



Quality Audit to Evaluate Readmission Rates and Underlying Risk Factors at Neonatal Intensive Care Unit of a Tertiary Care Hospital, Karachi - A Retrospective Study

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Abstract

Background: Neonates graduates usually experience re-admissions to hospital. Preterm neonates have 3-4 times more risk for readmissions following discharge compared to the term counterparts. There are several challenges to study readmissions and associated factors with within the neonatal populations, which include high hospital transfer rate during birth hospitalization. Nearby 50% of an infant's faces readmissions in their first 2 years of life. Also, there are wide range of reasons for initial NICU admissions and identifying the appropriate follow-up interval to capture re-admission following discharge has proven difficult and high variability.

Objective: To investigate the current status of unplanned readmissions of neonates after discharge from Neonatal Intensive Care Unit (NICU) and identify the associated risk factors.

Methods: This retrospective observational study included a total 511 neonates that were discharged from NICU and those who were readmitted neonate during the study period in NICU was extracted and analyzed as per gestational age, birth weight, diagnosis etc. For the association between neonatal demographics (fixed risk factors) and complications with hospital status chi-square test was used. Univariate & Multivariable logistic regression technique was used to estimate adjusted odds ratios (ORs) and 95% confidence interval (CI).

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Result: Total readmissions during our study period were 10.7% (n=55/511) out of which majority were male neonates 56.2% (n= 287/511). Of them, half of the population were full term babies 50.5%(n=258/511), followed by babies who were late pre term 22.1%(n=113/511), 11.7% (n=60/511) were moderate preterm, 9.4% (n=48/115) were very preterm and 6.3%(n=32/511) were in extreme pre-term category. While most of the neonates have normal birth weight 44.4%(n=227/511), 39.9%(n=204/511) have low birth weight, followed by very low birth weight 9.8% (n=50/511) and extremely low birth weight 5.9%(n=30/511). Mortality among readmitted neonates was 5.45% .

Conclusion: Neonates have higher risk of re-admissions after discharge from the NICU.

Most of readmitted neonates had low birth weight, while prematurity, neonatal jaundice and sepsis were most common reasons for readmission. Targeted discharge policies along with proper training of families and caregivers for care of premature, low birth weight neonates and early diagnosis for complications may result in reduction of readmissions rate and reduce burden on health care system.

Introduction

The first 28 days of life, commonly known as neonatal period, has a striking influence on a child's future physical and mental health. This period been the most crucial time of a child's life is also a very sensitive period. Worldwide, neonatal mortality was observed around 3 million in this period of life, entirely 45% of under-five deaths. The well-organized, systematic community care and medical management of a country is labelled from neonatal health care [1-3]. These readmissions in infants are the global concerns, having frequencies as high as 10.1% outside the United States, become very costly to patients, their families and also health care system [4,5].

Approximately twelve percent of live birth neonates get admitted in NICU [6]. Majority of these admissions are secondary to prematurity, sepsis, Respiratory Distress Syndrome (RDS) and asphyxia [7]. These babies are relatively higher risk and are also associated with increased mortality and morbidity. Around eight percent of neonates admitted to NICU, expire [7]. Even though the mortality and readmission rate of neonates have significantly dropped in recent years due to advances in antenatal surveillance, neonatal resuscitation and equipment, but still frequent readmissions of neonates have been observed. The readmission rate for developed countries like that of Croatia is 4.0% [8], and that of developing countries like India is 16.4% [9].

Discharge criteria for preterm babies in different NICU settings is when they are medically fit, feeding well on full feed, able to maintain body temperature independently, progressive weight gain and achieved weight of at least 1800gm, and family dynamics are supportive [10]. But in contrast, our NICU discharge criteria for preterm babies are weight of 1200gm, tolerating full tube feeding, vitally stable, parents are trained for care and feeding. Due to resource limitations in developing countries like Pakistan, most babies are discharged early, increasing the risk of readmission to NICU which significantly increased neonatal deaths [2]. There is also an association between length of stay on first admission with chances of getting readmitted [8]. Utmost, neonates mortality around 87% are reported due asphyxia, prematurity and infection in Pakistan [11].

