

(RESEARCH ARTICLE)



Morbidity and mortality pattern of admitted newborn in Special Newborn Care Unit at district hospital, Siddharthnagar, Uttar Pradesh

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International Journal of Science and Technology Research Archive, 2024, 06(01), 009–016

Publication history: Received on 23 November 2023; revised on 14 January 2024; accepted on 16 January 2024

Article DOI: <https://doi.org/10.53771/ijstra.2024.6.1.0107>

Abstract

Background: Special newborn care unit is formed to give facility based newborn care at district hospital. It is essential to know the competence of Special newborn care unit. The purpose of this study is to study the morbidity and mortality pattern of admitted newborn in Special Newborn Care Unit at district hospital, Siddharthnagar, Uttar Pradesh.

Material and methods: Hospital based secondary data collected from Special Newborn Care Unit of the district hospital of Siddharthnagar, Uttar Pradesh. The study period was from September 2020 to December 2020. The sample size for this study was 360 admitted newborn. Univariate and bivariate analysis done to get expected result. Kappa agreement is also used to show agreement between initial and final diagnosis of morbidity.

Results: The most predominant cause of morbidity among newborn was Perinatal Asphyxia (44.4%). Around 72.5% of admitted newborn successfully discharged from hospital and 7.8 % of admitted newborn died. The relative risk of mortality was highest from low birth weight. There is 87% of agreement between initial diagnosis and final diagnosis of morbidity with p-value < 0.0001.

Conclusion: A high proportion of newborns suffer from perinatal asphyxia. There is scope and need for a reduction of mortality of admitted newborns. This study will help hospital administration improve the healthcare situation of admitted newborns.

Keywords: Neonatal Mortality; Neonatal Morbidity; Siddharthnagar; Special Newborn Care Unit; Uttar Pradesh

1. Introduction

The eighth goal of SDG calls for an end to preventable deaths of newborns and children under age 5 to aim for all countries to have a neonatal mortality rate of 12 or fewer deaths per 1000 live births and an under-five mortality rate of 25 or fewer deaths per 1000 live birth by 2030. Given the current burden of deaths, child survival remains an urgent concern. In 2020 alone, 5 million children died before reaching their fifth birthday – 2.5 million of those died in the first month of life.¹

India contributes a large proportion of global live birth and neonatal death. Nearly, 0.75 million neonates died in India in 2013, the highest for any country in the world.² The latest estimate by the sample registration system (SRS) gives neonatal mortality rate (NMR) of 22 per 1000 live births. Given the Infant mortality rate (IMR) and under-five mortality rates (U5M) of 30 and 35 per 1000 live births, respectively.³

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Facility Based Newborn Care (FBNC) refers to round-the-clock clinical services provided by skilled personnel at healthcare facilities.⁴⁻⁵ FBNC is one of the key components to improving newborn health status. Three levels of facility-based neonatal care are envisaged. Level 1 care is Neonatal Stabilization Units (NSUs) in the first referral units. Care in the NSU's consists of stabilizing sick newborns and caring for low birth weight (LBW) newborns not requiring intensive care. Level two care consists of the functioning of Special Newborn Care units (SNCU) at the district hospital. These units can manage poor health newborns differently than those who want ventilator help and surgical care. The level 3 units are the neonatal intensive care units (NICUs).⁶

SNCUs are typically equipped to treat and care for babies with birth asphyxia, jaundice, sepsis, and LBW. These units cater to both inborn and outborn sick neonates. Uttar Pradesh is the highest populated state with high NMR. Therefore, it is necessary to know the competence of SNCU services, the pattern of morbidity and mortality of the admitted newborn in SNCUs so that some policy or program may be implanted to further improves the services catered by SNCUs.

The study area Siddharthnagar has a population of 25.53 lakh with only 1.6 lakh urban population. The district has a very low total literacy rate 52.4 % with male literacy rate 64.4 % and female literacy rate 39.8 %. This district is in the list of High Priority District in Uttar Pradesh. The U5M, IMR and NMR in Siddharthnagar are very high with 116 deaths, 87 deaths and 70 deaths per 1,000 live births respectively.⁷ It is essential to know the status of the functioning of SNCU in this district. Therefore, the district Siddharthnagar is taken as the study area for the study.

2. Material and methods

This is a hospital-based prospective study done in the SNCU of the district hospital of Siddharthnagar, Uttar Pradesh. The period for the present study was September 2020 to December 2020. Data for all the newborns admitted during the study period were considered for the study. Data from admission and discharge registers were extracted, compiled and analyzed. A total of 360 admitted newborns were considered for the study.

