Section: Paediatrics

Burden and Spectrum of Diseases in NICU of A Tertiary Hospital

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ABSTRACT

Background: To study the disease burden and its spectrum with emphasis on immediate neonatal outcome of babies admitted in NICU of a tertiary hospital. **Methods:** The study was conducted from 1 January 2018 till 31 December 2019. All newborns beyond gestational age 23, delivered in hospital where included in the study. Data were collected from the NICU admission register and death register in a pre-designed pro forma. **Results:** Total 6367 babies were delivered of which 55 babies were declared IUFD or stillborn. 1023 babies (162 per thousand live births) were admitted in the NICU and were analysed for study. Most admitted babies where in the gestation category of 28 to 33 weeks (19.5%), 34 to 36 weeks (31.9%) and 37 to 38 weeks (27.6%). Most common reasons for admission were NNH (30.5%), HIE 1 (24.6%), RDS (22%) and probable sepsis (14.2 %). Of all 95.1% babies were discharged home and 3.6% of babies died. **Conclusion:** As majority of NICU admissions require only high dependency care even in a tertiary hospital, in a low resource situation budgetary allocation should be directed to this area.

Keywords: NICU, Burden.

INTRODUCTION

Children face the highest risk of dying in the first month of life at an average global rate of 18 death by 1000 live births in 2018 (United Nations Inter-agency group for child mortality estimation (UN IGME) 2019.[1] Neonatal mortality rate in India even in 2019 holds between 20 to 25 whereas in the western world it varies between 1 to 5. Recently published reports suggest that India accounts for 14% of global neonatal death.[2] Although the state of West Bengal is not amongst the highest in neonatal mortality in India, still over the last few years the rate is gradually increasing (Govt of India Niti Aayog data. www.niti.gov.in).[3]

In the last few years there is massive improvement of the infrastructure the hospital facilities yet the death is not declining that much.[4] There are a number of factors affecting the neonatal mortality. This might be because the number of preterm delivery are increasing because of improvement in the IVF facilities in the government and also in private sectors.[5,6] Or there might be issues such as lack of appropriate facility, delays in the reporting referral may be lack of transportation. However one of the important issue always remains is the status of the NICU, its working load, staffing pattern which invariably affects the outcome.[6]

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Hence we wanted to examine the burden and the spectrum of diseases facing in the NICU of a tertiary care centre in the heart of a city, by analysis the data.

Aim:
The aim of the present study is to look at the disease burden and its spectrum with particular emphasis on the immediate neonatal outcome of babies delivered and admitted in a tertiary Hospital.

MATERIALS AND METHODS

A retrospective study of all newborns born and admitted at RKM Seva Pratisthan, a tertiary level University Hospital in the city of Kolkata. This hospital caters is a low to medium socio economic population residing in the city of Kolkata and in the surroundings. Being Private but charitable hospital, this hospital provides care for general population at a very nominal rate, yet with a well-managed modern NICU manned by postgraduate paediatric trainees and consultants. NICU is equipped with Ventilators including HFOV, CPAP, Bubble CPAP, HHFNC, Warmers, LED Phototherapy, Syringe pumps etc.

The study period was from first January 2018 till 31st December 2019.

Inclusion criteria:
All newborns admitted in NICU

Exclusion criteria:
Babies born below 23 weeks of gestation, all outborn babies.

The data were collected From the NICU admission discharge and death register in a predesigned pro forma.

Gestational age – confirmed gestation by ultrasound scan.

Birthweight – Martin electronic weighing scale and categorised into LBW less than 2500 g, VLWB – 1000 to 20 499, ELBW – less than 1000g.

Different disease spectrum evaluated:
1. **Respiratory morbidity–** Presented with RDS, TTN, PPHN, or maybe needing ventilatory support.
2. **Infectious morbidity–** Probable sepsis (where sepsis screen was positive and baby clinically unwell), or culture proven sepsis, or meningitis or pneumonia.
3. **CNS morbidity–** Baby presenting with HIE Hypocaemic Ischaemic Encepalopathy, seizures or Intra ventricular hemorrhage IVH.
4. **Jaundice or NNH Neonatal Hyperbilirubinemia–** Requiring phototherapy, exchange transfusion.

5. **Additional morbidities–** Such as hypoglycaemia anaemia congenital anomalies or feeding related issues - LBW infants needing feed establishment

Statistical analysis:
Analysis was performed using SPSS Vs 23 software and results were expressed as percentage with Median and IQR.

