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# **RESEARCH ARTICLE**

## NICU OUTCOME IN A LOW RESOURCE HOSPITAL

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#### **ABSTRACT:**

OBJECTIVE: To study the mortality pattern in a level III NICU in a low resource hospital. METHODS: A retrospective study was conducted over a period of 3yrs from Jan 12 to Dec 14. The medical records of all babies who died after being admitted to the NICU were reviewed. Survival was defined as the discharge of a live infant from the hospital. Data regarding birth weight, gestational age, primary cause of death and diagnosis was analyzed. Exclusion criteria were to exclude (A) babies who came in the NICU for a few hours observation and were shifted to mother. (B) Any baby who could not be successfully resuscitated in labor room. RESULTS: Total of 294 babies was admitted in this 3yr period in our NICU. Out of these, 96.9% babies survived and 3.1% babies expired. The total number of deliveries in these 3yrs was 2160 and the NMR in this study was 4.1% per 1000 live births. In the VLBW group the survival was 95% [38/40] and in ELBW group it was 80% [16/20]. In LBW group 98.2% [57/58] babies survived. Total Survival of VLBW & ELBW together was 90%[54/60] Out of 9 expired babies 77.7% [7/9] were premature and 42.8% [3/7] babies were <30 weeks of gestational age. Sepsis 22.2% [2/9] and pulmonary hemorrhage 22.2% [2/9] were the primary causes of death. CONCLUSIONS: This study identified neonatal sepsis, pulmonary hemorrhage as the major contributors to the neonatal mortality. Adequate antenatal care and postnatal care to the high risk mother's babies will improve the neonatal outcome.

Keywords: NICU, Neonatal Mortality, Low resource setting, Cause of death,

#### INTRODUCTION

In India alone, of the 25 million babies who are born every year, one million die, accounting for 25% of the mortality around the world. According to the National Family Health Survey - 3 (NFHS-3) report, the current neonatal mortality rate (NMR) in India of 39 per 1, 000 live births, accounts for nearly 77% of all the infant deaths (57/1000) and nearly half of the under-five child deaths  $(74/1000)^1$ . The rate of the neonatal mortality varies widely among the different states of India, ranging from 11 per 1000 live births in Kerala to 48 per 1000 live births in Uttar Pradesh. The neonatal mortality rate in Karnataka is 38 per 1000 live births. Preterm birth is one of the major clinical problems in obstetrics and neonatology, as it is associated with increased perinatal mortality and morbidity <sup>2</sup>.In a report which was published in The Lancet, the major direct causes of the deaths were preterm birth (27%), infection (26%), asphyxia (23%), congenital anomalies (7%), others (7%), tetanus (7%) and diarrhea (3%) <sup>3</sup>.The data from the tertiary care NICUs in the rural areas which primarily serve the very poor people is scarce. The objective of the study was to study the mortality pattern in a level 3 NICU in a low resource hospital.

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### **MATERIALS & METHODS**

This hospital based retrospective study was carried out in the neonatal intensive care unit (NICU), Narayana superspeciality hospital, Bangalore, Karnataka, India, for a period of 3 year from January 2012 to December 2014. The hospital ethical committee approved the study protocol. Our hospital caters mainly to rural and semi-urban patients, with a significant number of them being below the poverty line (BPL) income group patients. Approximately 1800 deliveries are conducted per year. All the admitted neonates were enrolled on a structured protocol, which included the data on antenatal care, maternal morbidity, mode and place of delivery, age, weight at admission, gestational age, diagnosis, relevant investigations, duration of stay and outcome.

Inclusion criteria: All the neonates who were admitted to the NICU of Narayana superspeciality hospital.

Exclusion Criteria: (A) Babies who came in the NICU for a few hours observation and were shifted to mother. (B) Any baby who could not be successfully resuscitated in labor room.

Survival was defined as the discharge of a live infant from the hospital. Data regarding birth weight, gestational age, stay in NICU, final cause of death was analyzed.

#### RESULTS

A total of 294 babies were admitted in this 3 year period in our NICU. Of these 294 babies, 174 were males and 120 were females. The ratio of the male 60% [174/294] and female 40% [120/294] neonates was 1.5: 1.Out of 294 babies, 285 baby's survived (96.9%) and 9 babies expired (3.1%).

In the very low birth weight (VLBW) group the survival was 95% (38/40) and in extremely low birth weight (ELBW) group it was 84.2% (16/19). In low birth weight (LBW) group 98.2% babies survived (57/58). Mortality was highest in ELBW group 40% [4/20] with the smallest birth weight recorded 550 grams. The mortality rate in other weight category was 5% [2/40] in VLBW and 1.7% [2/176] in LBW group. (Table 1).Total Survival of VLBW & ELBW together was 90%. [54/60] Out of 9 expired babies, 77.7% (7/9) were preterm and 22.2% (2/9) were term babies. Among preterm babies 42.8% babies (3/7) were below 30 weeks of gestational age, 2 28.5% (2/7) were in the age group of 30-34 weeks 28.5% (2/7) were between 35-37 weeks. Among expired babies sepsis 22.2% [2/9] and pulmonary hemorrhage 22.2% [2/9] were the predominant causes of death followed by hyaline membrane disease 11.1% [1/9], Hypoxic Ischemic encephalopathy (HIE)11.1% (1/9), CCHD 11.1% (1/9),NEC 11.1% (1/9), Pulmonary hypertension 11.1% (1/9) in these 9 babies.