There are several challenges to studying readmissions within the neonatal population, including a high hospital transfer rate during birth hospitalization making it difficult to differentiate continued birth hospitalizations versus readmissions. Despite these challenges, identifying modifiable predictors of readmission is crucial, so effective steps can be taken for families' post-discharge. Most of the studies done in NICU has focused more over the preterm or low birth weight neonates, but there is also a major chunk of NICU readmissions of term babies with congenital abnormality, sepsis or jaundice.

Pakistan is among the countries with highest neonatal mortality rate as number of neonatal facilities and services are limited. Public and private sector are also deprived in related research. Previous studies have investigated the incidence and causes of neonatal readmissions, with the little focus on the neonatal factors for readmission from Karachi, Sindh. So, this study will help us to determine the common risk factors of re-admission and its impact on our setting.

Operational definition

Readmission

As per National Guard Health Affairs (NGHA) Jeddah policy, an unplanned admission within 30 days of discharge is known as readmission [12].

Methodology

This retrospective observational study was conducted at neonatal intensive care unit at Sheikh Saeed Memorial Campus (SSMC) of Indus Hospital and Health Network (IHHN) Karachi over the 6 months' duration, from December 2020 to May 2021. All babies admitted in the neonatal intensive care unit and discharged electively were included. Patients who left against medical advice and/or discharged on request were excluded.

After IRB approval of Indus Hospital & Health Network, data was collected from electronic medical records and hospital management information system (HMIS) after permission. All included babies fulfilling inclusion criteria were evaluated for their gestational age, gender, birth weight, admission source and diagnostic categories etc. Readmission rates were calculated by the proportion of all re-admissions against all discharges during the study period. Also, the re-admissions were stratified as per gestational age, birth weight, length of the stay, diagnosis, number of re-admission, and cost of re-admissions. Outcomes including prolonged length of stay, mortality, and discharge status were measured against gestation, weight at discharge. Risk factors for possible re-admission were also determined in our study.

Statistical analysis

We examined basic demographics by using mean \pm standard deviation or median (interquartile range - IQR) for quantitative variables (age & length of the stay) and numbers and percentages for categorical variables (gender, birth weight, gestational age, hospital status and admission source). Normality of continuous variables was assessed by using shapiro-wilk test. For the association between factors and hospital status the chi-square test/fisher exact test was used. Furthermore, the univariate and multivariable logistic regression technique was used to estimate unadjusted and adjusted odds ratios (ORs) respectively with a 95% confidence interval (CI). A p-value less than or equal to 0.05 was considered statistically significant. All statistical calculations were carried out using SPSS version 26 (IBM, Armonk, NY, USA) software.

Table 1: Basic Demographics.

Age at admission (days)	N (%)
Median (IQR)	0.00 (0.00 -5.00)
Gender	
Female	224 (43.8%)
Male	287 (56.2%)
Birth weight	
Extremely LBW (<1000 gram)	30 (5.9%)
Very LBW (<1500 gram)	50 (9.8%)
LBW (< 2500 gram)	204 (39.9%)
Normal Birth Weight (>2500 gram)	227 (44.4%)
Gestational Age	
Extreme Preterm (<28 weeks)	32 (6.3%)
Very Preterm (28-32 weeks)	48 (9.4%)
Moderate Preterm (32-34 weeks)	60 (11.7%)
Late Preterm (34-37 weeks)	113 (22.1%)
Term (>37 weeks)	258 (50.5%)
Length of stay	
Median (IQR)	3.00 (2.00 -5.00)
Hospital status	
Admission	456 (89.2%)
Readmission	55 (10.8%)
Admission source	
Outborn	114 (22.3%)
Inborn	397 (77.7%)

Median (IQR): Median (Interquartile Ranges); LBW: Low Birth Weight.

