# PATTERN OF NEONATAL MORBIDITY AND MORTALITY IN THE NEONATAL INTENSIVE CARE UNIT

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## ABSTRACT

***Objective:*** To document the burden of different diseases, their pattern and outcome in neonates admitted to neonatal intensive care unit (NICU) of Combined Military Hospital (CMH) Malir Cantt, Karachi.

***Study Design:*** A descriptive study.

***Place and Duration of Study:*** The study was carried out in CMH Malir over a period of one year, from Jan 2011 to Dec 2011.

***Patients and Methods:*** Data of all admitted patients during the study period was reviewed and analyzed in terms of age, sex, weight, place and mode of delivery, cause of admission and their outcome. Diagnosis was made on clinical basis, radiological findings and laboratory investigations. Data were analyzed using SPSS version 18.

***Results:*** Total number of patients was 1020. Males were 556 (54.51%) and females were 464 (45.49%). The most common reason for admission was preterm/low birth weight (PT/LBW) i.e. 494 (48.43%) followed by neonatal sepsis which were 200 (19.61%), respiratory distress syndrome (RDS) 74 (7.25%), neonatal jaundice 65 (6.37%), meconium aspiration syndrome (MAS) 53 (5.20%), birth asphyxia (BAS) 51 (5%), transient tachypnea of newborn (TTN) 40 (3.92%), congenital malformations 27 (2.65%), infant of diabetic mother 9 (0.88%), neonatal seizures 6 (0.59%) and hemorrhagic disease of the newborn 1 (0.10%). The numbers of patients discharged were 947 (92.84%) and those patients who expired were 73 (7.16%). The commonest causes of death were PT/LBW 34 (46.57%) and neonatal sepsis 15 (20.55%).

***Conclusion:*** In our study the commonest causes of admission were PT/LBW and neonatal sepsis. Mortality was more for PT/LBW and neonatal sepsis both of which can be reduced by proper antenatal care, safe reduction in lower segment caesarian section (LSCS) and improvement in NICU care.

**Keywords:** Lower segment caesarean section, Mortality, Neonatal sepsis, Preterm, Spontaneous vertex delivery.



## INTRODUCTION

Nearly 130 million babies are born each year and 4 million die in the first 4 weeks of life; the neonatal period[1]. Neonatal period (0-28 days) is the most vulnerable period of life accounting for 37% of mortality under five years. Nearly 75% die in the first week of life and 40% die in the first 24 hours of life. In the developing countries the neonatal mortality is much more than that in the developed countries[2]. Preterm birth, low birth weight and lethal congenital anomalies are major causes of neonatal mortality[3]. Globally there has been a decline in infant and under five mortality rates in recent years, but neonatal mortality still remains the same. United Nations Millennium declaration was signed in 2000, since then there have been ever greater efforts to reduce mortality among children under five years of age. It will be difficult to reach the stated goal (to reduce the mortality rate by two-thirds by 2015) if we do not reduce the number of neonatal deaths[4].

Before 2000 there was given little importance in global policies to reduce the neonatal mortality but great attention has been made in recent years for the better neonatal outcomes by global organizations and local goverments[5]. By advancement in perinatal and neonatal care the neonatal mortality has been significantly reduced[6]. The improvement in neonatal mortality has largely been attributed to improved obstetrical and perinatal care which results in higher APGAR score and improved birth weight of babies. Better outcome and early discharge is

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possible by all these measures and result in better condition of the neonate[7]. Good NICU care gives better results and good neonatal out comes[8]. Neonatal mortality is still high in developing countries though most of the causes of neonatal mortality are preventable[9].

The aim of our study was to determine the major causes of mortality and morbidity in neonates admitted to our unit from Malir and surrounding areas.

## MATERIAL AND METHODS

This descriptive study was performed in the neonatal unit of Combined Military Hospital (CMH) Malir cantt Karachi from January 2012 to December 2012. CMH Malir is a class A Hospital of Pakistan Armed Forces hospitals. All live born neonates delivered in obstetrical unit of CMH Malir and those delivered in outdoor were admitted in Neonatal Intensive Care Unit (NICU) and were included in the study. Only intra uterine deaths were excluded from study. Patients who needed surgical intervention were also admitted. CMH Malir has a well equipped NICU with warmer, incubators and mechanical ventilators. The patient-nurse ratio is 15 to 1.

Admission papers of all the patients were analyzed who were admitted in year 2012 Records taken from the papers was entered into prepared proformas, which included information regarding age at admission, gestational age, place of delivery, mode of delivery, indication of admission, weight, sex, final diagnosis, and outcome. Diagnosis for prematurity and low birth weight was mainly clinical and was based on WHO definition for prematurity (live born neonates delivered before 37 weeks from 1st day of last menstrual period (LMP) and low birth weight (less than 2.5 kg). Intra uterine death was defined as birth of a baby after 28 completed weeks with no signs of life and were not included in study. Live birth was defined as baby delivered after 28 completed weeks with signs of life.