Ischemic encephalopathy (HIE)11.1%(1/9), CCHD 11.1%(1/9),NEC 11.1% (1/9), Pulmonary hypertension 11.1% (1/9) in these 9 babies. (Table2). The total number of deliveries in these three years was 2160 and out of these 294 babies got admitted in the NICU which is 13.6% of all deliveries. The total number of death was 9. So, the neonatal mortality rate (NMR) in this study was 4.1 per 1000 live births.

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Table 1: NICU outcome in different birth weight groups

|          | <1 kg | 1-1.49 kg | 1.5-2.5 kg | >2.5 kg | Total |
|----------|-------|-----------|------------|---------|-------|
|          |       |           |            |         |       |
| Survived | 16    | 38        | 57         | 174     | 285   |
| Died     | 4     | 2         | 1          | 2       | 9     |
|          | 20    | 40        | 58         | 176     | 294   |

Table 2: Final cause of death in expired babies in different weight groups

| Primary cause of death        | Number | <1 kg | 1-1.49 | 1.5-2.5 | >2.5 | % of    |
|-------------------------------|--------|-------|--------|---------|------|---------|
|                               |        |       | kg     | kg      | kg   | expired |
|                               |        |       |        |         |      | babies  |
| Hyaline Membrane disease      | 1      | 1     | 0      | 0       | 0    | 11.1    |
| Sepsis                        | 2      | 1     | 1      | 0       | 0    | 22.2    |
| Necrotising Enterocolitis     | 1      | 1     | 0      | 0       | 0    | 11.1    |
| Congenital.Heart.Disease      | 1      | 0     | 0      | 0       | 1    | 11.1    |
| Hypoxic Ischemic              | 1      | 0     | 0      | 0       | 1    | 11.1    |
| Encephalopathy                |        |       |        |         |      |         |
| Pulmonary hemorrhage          | 2      | 1     | 0      | 1       | 0    | 22.2    |
| Severe Pulmonary hypertension | 1      | 0     | 1      | 0       | 0    | 11.1    |
| Total                         | 9      | 4     | 2      | 1       | 2    |         |

#### DISCUSSION

Accurate data on the morbidity and mortality are useful for many reasons. It is important for the providers of primary care, investigators, local and national health administrators, and for decision makers to design interventions for prevention and treatment and to implement and evaluate health care programs. The data from the NICUs of low resource settings is very limited<sup>4</sup>. In our study, the admissions of male babies 60%[174/294] were more than those of females 40%[120/294]. These may be related to the preference for the male child in the society and the biological vulnerability of the males to infection. The male preponderance for admissions has been documented in previous studies <sup>5</sup>. There is a great variation in neonatal mortality statistics between NICUs from different parts of the world. This variation probably reflects the difference in the attending population, antenatal care, admission criteria, specific exclusion & inclusion criteria and level of neonatal care. In some studies from Canada, Pakistan & Brazil mortality rates were 4% <sup>6</sup>, 9% <sup>7</sup>& 6% <sup>8</sup> respectively. Higher rates have been reported from Saudi Arabia (22.4%) <sup>9</sup>, Kenya (24.6%) <sup>10</sup> and Togo (27%) <sup>11</sup>.Data from national neonatal mortality to be 25.4 per 1000 live births <sup>12</sup>. The Neonatal Mortality Rate in our study was 4.1% per 1000 live births. The participating centers in the national database are all tertiary care centers in

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metropolitan cities; they are likely to have more high risk pregnancies than other centers. The newborns reported in this database are therefore likely to have more problems and so be sicker than others.

The mortality in ELBW babies in our unit is 20% [4/20] which is much lower than that reported in the national perinatal database, probably because of less number of babies. Sehgal et al, <sup>13</sup> have reported a mortality of 43% in a cohort of 52 ELBW babies. Roy et al, <sup>2</sup> have reported a mortality of 33.3%. Both of these reports are from tertiary care postgraduate institutes.

The mortality of VLBW babies in our unit is 5%[2/40] which is comparable to Roy et al study, reported to have 15.7% & national perinatal database reported to be 29.7%. Other study from India showed mortality of 36.9% <sup>4</sup>. The mortality in LBW group is 1.7%[1/58] which is also comparable to the national perinatal database (6.1%).