Ethical considerations

Subjects who met the inclusion and exclusion criteria were selected. Confidentially and anonymity of all patients were maintained throughout the study, no names or numbers were documented any were. Only the research team had an access to the data during the study and after completion, furthermore the information and records were only utilized for research purposes.

Ethical approval was sought from the Institutional Review Board (IRB) of Indus Hospital & Health Network. As this was a retrospective study, ethical consent form was not required. (Ref # IHNN_IRB_2022_04_015).

Results

During our study period, a total of 506 admissions were done, of which 3 neonates expired during their first admission. While total discharges were 511, which also included already admitted neonates at start of this study.

Out of all the discharges done, The median age of the study participant was 0.00 (0.00 -5.00) days with their median length of the stay was 3.00 (2.00 -5.00). Almost half of the study participants were males (n =287, 56.2%). Furthermore, the inborn admission source was more (n=397,77.7%) as compare to out born (n=114,22.3%). The majority of the neonates in the study were admitted only one time (n=456,89.2%) as compare to re-admission status was (n=55,10.8%). These discharges were also stratified against birth weight including (n=227,44.4%) normal birth weight, (n=204,39.9%) low birth weight, (n=50,9.8%) very low birth weight, following to the extreme low birth weight babies was (n=30,5.9%). Further gestational stratification was done

on the basis of term (n=258,50.5%), late preterm 113(22.1%), moderate preterm (n=60,11.7%), very preterm (n=48,9.4%) and extremely preterm neonates (n=32,6.3%) (Table-1).

Table 2: Association of hospital status with basic demographics.

Characteristics	Admission N = 456 (%)	Re-admission N = 55 (%)	P-value
Age at admission (days)			
>28 days	14 (3.1%)	11 (20.0%)	<0.0001*
<28 days	442 (96.9%)	44 (80.0%)	
Gender			
Female	202 (44.3%)	22 (40.0%)	0.54
Male	254 (55.7%)	33 (60.0%)	
Length of stay (days)			
>30 days	19 (4.2%)	0 (0.0%)	0.24
<30 days	437 (95.8%)	55 (100%)	
Extremely LBW (<1000 gm)			
No	428 (93.9%)	53 (96.4%)	0.76
Yes	28 (6.1%)	2 (3.6%)	
Very LBW (<1500 gm)			
No	415 (91.0%)	46 (83.6%)	0.08
Yes	41 (9.0%)	9 (16.4%)	
LBW (< 2500 gm)			
No	280 (61.4%)	27 (49.1%)	0.07
Yes	176 (38.6%)	28 (50.9%)	
Normal Birth Weight (>2500 gm)			
No	245 (53.7%)	39 (70.9%)	0.01*
Yes	211 (46.3%)	16 (29.1%)	
Extreme Preterm (<28 weeks)			
No	428 (93.9%)	51 (92.7%)	0.76
Yes	28 (6.1%)	4 (7.3%)	
Very Preterm (28-32 weeks)			
No	417 (91.4%)	46 (83.6%)	0.06
Yes	39 (8.6%)	9 (16.4%)	
Moderate Preterm (32-34 weeks)			
No	406 (89.0%)	45 (81.8%)	0.11
Yes	50 (11.0%)	10 (18.2%)	
Late Preterm (34-37 weeks)			
No	358 (78.5%)	40 (72.7%)	0.32
Yes	98 (21.5%)	15 (27.3%)	
Term (>37 weeks)			
No	215 (47.1%)	38 (69.1%)	0.002*
Yes	241 (52.9%)	17 (30.9%)	
Admission source			
Outborn	107 (23.5%)	7 (12.7%)	0.07
Inborn	349 (76.5%)	48 (87.3%)	

*significance at 5%, LBW: low birth weight

Neonates who had age < 28 days significantly report readmission (p = <0.0001, 44/55 = 80.0%) as compare to neonates who's age was >28 days. Also, It was found that the participants who hadn't normal birth weight were more prone for readmission (p=0.01, 39/55=70.9%). Furthermore, the occurrence of readmission status was found to be significant in neonates who were not full term baby. (p=0.002, 38/55=69.1%) (Table 2).

