

## Original Research Article

# Study of morbidity and mortality profile in special care newborn unit at tertiary care teaching institute in Vadodara, Gujarat, India

Nimisha K. Pandya<sup>1\*</sup>, Kedar G. Mehta<sup>2</sup>

<sup>1</sup>Department of Pediatrics, <sup>2</sup>Department of Preventive and Social Medicine, GMERS Medical College, Gotri, Vadodara, Gujarat, India

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### \*Correspondence:

Dr. Nimisha K. Pandya,

E-mail: [nimisha.pandya@hotmail.com](mailto:nimisha.pandya@hotmail.com)

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## ABSTRACT

**Background:** The development of a country is defined by its healthcare status especially the maternal and child health. Neonatal Mortality Rate in India has always been an area of concern again due to logistic issues in implementation of preventive and curative programs in a large and diverse country as ours but has shown a slow but steady fall in the last 2 decades. The current NMR of Gujarat is 25.4/ 1000 live births (2016) which is similar to the national NMR. The goal is to bring down NMR to single digit. Several measures are being taken to address these goals. The objective is to study the morbidity and mortality profile of newborns admitted to the Special Newborn Care Unit at GMERS Medical College and Hospital, Gotri, Vadodara between January 2017 and December 2017.

**Methods:** Retrospective study was carried out at the Special Newborn Care Unit (SNCU), Department of Pediatrics, GMERS Medical College admitted in the period between January 2017 to December 2017. Both inborn and out born admissions were included. Newborns admitted in SCNU were analyzed for causes of morbidity and mortality.

**Results:** 1039 neonates were admitted over a period of 1 year. The gender distribution was 1.5:1 (M: F). 54% admissions were out born. 62% were Low Birth Weight out of which 14% were term SFD vs.86% were premature. Majority of admission in SNCU were Neonatal hyperbilirubinemia 38%, followed by Sepsis in 23%, RDS in 16%, Perinatal asphyxia 15%. Congenital anomalies were reported in 3% newborns. The outcome rates for Survival, LAMA and death were 75%, 06% and 19%. The most common cause for mortality was sepsis (40%) followed by birth asphyxia (21.4%) and RDS (12.2%).

**Conclusions:** The leading cause of morbidity were Sepsis, Birth asphyxia, Respiratory Distress Syndrome and prematurity. Sepsis was the leading causes of mortality in present study followed by Birth asphyxia and RDS. Leading causes of mortality in the study are preventable and curable. Therefore, surveillance and training interventions aimed at management of these causes should be established and strengthened.

**Keywords:** Morbidity, Mortality, Newborn

## INTRODUCTION

The development of any country is reflected by its growth indicators. WHO states that 5.9 million children died under 5 years of age in 2015 (16000deaths per day).<sup>1</sup> Every year four million babies die in the neonatal period (1<sup>st</sup> 4 weeks of life), with India contributing to one-fourth

of the total mortality burden. The highest contribution to infant and U5MR is neonatal mortality.<sup>1</sup> 75% of the neonatal deaths occur in the first week of life and at least 50% occur in the first day of life.<sup>2</sup> WHO world leaders had gathered together in 2000 to address the issue as millennium development goal. Consensus was reached to reduce child mortality to two -thirds by year 2015. Much has been done in this direction, but progress has been

slow. While the under-five mortality rate (U5MR) dropped by 30% from 74 per 1000 live births (2005-2006) to 52 (2012), the Neonatal Mortality Rate (NMR) has been to slow to decline, decreasing by 22% from 37/1000 live births to 29/ 1000 live births during the same period. Therefore, all efforts to reduce IMR U5MR essentially have to focus on steps for sustained reduction of neonatal mortality as 70% of infant deaths are due to neonatal mortality. There is evidence regarding significant reduction in NMR with facility-based care.

The commonest causes of neonatal mortality in India are low birth weight, perinatal asphyxia and sepsis. Highest NMRs are reported from the African countries due to its fluid socio-political situation and Southeast Asian countries. Current NMR of Gujarat is. 24/ 1000 live births which is similar to the national NMR. The ENAP (Every Newborn Action Plan) recently endorsed by the World Health Assembly calls for NMR <10/1000 live births by year 2035 in all countries.

