

Original Research :

Morbidity and Mortality of NICU Graduates - One Year Follow-up

Dhawale Padmaja*, Mohanty NC.**

*Research scholar (Paediatric Nursing), **Professor of Paediatrics, MGM Medical College, Navi Mumbai 410218. Corresponding author: Ms. Padmaja Dhawale. Email: pummy28@gmail.com (Received in December, 2015; Review completed in Feb, 2016)

Abstract:

Introduction: Neonatal period provides a foundation for future health of a child. This period is very critical, compounded with several problems flowing out of prematurity, infections, various congenital anomalies and so on. India alone contributes to about 25% of infant mortality around the world. In spite of advances in perinatal and neonatal care, infant mortality is still very high in India, varying from single digit figure in Kerala to over-all 27/1000 live-births. Even one third of babies discharged after due care and successful treatment from hospitals die out subsequently at home within one year for which the exact causes have not been identified. This study was undertaken to ascertain morbidity and mortality among infants after discharge from NICU of a tertiary facility of MGM medical College, Navi Mumbai, India. **Objective:** To study the incidence of morbidity and mortality of low birth weight infants discharged from hospital retrospectively for period of one year from hospital record and further interviewing the parents / care-givers. **Study design:** Retrospective study of hospital records and parents' interviews. **Methods and materials:** Neonates admitted to NICU of MGM Hospital, Kalamboli, Navi Mumbai between 1st January, 2013 and 30th June, 2014 were included in the study. Cases of incomplete clinical data in record Data was recorded in predesigned proforma and were analyzed. **Results:** 471 neonates were admitted to NICU during the study period of one year. 57.32% (270) were females and 42.67% (201) were males. The initial cause for hospitalization

were neonatal sepsis (1.91%), respiratory distress syndrome (12.7%), birth asphyxia (11.25%), neonatal jaundice (14.64%), Meconium aspiration syndrome (5.73%), congenital anomalies (3.39%), IUGR (3.60%), convulsions (2.1%), preterm with low birth weight (37.15%) and miscellaneous causes (7.43%).

However, hospital records of 384 subjects, found to be complete for eligible for inclusion in the study. Again, parents of only 249 subjects could be contacted through home visit and or telephonic interview. The rest were excluded from the study, including 135 lost contact due to migration and / or incorrect contact number / address. Overall morbidity data was collected after discharge from hospital during first year of life prospectively by monthly home visits and or telephonic interview of any of the parents. Morbidities identified were fever associated with cold and cough (91.96%), diarrhoea (36.14%), failure to gain weight (12.85%), jaundice (1.60%), convulsion (0.8%), and developmental delay (1.2%). Overall mortality rate was 12.04%. 80% deaths occurred during first months and 16.66% were within first week of post-NICU discharge. 3.33% of deaths were from 1 month to sixth months of life. Neonates with birth weight <1500 g (VLBW) had poorer outcome as compared to others. **Conclusion:** Most common morbidities identified was respiratory infections, followed by diarrhoea and failure to thrive, particularly among the VLBW category. Many of them infants were found to have developmental delay, deserving appropriate measures and further follow-up. Most common cause of mortality

identified was due to extreme prematurity and very low birth weight of infants, community acquired pneumonia and those taken premature discharge against advise (DAMA).

Key words:

Neonatal morbidity, neonatal mortality, infant mortality, low birth weight

Introduction:

The neonatal period is a transition from intra-uterine to independent life and is a very vulnerable period due to several problems, physical and physiological. Most of these are preventable. (1,2) Of 25 million babies born in India every year, one million die within their first 28 weeks of life. India alone contributes to 25% of neonatal mortality around the world. as per the national family health survey-3 report. The current neonatal mortality rate (NMR) in India is 39 per 1000 live births. Neonatal death accounts for nearly 77% of all infant deaths (57/1000) and nearly half of under five child death (74/1000). (3) Preterm and low birth weight (LBW) babies are at increased risk of prenatal mortality and morbidity. (4) As per report sheet published in the lancet, the major direct causes of neonatal mortality are prematurity (27%), infection (26%), asphyxia (23%), congenital anomalies, tetanus (7% each) and diarrhea (3%).(5)