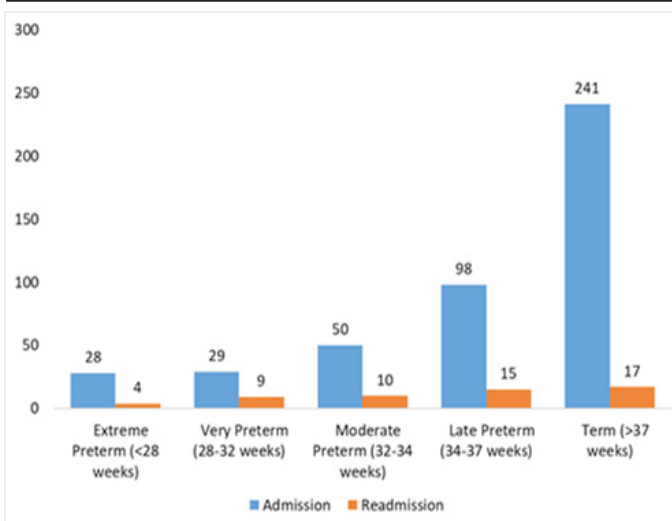


Figure 1a: Distribution of gestational age among admission and readmissions.

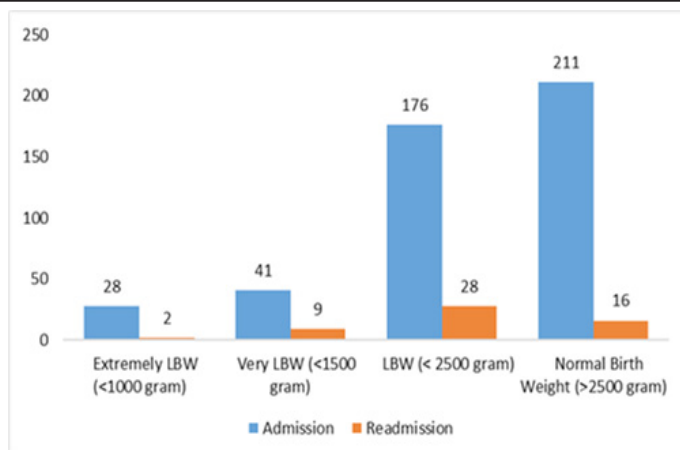


Figure 1b: Distribution of birth weight among admission and readmissions.

Table 3: Association of hospitalization status with neonatal complications.

Complications	Admission N = 456 (%)	Re-admission N = 55 (%)	P-value
Acute Gastro Enteritis (AGE)			
No	455 (99.8%)	54 (98.2%)	0.20
Yes	1 (0.2%)	1 (1.8%)	
Acute Kidney Injury (AKI)			
No	448 (98.2%)	55 (54.1%)	1.00
Yes	8 (1.8%)	0 (0.0%)	
Anemia			
No	454 (99.6%)	49 (89.1%)	<0.0001*
Yes	2 (0.4%)	6 (10.9%)	
Congenital Heart Diseases (CHD)			
No	441 (96.7%)	52 (94.5%)	0.42
Yes	15 (3.3%)	3 (5.5%)	
Feeding Problem			
No	447 (98.0%)	53 (96.4%)	0.33
Yes	9 (2.0%)	2 (3.6%)	
Hypnatremic Dehydration			
No	445 (97.6%)	53 (96.4%)	0.64
Yes	11 (2.4%)	2 (3.6%)	
Hypoxic Ischemic Encephalopathy (HIE)			
No	440 (96.5%)	54 (98.2%)	1.00
Yes	16 (3.5%)	1 (1.8%)	
Infant of Diabetic Mother (IDM)			
No	375 (82.2%)	50 (90.9%)	0.10
Yes	81 (17.8%)	5 (9.1%)	
Meconium Aspiration Syndrome (MAS)			
No	438 (96.1%)	55 (100%)	0.24
Yes	18 (3.9%)	0 (0.0%)	
Neonatal Jaundice (NNJ)			
No	291 (63%)	26 (47.3%)	0.01*
Yes	165 (36%)	29 (52.7%)	
Intra Uterine Growth Restriction (IUGR)			