Government of India is investing its energy and resources in reducing the NMR with collaboration with NNF, IAP, WHO and many others to achieve the milestone.<sup>2</sup>

Gujarat is highly prosperous state of India with substantial budgetary allocation to health care. Neonatal Mortality Rate (NMR) has been to slow to decline, from 37/1000 live births to 29 /1000 live births over last few years.<sup>2,3</sup> The current NMR of Gujarat is /1000 live births (2016) which is similar to the national NMR /1000 live births. A three-tiered facility based neonatal care was started in India to address the burden of neonatal mortality. Level I Newborn Stabilization Unit (NBSU) at all PHCS, Level II Special Newborn Care Unit (SNCU) at the district hospital and Level III Neonatal NICU at medical colleges were set up.<sup>4</sup>

The SNCU at GMERS Medical College and General Hospital was established in 2011 as a 5 bedded unit as joint venture of GOI, UNICEF and NHM (National Health Mission). SNCU at GMERS Medical College is an important tool to decrease NMR of Vadodara district. Being part of the medical college, the catchment area is Vadodara district, neighboring districts of Anand, Chhota Udaipur and Bharuch. It is now 32 bedded Level 3 (SNCU) with 15 bedded KMC unit. It provides services for advanced respiratory support like mechanical ventilation, surfactant administration, CPAP, as well as parenteral nutrition and management of sepsis, jaundice, low birth weight, prematurity and other neonatal conditions.

A review of the morbidity and mortality profile of sick newborns admitted to SNCU will help in analyzing problem areas and developing policies for further decrease in the neonatal mortality in the institute as well as the state. Therefore, a retrospective study was carried out to study the profile of newborns admitted in SNCU over a 1-year period (January 2017 to January 2018).

The aim is to study the morbidity and mortality profile of newborns admitted to the Special Newborn Care Unit at GMERS Medical College and Hospital, Gotri, Vadodara.

## METHODS

The study was carried out at the Special Newborn Care Unit (SNCU), Department of Pediatrics, GMERS Medical College and Hospital, Gotri, Vadodara (tertiary care hospital). The SNCU has total 32 beds. It is equipped with 32 radiant warmers, 21 phototherapy units, 5 bubble CPAP and 5 mechanical ventilators. Hospital stay, drugs and investigations are provided free of cost to all babies admitted in SNCU under JSSK and SNCU grant. The study was carried out over a period of 1 year (January 2017 to December 2017). In this retrospective record-based study, data of all neonates (0-28 days) admitted to SNCU was reviewed.

## Inclusion criteria

Records of all newborns admitted to NICU during the study period were included.

## Statistical analysis

Data was collected from the SNCU records and entered and analyzed using Microsoft Excel Worksheet. Key analytic outputs included morbidity profile (primary diagnosis on admission) and mortality profile (neonatal outcome and cause of death). Descriptive statistics is presented in the form of frequencies and proportions.

## RESULTS

Baseline characteristics of the neonates: 1039 neonates were admitted over a period of 1 year out of which 615 (59%) were males and 424 (41%) were females.

**Table 1: Baseline characteristics of newborns admitted in SNCU from January 2017 to December 2017 (N=1039).**

Baseline characteristics of newborns	
<b>Admissions</b>	
Intramural-inborn	475 (45.7%)
Out born	561 (54.3 %)
<b>Gender</b>	
Male	615 (59%)
Female	424 (41%)
<b>Weight on admission (gm)</b>	
>2500	390 (37.5%)
<2500	649 (62.4%)
1500-2499	447
<1500	173
<1000	29
<b>Maturity (weeks)</b>	
<37 weeks	478 (46%)
<37-42	561 (54%)

Intramural admissions were 475 (45.7%) and out born admissions were 561 (54.3%). On applying one sample Chi-square test for seeing the observed frequency distribution in males and females overall admitted neonates at the SNCU, it was found to be significant (P is 0.001).

Age and gestation of neonates in SNCU: The neonates were divided arbitrarily into different birth weight and gestational age groups (>2500gm, 2499gm to 1500 gm, 1500-1000 gm and <1000gm) and 37- 42 weeks, and <37 weeks), as the management, complications and prognosis of each group is different. 37.5% of the neonates admitted in the SNCU weighed more than 2500 and 62.4% were low birth weight. The percentage of VLBW and ELBW neonates was 16.7% and 2.7% respectively. 54% of admissions were preterm.