Very scanty data is available on neonatal mortality and morbidity pattern in India. Advancement in perinatal and neonatal care have significantly helped in reducing NMR in developed countries but the mortality and morbidity are still high in developing countries. (6) Moreover, under the NRHM plan, the level-2 neonatal care is certainly percolating to at least district headquarter level, albeit slowly. All medical colleges have taken the advantage in upgrading their new-born care facilities availing this central fund. However, it is feared that more than half of SNCU/NICU Graduates are believed succumb to death within three to six months from discharge. The exact reasons are required to be delineated. No study is

available on NICU Graduates followed-up in the community setting. To plan appropriate preventive strategies, we must have hard and reliable data in this regard as our national neonatal and perinatal database is silent on this aspect. Hence a preliminary study was undertaken on the morbidity pattern and survival pattern of neonates admitted to neonatal intensive care unit after their discharge from the tertiary care hospital located at Kalamboli, Navi Mumbai, Maharashtra, India; followed-up for one year.

Materials and methods:

This hospital and community based study was carried out in the MGM Medical College level-III NICU, in the department of paediatrics, Kalamboli, Navi Mumbai, Maharashtra, India from January 2013 to June 2014. The institutional ethical committee approved the study protocol. The NICU caters to the population of Raigad district and neighboring Panvel taluka of Navi Mumbai. Approximately 600 deliveries are conducted in year in the hospital; majority of patients are drawn from below poverty line. The NICU has bed strength of 16. Facility for phototherapy, surfactant administration, exchange transfusion, ventilators, CPAPS, CBC, micro-chemistry, ABG are available.

Inclusion criteria:

Records showing complete history, clinical diagnosis, appropriate investigations and management details were included in the study.

Exclusion criteria:

Neonates who were discharged on DAMA basis and those who were referred to other hospitals for non-availability of beds were excluded

Study process:

Parents of subjects were contacted through telephonic interview and home visits by the authors to complete essential data. The babies were further followed-up at high-risk new-born follow-up OPD

of the hospital, immunization clinic and / or by home visits / telephonic interview where ever needed; every month for first 3 months, every 2 months for subsequent 6 months and every 3 months until one year of corrected gestational age of the babies. Details of birth events, cause of NICU admission, course in hospital, final clinical diagnosis, discharge advise, growth parameters, immunization, details of morbidities and mortality if any, were entered in pre-designed and pre-tested proforma.

Statistics:

Data collected were complied and entered in MS excel spreadsheet and analyzed on completion of one year follow-up.

Results:

A total of 471 neonates were admitted to NICU during the study period of one year and 6 months. Out of this 57.32% (270/471) were female and 42.67% (201/471) were males. (Tab-1) The ratio of the female to male admitted was 1.3:1. Major causes of morbidity were neonatal sepsis (1.91%), respiratory distress syndrome (RDS) (12.7%), birth asphyxia (11.25%), neonatal jaundice (14.64%), Meconium aspiration syndrome (5.73%), congenital anomalies (3.39%), IUGR (3.60%), convulsions (2.1%), extreme

preterm with very low birth weight (37.15%) and miscellaneous conditions like loose stools etc (7.43%). (Tab-2 & 3)

Case records of 384 subjects out of 471 were found to be in order with complete data. Finally on their discharge from NICU, only 249 subjects could be contacted through home visits and or telephonic interview. 135 subjects could not be reached due to migration or incomplete address / contact number.

Overall morbidity data was collected after discharge from hospital during first year of life. Morbidities identified were fever associated with cold and cough suggestive of respiratory infections (91.96%), diarrhoea (36.14%), failure to gain weight (12.85%), jaundice (1.60%), convulsion (0.8%), and developmental delay (1.2%). (Tab-4).

12.04% of the babies expired due to various causes over one year and 6 months follow-up. Most of the deaths (80%) were during first months of life, (16.66%) were within first week of life, (3.33%) of death were during first sixth months of life (Tab-5). Common causes of deaths were - pneumonia and extremely low birth weight; particularly those had left against medical advice (DAMA).

Neonates with birth weight <1500g had poorer outcome as compared to those with birth weight > 2500g.