No	444 (98.2%)	54 (98.2%)	1.00
Yes	12 (2.6%)	1 (1.8%)	
Neural Tube Defects (NTDs)			
No	451 (98.9%)	55 (100%)	1.00
Yes	5 (1.1%)	0 (0.0%)	
Necrotizing Enterocolitis (NEC)			
No	439 (96.3%)	54 (98.2%)	0.70
Yes	17 (3.7%)	1 (1.8%)	
Pneumonia			
No	443 (97.1%)	51 (92.7%)	0.09
Yes	13 (2.9%)	4 (7.3%)	
Prematurity			
No	256 (56.1%)	39 (70.9%)	0.03*
Yes	200 (43.9%)	16 (29.1%)	
Large of gestational age (LGA)			
No	452 (99.1%)	55 (100%)	1.00
Yes	4 (0.9%)	0 (0.0%)	
Uro-sepsis			
No	448 (98.2%)	53 (96.4%)	0.29
Yes	8 (1.8%)	2 (3.6%)	
Sepsis			
No	305 (66.9%)	43 (78.2%)	0.09
Yes	151 (33.1%)	12 (21.8%)	
Surgical causes			
No	422 (92.5%)	55 (100%)	0.03*
Yes	34 (7.5%)	0 (0.0%)	
Respiratory Distress Syndrome (RDS)			
No	399 (87.5%)	55 (100%)	0.005*
Yes	57 (12.5%)	0 (0.0%)	
Intraventricular Hemorrhage (IVH)			
No	451 (98.9%)	55 (100%)	1.00
Yes	5 (1.1%)	0 (0.0%)	
Primary Persistent Pulmonary Hypertension (PPHN)			
No	449 (98.5%)	55 (100%)	1.00
Yes	7 (1.5%)	0 (0.0%)	
Transient Tachypnea Of Newborn (TTN)			
No	442 (96.9%)	55 (100%)	0.38
Yes	14 (3.1%)	0 (0.0%)	
Syndromic Baby			
No	452 (99.1%)	54 (98.2%)	0.43
Yes	4 (0.9%)	1 (1.8%)	
Hemolytic Disease of Newborn (HDN)			
No	453 (99.3%)	55 (100%)	1.00
Yes	3 (0.7%)	0 (0.0%)	
Others			
No	437 (95.8%)	55 (100%)	0.24
Yes	19 (4.2%)	0 (0.0%)	

*significance at 5%

Among these initial 511 discharges, a total of 55 neonates got admitted in NICU again. Overall, the most common diagnosis among these discharges were prematurity (47.3%), following to neonatal jaundice (42.5%) and sepsis (35.7%).

With respect to developing complication, more than half of the neonates who were admitted with neonatal jaundice significantly reports readmissions as compare to those who hadn't neonatal jaundice. (p=0.01, 29/55= 52.7%) Likewise, those neonates who had develop anemia had significantly report readmission as compare to those who did not suffer from anemia. (p<0.0001, 6/55=10.9%). We had also found that premature birth is the leading cause of admissions of neonates in NICU, of which out of 55 neonates 16 neonates were readmitted due to prematurity. (p<0.03, 16/55=29.1%).