**Table-I: Patients age on admission.**

| Age of newborn on admission | No. of patients | % age |
|---|---|---|
| Newborn < 1day | 867 | 85.00 |
| Neonate 1-3 days | 40 | 3.92 |
| Neonate 3-7 days | 28 | 2.75 |
| Neonate 7-28 days | 85 | 8.33 |
| Total | 1,020 | 100.00 |

**Table-II: Weight distribution of patients on admission.**

| Weight of newborn on admission | No. of patients | % age |
|---|---|---|
| Less than 1 kg | 3 | 0.29 |
| 1 - 1.5 kg | 23 | 2.25 |
| 1.5 - 2.5 kg | 203 | 19.90 |
| 2.5 - 3.5 kg | 678 | 66.47 |
| 3.5 - 4.5 kg | 113 | 11.08 |
| Total | 1020 | 100 |

The preterm babies were given the diagnosis of prematurity, even if they developed some complications during stay like anemia, neonatal jaundice, apnea, aspiration, sepsis or hemorrhage except for respiratory distress syndrome (RDS) which was included as a separate entity. Sepsis was diagnosed clinically and on blood culture. Birth asphyxia was diagnosed on clinical basis and according to Sarnats staging and RDS clinically and on the basis of chest x-ray. Sample size was calculated using WHO calculator and sampling technique used was consecutive non probability sampling.

Data were entered and interpreted in SPSS version 18. Frequency and cross tables were formulated.

## RESULTS

Total number of patients was 1020. Males were 556 (54.51%) and females were 464 (45.49%) as shown in fig-1.

Most of the newborns were admitted on the first day of life as shown in table-I and most of the neonates weighed between 2500 to 3500 grams as shown in table-II.

6 (26%) with cardiovascular defects, 4 (17%) were dysmorphic/ Down syndrome, with gastrointestinal and musculoskeletal 2 (9%) each and with genito urinary anomalies were 1 (4%). The number of patients discharged was 92.84% and those patients who expired were 7.16% as given in table-III. The most common causes of death were PT/LBW 46.57% and in term babies it

**Table-III: Incidence and outcome of different diseases.**

| Preterm Babies | Discharge | Discharged % | Expired | Expired % | Total |
|---|---|---|---|---|---|
| PT/LBW | 460 | 93.12% | 34 | 6.88% | 494 (48.43%) |
| Multi organ failure/DIC | | | 11 | | |
| Sepsis | | | 10 | | |
| Aspiration | | | 05 | | |
| NEC | | | 05 | | |
| IVH | | | 02 | | |
| Apnea | | | 01 | | |
| RDS | 65 | 87.84% | 9 | 12.16% | 74 (7.25%) |
| Term Babies | | | | | |
| NN Sepsis | 185 | 92.50% | 15 | 7.50% | 200 (19.61%) |
| NN Jaundice | 65 | 100.0% | 0 | 0.0% | 65 (6.37%) |
| TTN | 40 | 100.0% | 0 | 0.0% | 40 (3.92%) |
| BAS | 43 | 84.31% | 8 | 15.69% | 51 (5%) |
| MCA | 23 | 85.19% | 4 | 14.81% | 27 (2.65%) |
| IDM | 9 | 100.0% | 0 | 0.0% | 9 (0.88%) |
| MAS | 50 | 94.34% | 3 | 5.66% | 53 (5.20%) |
| NN seizures | 6 | 100.0% | 0 | 0.0% | 6 (0.59%) |
| HDN | 1 | 100.0% | 0 | 0.0% | 1 (0.10%) |
| Total | 947 | 92.84% | 73 | 7.16% | (100%) |

Admission rate was more for patients delivered by lower segment caesarian section (LSCS) as compared to those delivered by spontaneous vertex delivery as shown in fig-2.

The most common reason for admission was preterm/low birth weight (PT/LBW) 48.43% followed by neonatal sepsis 19.61%, RDS 7.25%, neonatal jaundice 6.37%, meconium aspiration syndrome (MAS) 5.20%, birth asphyxia (BAS) 5%, transient tachypnea of newborn (TTN) 3.92%, congenital malformations 2.65%, infant of diabetic mother 0.88%, neonatal seizures 0.59% and hemorrhagic disease of newborn 0.10%. Among patients of congenital anomalies 8 (35%) were with central nervous system defects, was neonatal sepsis 20.55%.