Data on delivery place, whether newborn delivered in the same hospital or from other hospitals, gender, Indication of admission (Initial diagnosis), Final diagnosis and Outcome of admitted newborn are considered for analysis purposes.

2.1. Statistical Analysis

The percentage distribution of sample characteristics is shown. Bivariate analysis has been shown with a different variable. Case fatality and relative risk of death with associated morbidity are shown. Diagnosis discordance is shown for Initial diagnosis and final diagnosis of morbidity. Univariate analysis for a factor associated with diagnostic discordance is also shown. Kappa Agreement is shown for Initial diagnosis and final diagnosis of morbidity.

3. Results

3.1. Newborn profile with different characteristics

A total of 360 newborn's mother interviewed and collected data during study period. Among 360, only 13 (3.6%) mothers delivered their baby on home whereas remaining 347 (96%) delivered their baby in Hospital. The of proportion Inborn and Outborn is nearly equal in admitted babies (Inborn: 50.3% and Outborn: 49.7%). 215 babies (59.7%) are Male and 145 babies (40.3%) are female among admitted babies. In the Initial diagnosis (Indication of diagnosis), Perinatal Asphyxia is leading morbidity with 52.2%, followed by Neonatal Jaundice (23.3%). 30 (8.3%) newborns diagnosed with low birth weight. Only 7.8% newborns initially diagnosed with respiratory disease. The indication of Perinatal Asphyxia is nearly 6 times more than low birth weight and 7 times more than respiratory disease. The chance of indication of Neonatal jaundice is nearly 3 times more than low birth weight. The final diagnosis shows the consistent pattern with initial diagnosis. Perinatal Asphyxia is leading cause of morbidity with 44.4% followed by Neonatal jaundice with 24.2%, low birth weight with 12.5% and respiratory disease with only 8.9%. The distribution of causes of morbidity changed little with same patterns. The low birth weight increased from 8.8% to 12.5%, Perinatal Asphyxia decreased from 52.2% to 44.4%, Neonatal jaundice changed from 23.3% to 24.2% and respiratory disease changed from 7.8% to 8.9%. The outcome of admitted newborn is categorized into four categories, viz., Successfully discharge, Leave Against Medical Advice, Referred to higher centre and Expired. Approximately 73% newborns discharged successfully from ward. 4.7% leaved against medical advice from ward whereas 15% referred to higher centre for better improvement. Considerable number of newborns (7.8%) died among admitted newborns (Table 1).

Table 1 Newborn profile collected during study period

Characteristics		Frequency	Percent
Delivery Place	Home	13	3.6
	Hospital	347	96.4
Inborn	Yes	181	50.3
	No	179	49.7
Gender	Male	215	59.7
	Female	145	40.3
Indication of admission	LBW	30	8.3
	Perinatal Asphyxia	188	52.2
	Neonatal jaundice	84	23.3
	RD	28	7.8
	other	30	8.3
Final Diagnosis	LBW	45	12.5
	Perinatal Asphyxia	160	44.4
	Neonatal jaundice	87	24.2
	RD	32	8.9
	Other	36	10
Outcome	Successfully discharge	261	72.5
	LAMA	17	4.7
	Referred	54	15
	Expired	28	7.8
	Total	360	100

3.2. Newborn profile by Inborn and Outborn

Table 2 Newborn profile by Inborn and Outborn

Characteristics		Inborn	Outborn
Sex	Male	105 (58.0)	110 (61.5)
	Female	76 (42.0)	69 (38.5)
Indication	LBW	16 (8.8)	14 (7.8)
	Perinatal Asphyxia	94 (51.9)	94 (52.5)
	Neonatal jaundice	40 (22.1)	44 (24.6)
	RD	14 (7.7)	14 (7.8)
	other	17 (9.4)	13 (7.3)
Final Diagnosis	LBW	24 (13.3)	21 (11.7)
	Perinatal Asphyxia	80 (42.2)	80 (44.7)
	Neonatal jaundice	41 (22.7)	46 (25.7)

	RD	14 (7.7)	18 (10.1)
	other	22 (12.2)	14 (7.8)
Outcome	Successfully discharge	128 (70.7)	133 (74.3)
	LAMA	10 (5.5)	7 (3.9)
	Referred	25 (13.8)	29 (16.2)
	Expired	18 (9.9)	10 (5.6)