Ethical committee:
Necessary permission for data Collection and analysis were obtained from the concerned authorities.

RESULTS

Between 1st January 2018 and 31st December 2019 total number of deliveries was 6367, of which 6312 babies were live-born and 55 babies were declared IUFD or still born. The number of babies required admission in NICU was 1023 that gives an incidence of NICU admission 162 per 1000 live births. Altogether 1023 babies were analysed for the study.

Table 1: Summary of Basic Details

Basic Details	Mean ± SD || Median (IQR) || Min-Max || Frequency (%)
Gender	
Male	552 (54.8%)
Female	455 (45.2%)
Gestation (Weeks)	35.60 ± 3.20 || 36.00 (34.00-38.00) || 19.00 - 41.00
Gestation Category	
<28 Weeks	24 (2.3%)
28-33 Weeks	199 (19.5%)
34-36 Weeks	326 (31.9%)
37-38 Weeks	282 (27.6%)
≥39 Weeks	192 (18.8%)
Birth Weight (Kg)	2.30 ± 0.74 || 2.31 (1.78-2.86) || 0.30 - 4.73
Birth Weight	
<1 Kg	40 (3.9%)
1-1.5 Kg	91 (8.9%)
1.5-2.5 Kg	461 (45.1%)
≥2.5 Kg	431 (42.1%)
Delivery	
ND	285 (28.0%)
CS	733 (72.0%)
Maternal Age (Years)	27.59 ± 4.77 || 27.00 (24.00-30.00) || 17.00 - 47.00
Parity	
Parity Category	
P0	775 (76.2%)
P1	206 (20.3%)
≥P2	36 (3.5%)
IUGR (Present)	262 (25.6%)

552 (54.8%) of the babies were Male, 455 (45.2%) were Female showing a distinct male preponderance in NICU admission.

Table 2: Distribution of the Participants in Terms of Gestation Category (n = 1023)

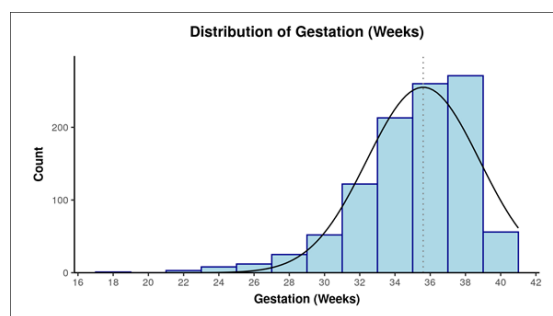| Gestation Category	Frequency	Percentage
<28 Weeks	24	2.3%
28-33 Weeks	199	19.5%
34-36 Weeks	326	31.9%
37-38 Weeks	282	27.6%
≥39 Weeks	192	18.8%
Total	1023	100.0%

Figure 1: Distribution of gestation

2.3% of the babies had Gestation Category: <28 Weeks, 19.5% had Gestation Category: 28-33 Weeks, 31.9% had Gestation Category: 34-36 Weeks, 27.6% of the participants had Gestation Category: 37-38 Weeks, 18.8% of the participants had Gestation Category: ≥39 Weeks. [Table 2]
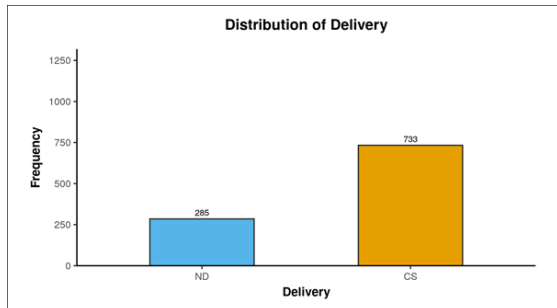

Figure 2: Distribution of delivery

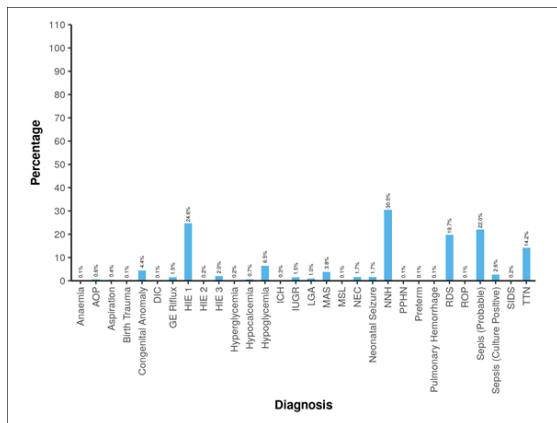In terms of delivery it appears that most babies needing NICU admission were born by C-section

