (4)	18 (2)	46 (5)	20 (2)	203 (24)	30 (4)	211 (25)	68 (8)	78 (9)	84 (10)
Mode of delivery											
LSCS	48 (4)	46 (4)	20 (2)	66 (5)	56 (4)	257 (20)	16 (1)	333 (26)	102 (8)	240 (19)	100 (8)
SVD	92 (14)	26 (4)	6 (1)	56 (9)	26 (4)	148 (23)	40 (6)	112 (18)	50 (8)	8 (1)	74 (12)
Place of delivery											
Indoor	100 (8)	24 (2)	18 (1)	56 (4)	64 (5)	245 (19)	22 (2)	413 (31)	68 (5)	208 (16)	104 (8)
Outdoor	40 (7)	48 (8)	8 (1)	66 (11)	18 (3)	160 (27)	34 (6)	32 (5)	84 (14)	40 (7)	70 (12)

ANN: Asphyxia nonatorum, **CHD:** Congenital heart disease, **JNN**: Jaundice neonatorum, **MAS:** Meconium aspiration syndrome, **TTN:** Transient tachypnea of the newborn, **LSCS:** lower segment caesarean section, **SVD:** Spontaneous vaginal delivery

CONCLUSION

The finding of this study has reported preterm, neonatal sepsis, and transient tachypnea of the newborn as most common reason for neonatal admission. Further studies are recommended to validate the findings keeping certain important predictor variables like admission in first 24 hours of life, and socio-economic circumstances as well.

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