In the univariate and also multivariable model, the neonatal readmissions in NICU was found to be significantly associated with age. With an increased age, there was a 8% less chances of readmission in NICU as compared to those neonates who had

a younger age at the time of admission. OR=0.92 (95% CI= 0.89 – 0.95). The birth weight of the neonate was also found to be significantly associated with readmissions at NICU. Similarly, with an increased birth weight, there was 99% less chances of getting readmissions as compared to those with very low birth weight (<1500 gm). OR= 0.01 (95% CI= 0.01 – 0.32). Likewise, neonates who had low birth weight (< 2500gm) or normal birth weight (> 2500gm) were slightly significantly associated with re-admission status respectively. OR= 0.002 (95% CI= 0.00 – 0.16) & OR= 0.003 (95% CI= 0.00 -0.19).

Statistically we found that, as compare to neonates who were full term (>37 weeks), had 2.50 times (95% CI=1.37-4.56) elevated risk for getting readmission in NICU. After adjusting confounders, the association remained robust. We found that the neonates with gestational age > 37weeks had 12 times higher odds of readmissions. OR=12.40 (4.04 – 37.98) these above findings are almost inverse clinically. Clinically it is observing that the participants who have gestational age < 37 weeks have traditionally higher prevalence of readmissions.

Table 4: Association of patient's basic demographics with Hospital status.

	Unadjusted OR (95% CI)	P-value	Adjusted OR (95% CI)	P-value
Age at admission (days)	0.94 (0.93 – 0.96)	<0.0001*	0.92 (0.89-0.95)	<0.0001*
Gender	0.83 (0.47 – 1.48)	0.54	-	-
Extremely LBW (<1000 gm)	1.73 (0.40 – 7.48)	0.46	-	-
Very LBW (<1500 gm)	0.50 (0.23 -1.10)	0.08*	0.01 (0.01 – 0.32)	0.008*
LBW (< 2500 gm)	0.60 (0.34 -1.06)	0.08*	0.007 (0.00 – 0.16)	0.002*
Normal Birth Weight (>2500 gm)	2.09 (1.14 -3.86)	0.01*	0.007 (0.00 -0.19)	0.003*
Extreme Preterm (<28 weeks)	0.83 (0.28 – 2.47)	0.74	-	-
Very Preterm (28-32 weeks)	0.47 (0.21-1.04)	0.06*	0.52 (0.11- 2.38)	0.40
Moderate Preterm (32-34 weeks)	0.55 (0.26 – 1.16)	0.12*	0.96 (0.31- 2.96)	0.94
Late Preterm (34-37 weeks)	0.73 (0.38 – 1.37)	0.33	-	-
Term (>37 weeks)	2.50 (1.37-4.56)	0.003*	12.40 (4.04 – 37.98)	<0.0001*
Admission source	0.47 (0.20 – 1.08)	0.07*	0.45 (0.16-1.31)	0.14

OR: Odds Ratio using binary logistic regression; C.I: Confidence Interval; *significance at 5%, LBW: Low birth weight.

Table 5: Association of neonatal complications with Hospital status.

	Unadjusted OR (95% CI)	P-value	Adjusted OR (95% CI)	P-value
AGE	0.11 (0.007 – 1.92)	0.13*	0.34 (0.007 – 18.08)	0.59
Uro-sepsis	0.47 (0.09 – 2.28)	0.35	-	-
CHD	0.59 (0.16 – 2.10)	0.41	-	-
HIE	1.96 (0.25 – 15.10)	0.51	-	-
IDM	2.10 (0.83-5.58)	0.11*	1.05 (0.36 – 3.06)	0.92
IUGR	1.45 (0.18 – 11.44)	0.71	-	-
NEC	2.09 (0.27 – 16.02)	0.47	-	-
Anemia	0.03 (0.007-0.18)	<0.0001*	0.36 (0.02-4.62)	0.43
NNJ	0.50 (0.29 – 0.89)	0.01*	0.27 (0.12 – 0.60)	0.001*
Feeding Problem	0.53 (0.11 -2.53)	0.42	-	-
Hypnatremic Dehydration	0.65 (0.14 – 3.03)	0.58	-	-
Pneumonia	0.37 (0.11 – 1.19)	0.09*	0.66 (0.09-4.42)	0.67
Prematurity	1.90 (1.03 – 3.50)	0.03*	14.34 (5.27 – 38.95)	<0.0001*
Sepsis	1.77 (0.90-3.46)	0.09*	1.12 (0.45 – 2.77)	0.80
Syndromic Baby	0.47 (0.05 – 4.35)	0.51	-	-