**Table 2: Morbidity profile of newborns admitted in SNCU from January 2017 to December 2017 (N = 1039).**

Primary diagnosis	N = 1039
Hyper bilirubinemia	396 (38.1%)
Sepsis	247 (23.8%)
Birth asphyxia	151 (14.5%)
RDS	170 (16.4%)
Meconium aspiration syndrome	42 (04%)
Congenital malformations	33 (03.2%)

Morbidity profile of admitted neonates: The chief causes of admission in SNCU were Hyperbilirubinemia 396 (38.1%), followed by Sepsis 23.8%, RDS 16.4%, Birth asphyxia 14.5%. Congenital anomalies were observed in 3.2%.

**Table 3: Outcome of admitted newborns and mortality profile of neonatal deaths.**

Outcome	N=1039
LAMA	63 (06.1%)
Expired	196 (18.9%)
Discharge	780 (75.1%)
<b>Cause of death</b>	<b>N=365</b>
Sepsis	78 (39.8%)
Birth asphyxia	42 (21.4%)
RDS	24 (12.2%)
MAS	10 (05.1%)
Prematurity <28week	11 (05.6%)
Cong.	9 (04.5%)

Outcome of admitted neonates: Of all neonates admitted in SNCU, 75.1 survived. The percentage of the admitted neonates who went on leave against medical advice (LAMA) was 06.1%, and 18.9% neonates succumbed.

Mortality profile of neonates: The major causes of death in this study in decreasing order are sepsis 39.8%, Birth asphyxia 21.4%, and RDS 12.2%.

30% of newborns with birth asphyxia succumbed while 14% newborns reduce the NMR by providing free supply of Surfactant and high-end Ventilators has resulted in improvement in RDS outcomes.

**Table 4: Mortality profile according to gestational age and birth weight.**

Gestational age	Mortality
>37 weeks	56 (28.6%)
<37 weeks	140 (71.4%)
<b>Birth weight</b>	
>2500 gm	56 (28.6%)
1500-2499 gm	59 (30.1%)
1000-1499 gm	52 (26.5%)
<1000 gm	29 (14.8%)

Mortality was observed to be the highest in premature newborns versus sick term neonates. Mortality was higher with decreasing birth weight.

## DISCUSSION

All tertiary care NICU cater to substantial inborn and out born newborn admission load.

The ratio of intramural to extramural admission rates is 1.5:1. Higher percentage of males were admitted could be due to increased emphasis on health intervention for male child versus female child. Male predominance has been observed in studies in developing countries: 63% in Pakistan, 58% in Nigeria and 58% in South Africa.<sup>5-7</sup>

The incidence of low birth weight was 62.4%, ratio being 0.6:1. Similar incidence was found in study in tertiary care NICU at Bhopal and South India, Uttarakhand and South Africa.<sup>7-10</sup> It is higher as compared to average incidence of LBW (30%) in India. This can be explained by higher number of Preterm deliveries 54%, institute being a tertiary care center and catering to high risk deliveries. The incidence of LBW was observed to be lower in studies from Pakistan (37.7%) and Ethiopia (35%). Low socio-economic strata, anaemia, undernutrition and maternal illness are the major contributors to low birth weight.

The most common cause for morbidity was sepsis (23.8%) and birth asphyxia (14.5%) and RDS (16.4%). Incidence of sepsis was at par with other NICUS in Pakistan, South Africa and Bhopal and Bihar.<sup>5,7,9,11</sup> but lower than study in Nepal (34.5%). The incidence of RDS can be attributed to increased preterm admissions.

The overall mortality was 18.9%. Sepsis contributed maximally to the mortality (40%), nearly two fifth all mortality, followed by birth asphyxia (21.4%) and RDS (12.2%) with similar patterns in other studies.<sup>7-9</sup> Mortality can be reduced substantially if we focus on effective disinfection in hospital settings and hygiene practices as part of Essential Newborn Care in community. Sepsis,

Prematurity, RDS and Perinatal Asphyxia, remain significant causes for morbidity and mortality in newborn.

The limitation of this study is, this study being a tertiary hospital-based study does not reflect the morbidity and mortality of newborns treated in community. The outcome of newborns who left against medical advice is not known.

## CONCLUSION

Birth asphyxia, sepsis and preterm RDS are the leading causes of mortality in present study. Leading causes of mortality in the study can be prevented. Effective interventions are in place in form of NSSK, IMNCI, FIMNCI and ENBC program for training in resuscitation and management of sick and low birth weight newborn.

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