Factors Leading to Newborn's Admission to Neonatal Intensive Care Unit & Their Outcome

Hiral Panchal[1], Dr. Rani Shetty[2]

[1]Department of Nursing, [2]Department of Nursing,
Maniba Bhula Nursing College, Uka Tarsadia University, Surat, Gujarat, India

Corresponding Author: Hiral Panchal

ABSTRACT

Background: The neonatal phase, which is the first 28 days of an infant's life, is a vulnerable period due to many reversible severe illnesses. Nearly 3.5 million babies in India are born too early, 1.7 million babies are born with birth defects, and one million new-borns are discharged each year from Special New-born Care Units. These new-borns remain at high risk of death, stunting and developmental delay.
Objectives: This study was aimed to assess factors leading to admission of newborns to Neonatal Intensive care Unit, their outcome and predictors for neonatal mortality.
Methods: Quantitative- retrospective survey method was adopted for the study. The data was retrieved from the records of 440 babies admitted at Shree Sardar Smarak Hospital, Bardoli from 1st February, 2022 to 31st January, 2023.
Results: The majority 260(59.1%) of babies admitted were delivered by primi mothers, 406(92.3%) were term at the time of delivery, 218 (49.5%) were delivered through normal vaginal delivery & 234(53.2%) babies were male. LBW (20%) which ranged from 900 gm to 2200 gm was the most common and tachypnea (0.5%) was the least common reason for admission. Concerning to neonatal outcome, majority 426 (96.81%) babies survived and 14 (3.18%) were not able to survive. The crude odds ratio with a 95% confidence interval (CI) and p-value <0.05, showed that age of mother, parity, gestational age at the time of delivery and mode of delivery were significantly related with neonatal survival status.
Conclusion: Understanding the reasons for admission to NICU and predictors for neonatal mortality is significant for planning health services, improving the quality of care and reducing neonatal mortality rate.

Keywords: Factors leading, NICU admission, neonatal outcome, predictors

INTRODUCTION

The neonatal phase, which is the first 28 days of an infant's life, is a vulnerable period due to many reversible severe illnesses. Neonatal intensive care units (NICU) are specialized units that provide medical attention to neonates, and thus have become a vital aspect in the provision of critical care to infants who are faced with special challenges following birth. Low infant birth weight and premature babies are at a higher risk and are universally acknowledged as the ranking causes of morbidity and neonatal deaths.[1] Globally, prematurity is the leading cause of death in children under the age of 5 years. And in almost all countries with reliable data, preterm birth rates are increasing.[2] Every year an estimated 15 million babies are born preterm (before 37 completed weeks of gestation), and this number is rising. Preterm birth complications are the leading cause of death among children under 5 years of age, responsible for approximately 1 million deaths in 2015.[3] Nearly 3.5 million babies in India are born too early, 1.7 million babies are born with birth defects, and one million new-borns are discharged each year from Special New-born Care

Units (SNCUs). These new-borns remain at high risk of death, stunting, and developmental delay.[4] In India, the infant mortality rate (IMR) has been declined from 89/1000 (year 1990) to 28/1000 (year 2019) and neonatal mortality rate (NMR) from 57/1000 (year 1990) to 22/1000 (year 2019).[5] Hence, this study was carried out to assess the factors leading to admission of neonates to NICU, their outcome and predictors for neonatal mortality.

MATERIALS & METHODS
Quantitative research approach with non experimental survey design was used for the study. Hospital based retrospective study was conducted at Shree Sardar Smarak Hospital, Bardoli, Surat, Gujarat. Hospital records of 440 neonates admitted to NICU during the study period of 1st February, 2022 to 31st January, 2023 was scrutinized. Newborn babies irrespective of inborn and out born delivery admitted to NICU whose records are available were included.

Ethical approval was obtained from the institutional ethics committee of the college and from the concerned hospital authority to use hospital records for data collection. Tool was designed under four sections which included socio demographic data of mother, obstetric data of mother, inventory checklist for factors leading to admission and inventory checklist for neonatal outcome. Tool was validated by three experts from the field of obstetrics & gynecological nursing with CVI of 0.84. Pearson correlation coefficient reliability r was 0.82.

STATISTICAL ANALYSIS
The data were analyzed using the statistical software i.e. SPSS version 20.0. Descriptive statistics were used to describe the characteristics of variables. Logistic regression analysis was used to assess the predictors of neonatal mortality.