On analysis of the primary cause of death, it was found that sepsis and pulmonary haemorrhage were the leading causes of death 22.2% each followed by Hyaline membrane disease following at 11.1%. Birth asphyxia as the cause of death was seen in 11.1% of the babies in our unit as opposed to being the leading cause in the national perinatal database (28.8%). Basu et al <sup>4</sup> in a cohort of 260 cases, out of which 96 died, have reported birth asphyxia as the leading cause of death at 32.2% followed by respiratory distress syndrome at 23.96%. Sepsis as the cause of death in their unit is reported to be 7.29%. Garg et al <sup>14</sup> from a community level NICU have reported birth asphyxia as the leading cause of death followed by sepsis.

A low resource NICU has many inherent problems relating to the population catered by it. Population we cater to are mostly people with financial limitations. With the limited finances and time commitment the compliance of these patients is also suboptimal. Low resource hospitals have to work with these handicaps. For such units to work effectively it is wise to adopt certain policies by which "intensive care" is provided, but not necessarily "invasive care". Some such practices adopted in our unit are mother centered care, minimal invasive investigations, minimal use of central lines and TPN and pro-enteral feeding policy. Fernandez et al <sup>15</sup> have advocated usefulness of similar interventions for low resource NICUs. Agarwal et al <sup>16</sup> have shown the effectiveness of these simple interventions in a low resource teaching hospital and the reduction in mortality in their unit with these measures was statistically significant.

#### CONCLUSION

We conclude that the overall survival of newborns in our unit is comparable to many previously published reports. We advocate that more data be published from centers all over the country. More and more units providing intensive care should report their data and also contribute to the national database to increase the awareness in the variability of neonatal morbidity and mortality countrywide and the reasons behind them. In developing countries and especially in low resource areas more stress should be given to babies more than 1000 grams birth weight as it is in this group that the quality of care will have significant impact on "intact survival

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#### REFERENCES

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1. NFHS-3: Ministry of Health and Family Welfare, Govt. of India. Available at URL: http://www.mohfw.nic.in/NFHS-PRESENTATION.html. Accessed on 3rd September 2011.

2. Roy KK, Baruah J, Kumar S, Malhotra N, Deorari AK, Sharma JB. The maternal antenatal profile and the immediate neonatal outcome in VLBW and ELBW babies. Indian J Pediatr. 2006; 73: 669-73.

3. Lawn JE, et al. 4 million neonatal deaths: when? Where? Why? The Lancet, 5 March 2005; 365 (9462) : 891-900

4. Basu S, Rathore P, Bhatia BD. Predictors of mortality in very low birth weight neonates in India. Singapore Med J. 2008; 49: 556-60.

5. Nath Roy R, et al. The mortality pattern of the hospitalised children in a tertiary care hospital of Kolkata. Indian Journal of Community Medicine, 2008 Jul; 33(3):187-89.

6. Sankaran K, Chien LY, Walker R, Seshia M, Ohlsson A; Canadian Neonatal Network. Variations in mortality rates among Canadian neonatal intensive care units. CMAJ. 2002; 166: 173-178.

7. Tariq P, Kundi Z. Determinants of neonatal mortality. J Pak Med Assoc. 1999; 49: 56-60.

8. Zullini MT, Bonati M, Sanvito E. Survival at nine neonatal intensive care units in Sao Paulo, Brazil. Paulista Collaborative Group on Neonatal Care. Rev Panam Salud Publica. 1997; 2: 303-309.

9. Arafa MA, Alshehri MA. Predictors of neonatal mortality in the intensive care unit in Abha, Saudi Arabia. Saudi Med J. 2003; 24: 1374-1376.

10. Kasirye-Bainda E, Musoke FN. Neonatal morbidity and mortality at Kenyatta National Hospital newborn unit. East Afr Med J. 1992; 69: 360-365.

11. Agbere AD, Baeta S, Balaka B, Douti Y, Atakouma DY, Kessie K, Assimadi K. Neonatal mortality in the Tantigou pediatric hospital, Dapaong (north Togo) in 1984-1985 and 1994-1995. Bull Soc Pathol Exot. 1998; 91: 315-317.

12. National Neonatology Forum. Report of the National perinatal database 2002-2003. New Delhi 2004.

13. Sehgal A, Telang S, Passah SM, Jyothi MC. Maternal and neonatal profile and immediate outcome in ELBW babies. Indian Pediatr. 2003; 40: 991-995.

14. Garg P, Krishak R, Shukla DK. NICU in a community level hospital. Indian J Pediatr. 2005; 72: 27-30.

15. Fernandez A, Mondkar JA. Status of neonatal intensive care units in India. J Postgrad Med. 1993; 39: 57-59.

16. Agarwal R, Agarwal K, Acharya U, Christina P, Sreenivas V, Seetaraman S. Impact of simple interventions on neonatal mortality in a low-resource teaching hospital in India. J.Perinatol 2007;27;44-49.