## DISCUSSION

There is great variation in NICU admissions among different set ups. There are multiple factors which influence admission to NICU including individual NICU bonding[10]. In our study there was male predominance and admission rate was more for those delivered by LSCS than by SVD. Study done by Shahid et al at Military Hospital Rawalpindi also showed more hospital admission for children delivered by LSCS as compared to those delivered by SVD but in contrast to our study that had female predominance[11]. Another study carried out in

Nepal also showed male predominance[12]. Results from Pakistan Instituite of Medical Sciences also showed male predominance and more admission for babies born by LSCS[13]. The male predominance may be due to the fact that males are given more importance than the female.

In developing countries LBW is one of the most common causes of admission. Prematurity masks the clinical picture of many diseases. Mortality and morbidity is high for LBW and PT babies due to their immatutre organ functions and some specific disorders of prematurity[14]. The most common cause of admission in our study was also prematurity and low birth weight which accounted for about 48% of total admission. Majority of the babies weighed between 2500 to 3599 gm with 3 babies less than 1000gm. Study from Karachi also reported LBW/PT to be the most common cause with the lowest weight about 800gm[14]. Study by Shahid et al also reported same results (PT/LBW, 23%)[11].

Neonatal sepsis (19.61%), respiratory distress syndrome (7.25%), neonatal jaundice (6.37%), meconium aspiration syndrome (5.20%), birth asphyxia (5%), transient tachypnea of newborn (3.92%) and congenital malformations (2.65%) were the other important causes of admission in our study. Gauchan et al[15] reported neonatal jaundice (24.7%), sepsis (21.4%) perinatal asphyxia (19.2%), low birth weight (7.54%), meconium aspiration syndrome (4.32%) and Hyaline membrane disease (1.6%) to be the most common causes of admissions. About 44% newborn were admitted on the 1st day of life; whereas neonates admitted between 2nd to 5th day of life were about 30% in their study[15]. In our study too most of the babies were admitted during first to fifth day of life (88%). Reports from Hyderabad (Pakistan) showed prematurity (28%), neonatal sepsis (20%), birth asphyxia (13%) and neonatal jaundice (11%) to be the most common causes of admission to NICU[16].

The overall mortality in our study was 7.16% which is comparable to reports from Hyderabad (6.8%)[16] but is much lower than from study by Shahid et al[11] which showed mortality of about 22%. Mortality rates reported from other part of Pakistan is also much higher than our study like it is 38% in Larkana[17], 15% in Peshawar[18], 26% in Karachi[19] and 34% in Lahore[20]. The major causes of mortality in our study were PT/LBW (46.58%), neonatal sepsis (20.55%), respiratory distress syndrome (12.13%) and birth asphyxia (10.96%). The major causes of mortality reported from Hyderabad were PT/LBW (53%), birth asphyxia

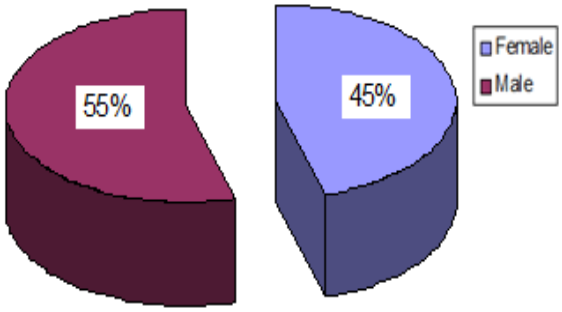


**Figure-1: Sex ratio of patients admitted in neonatal intensive care unit.**

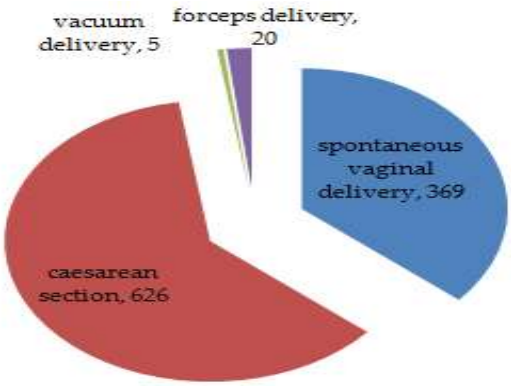


**Figure-2: Mode of delivery of babies admitted in neonatal intensive care unit during study period.**

(21%) and neonatal sepsis (9%)[21]. Mortality rates from India showed PT 25%, neonatal sepsis 21%, birth asphyxia 19% and respiratory distress syndrome 17%.

## CONCLUSION

In our study the commonest causes of admission were PT/LBW and neonatal sepsis. Mortality was more for PT/LBW and neonatal sepsis both of which can be reduced by proper antenatal care, safe reduction in LSCS and improvement in NICU care.

## CONFLICT OF INTEREST

This study has no conflict of interest to declare by any author.

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