The proportion of male babies are 0.58 and 0.61 in Inborn and Outborn newborns respectively. Whereas, the proportion of female babies are 0.42 and 0.38 in Inborn and Outborn respectively. The distribution of initial morbidity for Inborn newborns are low birth weight with 8.8%, Perinatal Asphyxia with 51.9%, Neonatal jaundice with 22.1%, Respiratory disease with 7.7% and other morbidity with 9.4%. The distribution of initial morbidity for Outborn newborns have the similar patterns with Inborn newborns. Among all Outborn newborn, 7.8% are low birth weight, 52.5% have perinatal asphyxia, 24.6% have neonatal jaundice, 7.8% have respiratory disease and 7.3% have any other morbidity. In case of Final diagnosis, the percentage of low birth weight is 13.3%, the percentage of Perinatal Asphyxia is 42.2%, the percentage of Neonatal jaundice is 22.7%, Respiratory disease is 7.7% and other morbidity is 12.2% for Inborn admitted newborn. For Outborn newborn, the percentage distribution of morbidity is 11.7%, 44.7%, 25.7% and 7.8% for low birth weight, perinatal asphyxia, neonatal jaundice, Respiratory disease and other respectively. Approximately, 71% of Inborn admitted newborns successfully discharged from hospital. 13.8% of Inborn referred to higher centre, 5.5% of Inborn given leave against medical advice and 9.9% of inborn could not survived. Whereas for Outborn newborn, the percentage of successfully discharged newborn from hospital is slightly higher than Inborn newborn. The percentage of newborn successfully going from ward is 74.3%. Only 5.6% of Outborn newborn died. 29 newborns transferred to higher referral centre (Table 2).

3.3. Bivariate analysis of Indication of admission, Final diagnosis and Outcome with gender of newborn

Table 3 Cross-tabulation of gender with Indication of admission, final diagnosis and outcome

Characteristics		Male	Female
Indication	LBW	17 (7.9)	13 (9.0)
	Perinatal Asphyxia	107 (49.8)	81 (55.9)
	Neonatal jaundice	50 (23.3)	34 (23.4)
	RD	18 (8.4)	10 (6.9)
	Other	23 (10.7)	7 (4.8)
Final Diagnosis	LBW	26 (12.1)	19 (13.1)
	Perinatal Asphyxia	90 (41.9)	70 (48.3)
	Neonatal jaundice	52 (24.2)	35 (24.1)
	RD	20 (9.3)	12 (8.3)
	Other	27 (12.6)	9 (6.2)
Outcome	Successfully discharge	158 (73.5)	103 (71.0)
	LAMA	9 (4.2)	8 (5.5)
	Referred	29 (13.5)	25 (17.2)
	Expired	19 (8.8)	9 (6.2)

The percentage distribution of Initial diagnosis, Final diagnosis and Outcome of newborn from ward is shown by gender of newborn to get the crude association between the gender and morbidity. In initial diagnosis, 49.8% of male newborn suffer from Perinatal Asphyxia, 23.3% of male newborn suffer from Neonatal jaundice, 8.4% of male newborn suffer

from Respiratory disease, 7.9% of male newborn suffer from low birth weight and remaining 10.7% suffer from any other morbidity. Whereas, 55.9% of female newborn have shown symptoms Perinatal Asphyxia, 23.4% of female suffer from Neonatal jaundice, 9% of female are low birth weight, 6.9% of female suffer from Respiratory disease and remaining 4.8% with other morbidity. Perinatal Asphyxia is the leading cause of morbidity in both genders, followed by Neonatal Jaundice, low birth weight and Respiratory disease. The distribution of Final diagnosis of morbidity shows the similar pattern with initial diagnosis with little changes in percentage distribution. For both sexes, Perinatal asphyxia is the leading cause of morbidity, followed by Neonatal jaundice, Low birth weight, Respiratory diseases. In case of male newborn, 12.1%, 41.9%, 24.2% and 9.3% of newborn suffer from Low birth weight, Perinatal Asphyxia, Neonatal Jaundice and respiratory disease respectively. While in case of females, 13.1%, 48.3%, 24.1% and 8.3% of the newborn were diagnosed with low birth weight, Perinatal Asphyxia, Neonatal Jaundice and Respiratory disease respectively. 73.5% of male newborn successfully discharge from ward whereas in case of female, 71% of newborn successfully discharged from ward. 4.2% and 5.5% of newborn given leave against medical advice from male and female newborn respectively. The percentage of death is higher in male newborn (73.5% for male and 71% for female). While, referral percentage is higher in female newborn. 17.2% of female newborns are referred to higher referral point. 13.5% of male newborns are transferred to higher referral point (Table 3).