Figure 3: Diagnosis

Amongst the major diagnosis 45 (4.4%) of the babies had Congenital Anomaly, 252 (24.6%) had HIE 1: 66 (6.5%) had Hypoglycemia 312 (30.5%) had NNH: 202 (19.7%) had a diagnosis of RDS, 225 (22.0%) had Sepis (Probable), 145 (14.2%) babies had Diagnosis: TTN

Amongst the most serious diagnosis babies requiring intensive care 27 (2.6%) of the babies had Sepsis (Culture Positive) 202 (19.7%) of the babies had RDS, 17 (1.7%) of had Neonatal Seizure, 17 (1.7%) of the babies had NEC: 39 (3.8%) had Diagnosis: MAS: 20 (2.0%) of the babies had Diagnosis: HIE 3. Only 1 baby had diagnosis of ROP, PPHN, IVH in each category respectively.

Table 3: Summary of Outcome

Outcome	Mean ± SD || Median (IQR) || Min-Max || Frequency (%)
Outcome	
Discharged	970 (95.1%)
DORB	9 (0.9%)
NICU Transfer	4 (0.4%)
Expired	37 (3.6%)

970 (95.1%) of the babies were Discharged, 9 (0.9%) left hospital against medical advice, 4 (0.4%) babies were transferred outside for various reasons, 37 (3.6%) of the babies unfortunately Expired.
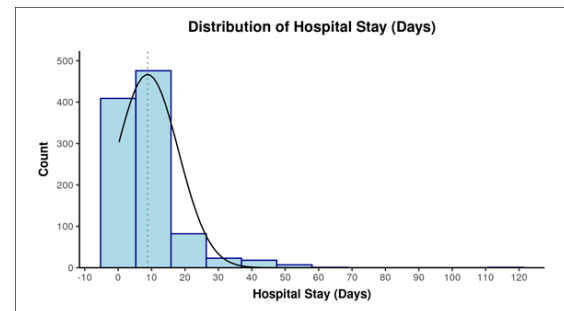

Figure 4: Duration of Hospital stay

The mean (SD) of Hospital Stay (Days) was 8.81 (9.22). The median (IQR) of Hospital Stay (Days) was 6.00 (4-10). The Hospital Stay (Days) ranged from 0.25 - 116.

DISCUSSION

Outcome of neonatal care is intimately associated with the state of the NICU, its workload and staffing pattern. As we observed between 1 January 2018 and 31 December 2019 the total number of live birth was 6312, that comes to approximately 3000 deliveries that is an average of a tertiary care hospital in any of the city in our country.

Of these approximate 500 deliveries needs in NICU admission in a year. By looking at the data it appears that most of the babies admitted are in the gestation category of 34 to 36 weeks and 37 to 38 weeks. And also being male sex is always a disadvantage having increased NICU admission.

When we analysed the main diagnosis of admission it appears that a major chunk of the babies are with jaundice (30.5%) needing intervention, a slightly lesser number of babies with sepsis (22% – probable sepsis, 2.6% – culture positive sepsis) and another major group babies with HIE stage 1, perhaps those babies requiring some resuscitation and may have suffered some asphyxia. This group of babies are mainly admitted for post resuscitation observational care.

The other important category is the group of babies are being admitted with respiratory morbidity either in the form of RDS or TTN (19% and 14% respectively).

The median IQR of hospital stay was 6 days. Although it's beyond the scope of our study we can postulate that this long median duration may be because of many of the babies would require feeding establishment, temperature management rather than real intensive care.

This NICU had a discharge rate of 96.4%.

Now if we leave those less than 28 weeks (approximately 2.3%) who mostly needs full

intensive care, and the other group of babies between 28 and 33 weeks (19%) who mostly required feeding establishment and temperature management, the remaining categories of the babies required only high dependency care. Although this is a single centred study with small numbers, it appears that we need to concentrate more on the high dependency care, in the form of budget allocation, and training the staff. Apart from more warmers, phototherapy units, we need to make provision for more KMC room, parental involvement in patient care.

CONCLUSION

In a low resource situation in order to improve neonatal morbidity and mortality, we need to develop higher dependency care area.

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