RESULT
During the study period of one year, total 440 babies were admitted to NICU out of which 220 (50%) were inborn admission & 220 (50%) were out born (referred from outside) admission.

Socio-demographic data of mother:
Socio-demographic characteristics of mothers showed that 202 (45.9%) belonged to the age group of 21-25 years and six (1.3%) of them were from the age group of 36-40 years. 180 (40.9%) mothers had primary level of education and 28 (6.4%) of them were graduates & post graduates. 262(59.6%) of them were home makers. 360(81.8%) mothers resided in rural area and 80(18.2) of them lived in urban area of Surat district.

Obstetrical data of mother:
With regards to obstetrical data, 260(59.1%) of them were primi mothers, 406(92.3%) were of them have completed 37 weeks or more of gestational period, 218(49.5%) of them delivered by normal vaginal delivery and majority 234(53.2%) of babies were males and 206 (46.8%) were females by gender.

Risk factors for admission to NICU:
Data from table.1 reveals that 431 (98%) babies were admitted due to neonatal factors and 09 (2%) were admitted due to other factors. Out of the neonatal factors LBW (20.4%) and late cry (17.1%) was the most occurring reason for admission.

Table 1: Distribution of neonates according to risk factors for admission to NICU

Neonatal factors (n=431)	f (%)	Other factors (n=9)	f (%)
LBW	88 (20.4)	Preterm delivery+ APH	02 (22.2)
Late cry	74 (17.1)	Vacuum delivery + Late cry	02 (22.2)
Pathological jaundice	69 (16)	Vacuum delivery + Fetal distress	01 (11.1)
Fetal distress	48 (11.1)	Forceps delivery + Fetal distress	01 (11.1)
MSL	43 (9.9)	Vacuum delivery + MSL	01 (11.1)
Preterm delivery+ LBW	26 (6)	Vacuum delivery + Jaundice	01 (11.1)
Under observation	25 (5.8)	Vacuum delivery + Observation	01 (11.1)
RDS	22 (5.1)		

MSL aspiration	08 (1.8)
Fetal distress +MSL	04 (0.9)
Fever	04 (0.9)
Preterm delivery + LBW+ late cry	02 (0.5)
Preterm delivery + LBW + RDS	02 (0.5)
Preterm delivery + LBW + IUGR	02 (0.5)
LBW+IUGR+ Jaundice	02 (0.5)
MSL+IUGR+LBW	02 (0.5)
Late cry +MSL	02 (0.5)
IUGR+ Oligohydramnios	02 (0.5)
No cry + No movement	02 (0.5)
Spleenomegaly	02 (0.5)
Tachypnea	02 (0.5)

LBW-Low Birth Weight, MSL- Meconium-Stained Liquor, RDS- Respiratory Distress Syndrome, IUGR-Intra Uterine Growth Retardation, APH-Antepartum Hemorrhage

Neonatal outcome among the babies admitted to NICU:

Data from table.2 indicates that 338 (76.9%) babies were discharged home, 44 (10%) were transferred to higher center and 44 (10) were discharged against medical advice. Neonatal mortality in this NICU was 14 (3.18%) which was lower than the IMR of Surat district 21.78% (2021).[6]

Table 2: Distribution of neonates according to their outcome

Neonatal outcome	f (%)
Discharge	338 (76.9)
Within 2 days	48 (14.2)
Within 3-5 days	114 (33.7)
Within 6-10 days	116 (34.3)
After 10 days	60 (17.8)
Transfer to higher center	44 (10)
DAMA	44 (10)
Neonatal death	14 (3.2)
Reasons of death, n=14	
Cardio-respiratory failure	4 (28.5)
VLBW	4 (28.5)
Cardio-respiratory failure + Pulmonary hemorrhage	2 (14.3)
VLBW + RDS-II	2 (14.3)
Meconium aspiration	2 (14.3)
Duration of death, n=14	
Within 1 day	8 (57.1)
2-3 day	4 (28.6)
3-5 day	2 (14.3)

DAMA- Discharge Against Medical Advice, VLBW- Very Low Birth Weight, RDS- respiratory distress syndrome

Predictors of neonatal mortality:

The crude odds ratio with a 95% confidence interval (CI) and p-value <0.05, showed that age of mother, parity, gestational age at the time of delivery and mode of delivery were significantly related with neonatal survival status. The survival chances were higher in the maternal age group of 21-25 years than 31-35 years (OR=1.53, p=0.74). Neonates delivered by primi mothers had higher survival chances than multi mothers (OR=0.45, p=0.37). The chances of survival were higher in term neonates than pre term neonates (OR=1.15, p=0.84). Neonates delivered by normal delivery had higher survival chances than delivered by cesarean section (OR=1.41, p=0.55). (Table 3)

Table 3: Logistic regression analysis to identify predictors for neonatal mortality (n = 440)

	OR	p value	95% C.I. for EXP(B)	
			Lower	Upper
Age (<21)	1			
Age(21 - 25)	1.519	.471	.418	5.521
Age(26 - 30)	1.721	.431	.375	7.894
Age(31 - 35)	1.535	.745	.165	14.242
Parity (Primi)	1			

Parity(Second)	1.549	.538	.385	6.237
Parity(Multi)	.455	.373	.081	2.571
Gestation(<37)	1			
Gestation(>37)	1.157	.846	.142	9.447
Mode of delivery (CS)	1			
Mode of delivery (Normal)	1.410	.555	.451	4.410
Mode of delivery (Assisted)	.553	.605	.058	5.246

OR=Odds Ratio, CI= Confidence Interval, EXP (B) = Exponential value of B

DISCUSSION

This research was undertaken to identify the factors leading for admission of neonates to NICU, their outcome and predictors for neonatal mortality. In this study, majority 234 (59.1%) of neonates admitted to NICU were male and 206 (41.9%) were female. This finding was supported by a study conducted by Raikwar P.(2018) at Haryana in which 222 (53%) were males and 190 (47%) were females.[7] Modi R.(2015) reported admission to NICU is more in male 300 (53.8%) than female 257 (46.2) at Gandhinagar[8] and Shah H, (2018) at Gujarat has same findings.[9]

406 (92.3%) neonates admitted to NICU have completed 37 weeks or more of gestational period. This finding was supported by Malkar V. (2022) [5], Modi R. (2015) [8] and Mohmoud M. (2020) [10] in their studies.

Concerning mode of delivery, majority 218 (49.5%) of admitted neonates were delivered by normal vaginal delivery and 206 (46.8%) were delivered by cesarean section. This finding was supported by Rehana R. (2022) who reported that 57.1% of neonates delivered vaginally required NICU admission against and 42.9% of neonates delivered through cesarean section in Kashmir.[11] However Fallahi M. (2014) reported that 58.6% babies delivered by cesarean section required NICU admission in Iran.[12]

On the contrary, Raikwar P. (2018) [7] reported RDS (36.6%) as the common reason of admission of neonates in NICU in rural Haryana and noticed preterm delivery (54.8%) as the most common reason for admission to NICU by Narayan R. (2017). [13]

In this study, the rate of discharge to home was high (76.9%) where as the mortality rate was low (3.2%). A high rate of discharge (67%) was reported by Shah H. (2018) [9] in Gujarat with mortality rate of 16%. Low mortality rate was reported by Modi R. (2015) [8] and Mohamoud M. (2020). [10] Increased rate of discharges and lower rate of mortality can be attributed to the advanced medical and nursing care received by the neonates.

Low birth weight (28.5%), cardio respiratory failure (28.5%) and RDS (14.3%) were the main reasons of neonatal death. These findings are in contrast to the findings reported by Raikwar P. (2018) and Narayan R. (2017) [7,13]

Logistic regression analysis predicts age of mother, parity, gestational age at the time of delivery and mode of delivery for neonatal mortality. A study conducted at Jordan has same findings. [10]

LIMITATION OF THE STUDY

As it was a clinical based study that examined data from the medical records of neonates in a single health facility, the findings cannot be generalized. Apgar score was not available in the records and only late cry was recorded.

CONCLUSION

This study concludes that, major reasons for admission to NICU were LBW, late cry pathological jaundice and fetal distress. With regards to neonatal outcome, majority of the babies survived and discharged. Early diagnosis & prompt management of complications in neonatal period helps in increasing survival rates. Understanding the reasons for admission to NICU and predictors for neonatal mortality is significant for planning antenatal health services, improving the quality of care during delivery, identifying neonatal

problems early and shifting the neonates to NICU as quickly as possible and thus improve the survival rate of neonates.

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