3.4. Percentage distribution of outcome by final diagnosis

Among low birth weight newborns, 68.9% are successfully discharged, 4.4% are LAMA, 15.6% are referred to higher centres and 11.1% died. Among the newborn suffering from Perinatal Asphyxia, 74.4% are successfully discharged, 5% are LAMA, 13.1% are referred to higher centres and 7.5% are not survived. Among the newborn suffering from Neonatal jaundice, 69% are successfully discharged, 4.6% are LAMA, 9.2% are referred to higher centre point and 9.2% died. Among the newborn suffering from Respiratory disease, 81.3% successfully discharged, 6.3% are referred, 6.3% are LAMA and 6.3% died. From the above result, it is clear that the percentage of successfully discharged is highest for Respiratory disease, percentage of referral is highest for low birth weight and percentage death is also highest for low birth weight (Table 4).

Table 4 Percentage distribution of outcome by final diagnosis

	Successfully discharge	LAMA	Referred	Expired
LBW	31 (68.9)	2 (4.4)	7 (15.6)	5 (11.1)
Perinatal Asphyxia	119 (74.4)	8 (5.0)	21 (13.1)	12 (7.5)
Neonatal jaundice	60 (69.0)	4 (4.6)	8 (9.2)	8 (9.2)
RD	26 (81.3)	2 (6.3)	2 (6.3)	2 (6.3)
Other	25 (69.4)	1 (2.8)	1 (2.8)	1 (2.8)

3.5. Case fatality and relative risk of deaths associated with morbidity

Table 5 Case fatality and relative risk of deaths associated with morbidity

	Admitted (%)	Death (%)	Relative Risk	Proportion of death
LBW	45 (12.5)	5 (11.1)	4.0	0.18
Perinatal Asphyxia	160 (44.4)	12 (7.5)	2.7	0.43
Neonatal jaundice	87 (24.2)	8 (9.2)	3.3	0.29
RD	32 (8.9)	2 (6.3)	2.3	0.07
other	36 (10.0)	1 (2.8)	1.0	0.04

A total of 360 newborns admitted during study period and 12.5%, 44.4%, 24.2%, 8.8% and 10% diagnosed with low birth weight, Perinatal Asphyxia, Neonatal jaundice, Respiratory disease and any other morbidity respectively. The percentage of deaths are 11.1%, 7.5%, 9.2%, 6.3% and 2.8% for low birth weight, Perinatal Asphyxia, Neonatal jaundice, Respiratory disease and other morbidity respectively. The relative risk of death for low birth weight is 4 times of other morbidity. The relative risk of deaths for Perinatal Asphyxia is 2.7 times of other morbidity. The relative risk of death for Neonatal jaundice is 3.3 times of other morbidity. The relative risk of death for Respiratory disease is 2.3 times of

other morbidity. The proportion of deaths due to specific morbidities are 0.18, 0.43, 0.29, 0.07 and 0.04 for low birth weight, Perinatal Asphyxia, Neonatal jaundice, respiratory disease and other morbidity respectively (Table 5).

3.6. Diagnosis discordance of Indication of admission and Final diagnosis

30 newborns from a total of 45 newborn who initially diagnosed with low birth weight confirmed low birth weight after final diagnosis. All newborns are confirmed with Perinatal Asphyxia in Final diagnosis who were initially diagnosed with Perinatal Asphyxia. From initially diagnosed with Neonatal Jaundice, only 13 newborns could not confirm Neonatal jaundice in Final diagnosis. 11 newborns confirmed with other morbidity who have initially diagnosed with respiratory disease (Table 6).

Table 6 Diagnosis discordance

		Indication				
		LBW	Perinatal Asphyxia	Neonatal jaundice	RD	Other
Final diagnosis	LBW	30	15	0	0	0
	Perinatal Asphyxia	0	160	0	0	0
	Neonatal jaundice	0	13	74	0	0
	RD	0	0	10	21	1
	other	0	0	0	7	29

3.7. Univariate analysis for factors associated with diagnostic discordance

Overall, 314 newborns (87.2%) diagnosed with same morbidity in initial and final diagnosis. 86.5% diagnostic concordance observed for male newborns whereas 88.3% diagnostic concordance observed for female newborn. Male newborn has nearly 2% higher diagnostic concordance than female newborn. 84.6% diagnostic concordance observed for newborn who delivered at home whereas 87.3% diagnostic concordance observed for newborn who delivered at hospital. 12.7% diagnostic discordance observed for newborn who delivered at hospital. Among Inborn newborn, 86.7% diagnostic concordance observed. While for Outborn newborn, 87.7% diagnostic concordance observed. 13.6% diagnostic discordance observed for Inborn newborn. 12.3% diagnostic discordance observed for Outborn newborn (Table 7)