OR: Odds Ratio using binary logistic regression; C.I: Confidence Interval; *significance at 5%; LBW: Low birth weight; AGE: Acute Gastro Enteritis; CHD: Congenital Heart Diseases; HIE: Hypoxic Ischemic Encephalopathy; IDM: Infant of Diabetic Mother; IUGR: Intra Uterine Growth Restriction; NEC: Necrotizing Enterocolitis; NNJ: Neonatal Jaundice.

In our study, it was found that the neonates who were admitted with the complication of jaundice had 27% higher risk of getting readmission at NICU. Furthermore, neonates who were admitted with prematurity were prone to be 14 times higher odds of getting readmit in NICU.

Table 6: Basic Summary of readmission data.

Most common reason of admission	Prematurity (47.3%), neonatal jaundice (42.5%) and sepsis (35.7%).
Total number of patients readmitted	55
Total number of male patients	33(60%)
Average age at time of admission (days)	17.8
Average weight at time of admission (grams)	2008
Length of stay	2.1 days
Average hospital cost	PKR. 30,570
Discharge	52
Expired	3

Among these initial 511 discharges, a total of 55 neonates got re-admitted once only, while 9 got readmitted more than once. There was a male predominance (60.0%) among these readmissions. The average weight of neonates on readmission was 2008 grams & average length of stay was 2.1 days. The most common cause on readmission was prematurity followed by neonatal jaundice and then sepsis. It was also observed that almost half of these neonates got readmitted within one week of discharge and while the other half presented after one week of discharge. We had also calculated the cost of hospital stay for each patient with the help of our hospitals finance department. The average cost of hospital stay that we found on first readmission was estimated to be 173.19 USD (PKR 30,570). Out of them, 52 participants were discharge and 3 participants were expired.

Discussion

The results of our study shows that most newborns were re-admitted on 5th day of life. While in the study done at NICU of Kharadar General Hospital showed that most neonates admitted were 3.5 days old [13]. We reported in our study that the most common cause for readmission was prematurity followed by the neonatal jaundice and sepsis. Indeed, it was also comparable to the study done by Eyeberu et al that the most common cause of re-admission is pre-maturity as the neonate's organ are under-developed therefore, they are more prone to infections and dysfunctionality [14]. The incidence of NICU re-admission in Indus Hospital Karachi was found to be prematurity followed by neonatal jaundice. In contrast to that studies done in mid-eastern country, concluded that neonatal sepsis followed by the neonatal jaundice as most common cause of NICU readmissions [15], while in western countries like Croatia, respiratory tract infections followed by neonatal jaundice were most common reason [8]. In our study, the Interquartile range was given up to 5 days. Which is also comparable to the study done by Sidra Tanveer et al states the mean age of infants was 4.96 days in her study [11].