Table 1: sex distribution of neonates admitted in Level-III NICU

Sex	Frequency	Percentage(%)
Female	270	57.32%
Male	201	42.67%
Total	471	100%

Table 2: Morbidity profile of neonates admitted in NICU

Morbidity	Frequency	Percentage (%)
Neonatal sepsis	9	1.91
Respiratory distress syndrome	60	12.7
Birth asphyxia	53	11.25
Neonatal jaundice	69	14.64
Meconium aspiration syndrome	27	5.73
Congenital anomalies	16	3.39
IUGR	17	3.60
Convulsion	10	2.16
Prematurity / low birth weight	175	37.15
Miscellaneous	35	7.43
Total	471	100

Table 3: classification of neonates according to birth weight

Weight	No. of babies
<1.0 kg	08 (2.1%)
1.0 -1.5kg	66 (17.1%)
1.501-2.0kg	129 (33.6%)
2.01- 2.5	96 (25%)
2.501-3.0kg	54 (14%)
3.01-3.5kg	29 (7.6%)
3.501-4.0kg	0
4.01-4.5kg	02 (0.6%)
Total	384 (100%)

Table 4: Morbidity during first year of life after discharge from NICU

Morbidity	Frequency	Percentage (%)
Fever with cold and cough (? Viral URI)	229	91.96
Fever with watery diarrhoea	90	36.14
Weight loss/failure to gain weight	32	12.84
Jaundice	4	1.6
Convulsion	2	0.8
Developmental delay	3	1.2

Table 5: Mortality distribution according to month during first year of life

Mortality	Frequency	Percentage (%)
First week	05	16.66
Within one month	24	80
From 1-3 month	00	00
4-6 month	01	3.33
Total	30	100

Discussion:

Globally, it has been reported that preterm newborns have 13 times greater risk of death than full-term newborns,^{7,8} with babies born prematurely and small for gestational age at even higher risk of death.⁹ In low-resource ASEAN countries where high-technology equipment is not widely available in neonatal care, it is important that prevention of preterm births / LBW and application of effective interventions is given priority. Most preterm deliveries occur between 33 to 37 weeks and these babies have a good survival rate if they receive appropriate care for hypothermia, feeding, respiratory problems, jaundice and infections. These problems may not require the same level of intensive care technology as seen in developed countries for VLBW babies. Therefore in addition to good coverage of antenatal care, low cost interventions such as antenatal corticosteroids, breastfeeding and kangaroo mother care should be prioritized in the ASEAN region.^{10,11}

As low birth weight babies are expected to develop complications during infancy and further in life course, prevention and control of its determinants factors should be considered in primary health care settings in order to improve mother and child health.¹²

Infants born preterm are more likely to die during the neonatal period (first 28 days) and infancy (first year) and mortality rates increase proportionally with decreasing gestational age or birth weight.¹³

Another study suggests that preterm babies of least educated mothers were more at risk for infant death. Mothers' educational level is an important indicator of socioeconomic status. With increase in education level, a rise in socioeconomic status is anticipated. Higher socioeconomic status provides opportunity for better awareness of health issues and access to prenatal care. In United States,

babies born to least educated mothers were 2.3 times more at risk for infant death as compared to college graduates.¹⁴

Limitations of the current study is that a large number of babies got lost to follow-up as several of them, drawn from rural tribal hamlets of Raigarh district either could not be reached or did not wish to co-operate. Few more deaths and disabilities among them can not be denied; may be a cause for their reluctance to turn-up. Based on preliminary data of this study, a prospective study with larger population from a contiguous area within 10 Km radius is underway in order to ensure better and close follow-up.

Conclusion:

According to this study the leading cause of mortality seen is respiratory infections/pneumonia and extremely low birth weight those who have taken DAMA, whereas common morbidities reported was respiratory infection such as cold-cough, diarrhoea associated with fever, jaundice, convulsions, failure to gain weight, and developmental delay, which can be prevented by timely interventions and educating parents/caregivers on home care management of low birth weight infants.

What was known:

Morbidity and mortality of infants, particularly among pre-terms and LBW babies are high.

What the study adds:

Mortality of NICU Graduates in rural and sub-urban tribal community of Raigarh district among high risk neonates demanding NICU care was only 12% which is much less than expected. 80% of the deaths occurred within first one month of NICU discharge.

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Conflict of interest Declared: None.

Individual Role of Authors:

Dr. Nimain C. Mohanty: Concept, study design, supervision and editing

Ms. Padmaja Dhawale: Collection of data, analysis and drafting the paper

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