Table 7 Univariate analysis for factors associated with diagnostic discordance

Basic characteristics		Diagnostic concordance (n=314)	Diagnostic discordance (n=46)
Gender	Male	186 (86.5)	29 (13.5)
	Female	128 (88.3)	17 (11.7)
Delivery place	Home	11 (84.6)	2 (15.4)
	Hospital	303 (87.3)	44 (12.7)
Inborn	Yes	157 (86.7)	24 (13.6)
	No	157 (87.7)	22 (12.3)

3.8. Agreement between Indication and Final diagnosis

Table 8 Agreement between Indication and Final diagnosis

	Expected				
Agreement	Agreement	Kappa	Std. Err.	Z	p-value
87.22%	31.42%	0.8137	0.0304	26.74	0.0000

The agreement between Initial diagnosis and Final diagnosis is 87.22% with Kappa value 0.81 indicating high agreement between initial and final diagnosis. This result is highly significant with p-value less than 0.000. The standard error for kappa value is 0.03 (Table 8).

4. Discussion

This study found that LBW, Perinatal Asphyxia, Neonatal Jaundice, and Respiratory disease are major causes of morbidity. Perinatal Asphyxia is highest prevalent morbidity among admitted newborns. Around 72% of admitted newborns were discharged, while 7.8% of admitted newborns died. The death percentage was highest among LBW newborns, whereas the successful discharge rate was highest in the case of respiratory diseases. The initial and final diagnosis has shown a high agreement value. Different studies have been done to know the pattern of Morbidity and Mortality in SNCU in different parts of countries. A study done in Odisha based on 30 SNCUs for three years found that the common causes of admission were Moderate to severe birth Asphyxia (29.09%), LBW (25%), Jaundice (15%) and Infections (15%).⁸ A study conducted in the district hospital of Kurnool, Andhra Pradesh identified LBW (49.72%), birth asphyxia (32.02%), respiratory distress (27.43%), and sepsis (23.41%), as major causes of morbidity.⁹ A study by Pandya & Mehata in Vadodara, Gujarat, found that 54% of total admissions were outborn. Most admissions in SNCU were jaundice followed by Sepsis, RDS, Perinatal Asphyxia & Congenital anomalies. The most common cause of mortality was sepsis (40%), followed by birth asphyxia (21.4%) and RDS (12.2%).¹⁰ Uttarakhand's study reported that major admission causes were jaundice, sepsis, and birth asphyxia, whereas birth asphyxia was the major cause of mortality, followed by sepsis and prematurity. Mortality was more in outborn babies, 14.67%, compared to inborn babies, 9.80%.¹¹ A Retrospective study for three years conducted in the SCNU of the teaching hospital of Assam shows that from a total admitted to the SCNU, the percentage share of the inborn newborn was high compared to outborn. The common morbidities in the study were neonatal sepsis, jaundice, and birth asphyxia. Mortality was much higher in the outborn compared to the inborn unit. 77.5% of deaths were early neonatal deaths. 66.1% of the death cases were LBW. Sepsis (42.6%), birth asphyxia (29.3%) and prematurity-related complications (17.5%) were the common causes of death.¹² A study conducted in Rohtas District of Bihar shows that babies born outside the hospital had 2.5 times higher mortality rate than those born in our hospital. Most deaths were associated with LBW, prematurity, sepsis, respiratory distress syndrome (RSD) and intrauterine growth retardation.¹³

5. Conclusion

The findings from this study reveal many essential factors. Most of the admitted numbers in SNCU are coming from the hospital. More than half of newborns are admitted due to perinatal asphyxia. There is a scope for minimizing the death percentage of the admitted newborn. There is good agreement value between initial and final morbidity diagnosis for admitted newborns. Since this study was done with small sample size, there is a further need for a study with a large sample size to get a clearer picture of the morbidity and mortality situation in SNCU.

Compliance with ethical standards

Acknowledgments

I would like to extend my sincere appreciation to hospital administration who helped me to successfully complete this study.

Disclosure of conflict of interest

No conflict of interest to be disclosed.

Statement of ethical approval

Ethical review board of International Institute for population Sciences, Mumbai have approved the present study.

Funding

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

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