Limited data was available on NICU readmission rates in Pakistan which was outdated. Other causes like CHD (Congenital heart disease), HIE (Hypoxic-ischemic encephalopathy), Meconium Aspiration Syndrome (MAS) and Pneumonia are considered secondary reason of neonate morbidity rate and re-admission in NICU [11]. However, the above mention factors were found insignificant in our study. Developing countries like Pakistan are still struggling with morbidity and mortality of the neonates. Our findings add evidence to the literature on the male gender predominance for readmission status. Although previous work [12] did report the similar findings. One of the reasons for hospital readmissions are preterm babies. We were able to trace previous studies which had reported preponderance of preterm as the leading cause of admissions. Quddusi with co-authors and Ali et al reported that 20% of average neonatal admissions comprised of preterm neonates [16,17]. However, Shakya et al and Narayan et al reported lower number of preterm neonates i.e. 10.8% and 13% respectively [18,19]. Consist with previous studies, our study also found that readmissions were higher in preterm babies. We have also found that the readmissions were significantly associated with babies who fall in the categories of very low birth weight (< 1500 gm) and also low birth weight (< 2500 gm) that we can tentatively compare with the study findings done by Kathleen E. Hannan et al state that the rate of rehospitalization in low birth weight infants approach to 45% in the first 18-22 months. With reference to the neonatal complication, IDM, Anemia and Pneumonia was also found to be significant in the univariate analysis but in the multivariate it was found insignificant.

In our study the number of re-admissions is higher due to improper care at home due to low literacy rate. As per our observation the common risk factor for readmission was neonatal jaundice and weight loss in preterm babies. It is also observed that parents of preterm babies also frequently miss OPD visits as close follow ups are needed for such babies to keep check on weight trends and monitoring of complications of prematurity.

In our study, when interpreting the results some of the limitations should be considered.

This study is a single center, retrospective-study so the conclusions we obtained may vary by local practices. Moreover, no follow-up was conducted after discharge in the study. Our study is of limited time duration which limits this study's findings. Along with this our set up is a free of cost set up which is more approachable to lower socioeconomic class, which makes it tough to educated family and ensure standard care at home due to limited financial constraints of family. Also, we have a limited inpatient capacity, due to which we cater mostly to in-born neonates. Also, there is another important limitation we should kept consider, that may be small number of infants readmitted to their nearby hospital which were more close to their houses. However, empirically it was seen, that parents are more disposed to present their new-born on the bases of priorities to the hospital of birth in the region the author concentrated on.

Conclusion

The survival of preterm neonates of gestation age as low as 26 weeks has been possible over the last decade with rapid advancement in medicine. But this advancement comes with

an increased burden over NICU. A major portion of NICU admissions and readmissions consist of preterm neonates, as also seen in our study, with comparatively longer duration of stay.

This study shows readmissions rates of 10.7% over the duration of 6 months. The most common cause of readmission was prematurity, neonatal jaundice and sepsis. Keeping the certain important predictor variables like admission of neonate in the initial first 24 hours of life and socioeconomic circumstances, further studies are recommended to validate the findings.

Recommendation

Neonates are at high risk of bounce back and readmission after they are discharged from NICU. Community care in Pakistan is not optimistic, and home visits by health care providers are lacking which may increase burden on hospitals. There should be a complete program for the treatment of neonates in which the medical staff should have to pay attention to the associated factors for readmission including maintenance of good hygiene, understanding and monitoring of caregiver in proper handling and feeding of preterm, low birth weight babies and formulate targeted interventional steps, so as to decrease the rate of readmissions reduction in physical and financial burden on health care providers and improve the quality of life through proper medical services. Also, a bigger cohort study is needed to aid in determining the prevalence and associated factors further studies are required in Pakistan. Additionally, more studies are also needed in this field to enhance awareness and knowledge about neonatal care, support and factors associated with and complications developed by readmissions at NICU in the group of parents and guardians. Assessment of the factors related with readmission before the first discharge and post discharge follow-ups can decrease the rates of readmissions. This highlights the need of a better discharge policies targeted specifically for preterm and low birth weight neonates, which revolves around proper training of family, consistent frequent follow up visits, home team visit. Proper training of mothers on nursing the pre-mature baby can reduce the chances of re-admission.

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