



## CLINICAL CAUSES FOR HOSPITAL STAY IN PRETERM INFANTS

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**ABSTRACT** **INTRODUCTION-** Worldwide it has been observed that premature babies contribute significantly to neonatal morbidities which are predominant cause of prolonged hospital stay and lead to increase in the risk of nosocomial infections, disturbances in biological rhythm and poor parent-infant emotional bonding after discharge. This study identifies clinical factors which are important in prolonged length of hospital stay. **METHODOLOGY-** Prospective observational study was conducted for a period of 9 months and details of neonates were documented. **RESULT-** 84 preterm newborns were screened. Birth weight & gestation have independent correlation with length of stay. There was no significant association of hospital stay with maternal illnesses. Jaundice was the most common neonatal illness. **CONCLUSION-** Identification of risk factors of prolonged length of stay as gestational age, birth weight, RDS, sepsis would be helpful in resource planning, commissioning of services, to aid clinician in their counseling of parents and to stimulate quality improvement initiatives.

**KEYWORDS :** preterm infant, clinical causes, hospital stay.

### INTRODUCTION

According to WHO every year about 15 million babies are born prematurely that is more than one in ten of all babies born globally. Preterm birth complications are the leading cause of death in children under 5 years of age, responsible for approximately 1 million deaths in 2015.<sup>1</sup> Preterm birth rates in Sub-saharan Africa and Southern Asia is 12.3% and 13.3% in comparison to 5-18% across 184 countries of the world.<sup>1</sup> In India out of 27 million babies born every year 3.5 million babies are born premature (12.96%).<sup>2</sup> In India Prematurity is number one cause of neonatal death(35%) followed by Birth asphyxia(20%), Pneumonia(16%), Sepsis(15%), Malformation(9%) and Diarrhoea(2%).<sup>2</sup> In India prematurity is also leading cause of Under 5 mortality after pneumonia.<sup>1</sup> More than 80% of preterm births occur between 32-37 weeks of gestation and most of these babies can survive with essential newborn care. However 25% of premature neonate require special newborn care for survival.

Morbidity in premature infants is higher than term infants.<sup>3-8</sup> Preterm infants are a unique group of patients because these infants are physiologically immature, they are extremely sensitive to small changes in respiratory management, blood pressure, fluid administration, nutrition, and virtually all other aspects of care. So these premature infants should be delivered in a facility with a high-risk obstetrical service and a level 3 or 4 neonatal intensive care unit. Worldwide it has been observed that these babies contribute significantly to neonatal morbidities and mortality. Premature babies are more likely to suffer both short term morbidities (Respiratory distress syndrome, apnea of prematurity, bronchopulmonary dysplasia, intraventricular hemorrhage, periventricular white matter disease, feed intolerance, necrotizing enterocolitis, perinatal and nosocomial infection, retinopathy of prematurity, anemia of prematurity, patent ductus arteriosus, hypotension, water, electrolyte and acid base imbalance) and long term morbidities (chronic lung disease, reactive airway disease, cerebral palsy, neurodevelopment delay, failure to thrive, blindness, hearing loss, pulmonary hypertension) than normal newborn.<sup>9</sup> This exposes them to additional diagnostic and therapeutic intervention and increases the duration of hospitalization and cost of treatment. Above mentioned short term morbidities are predominant cause of prolonged hospital stay and lead to increase in the risk of nosocomial infections, disturbances in biological rhythm and poor parent-infant emotional bonding after discharge.

The hypothesis of this study is to identify, explore and describe factors which are important in prolonged length of hospital stay. In developing countries like India it will also try to understand these factors which could help in optimizing of neonatal care and help health workers and

hospital management to develop intervention that may reduce length of hospital stay of newborn.

### AIM OF STUDY

To study clinical factors which influence length of hospital stay of premature infants.

### MATERIAL AND METHODS

**STUDY DESIGN:** Observational Prospective Study

**STUDY SITE:** Batra Hospital and Medical Research Centre, New Delhi

**STUDY SUBJECTS:** Preterm neonates (Gestation <37 weeks)

**STUDY DURATION:** From October 2017 to June 2018.

**INCLUSION CRITERIA:** The inclusion criteria would be Gestational age <37 weeks including inborn and outborn.

**EXCLUSION CRITERIA :** Neonates having major congenital malformations would be excluded from the study.

**OUTCOME :** The primary outcome of the study would be length of hospital stay (in days) Length of hospital stay (LOS) - Length of stay (LOS) is the time period between admission of the neonate to the Unit and discharge.

The discharge criteria that the study would use include the following:

1. Infant feeding completely from breast and/or spoon/cup
2. Baby has documented Weight gain of 20-30 gm/day for three consecutive days, and weight is more than 1.5 Kg.
3. Apnea free for 3 days
4. Maintaining normal body temperature on own
5. Baby is hemodynamically stable (normal capillary refill time, normal peripheral pulse)
6. Not on any injectable medication
7. Primary illness has resolved
8. Mother confident to look after her baby at home

Patients were divided in two groups

1. Those discharged in <7 days (Short stay)
2. Those discharged in ≥7 days (Long stay)

### DATA COLLECTION:

The parents of all neonates who were eligible for enrolment in this

study approached. They were explained in details about the study and also provided with a patient information sheet in the language they could understand. Neonates, whose parents or caregiver gave written consent, were enrolled into the study. Details of all neonates who were screened but could not be enrolled into the study along with reasons were carefully documented. All data were entered into a structured pretested proforma.

**RESULT AND CONCLUSION**

84 preterm newborns were screened, of whom 74 were enrolled into the study. Of the 74 enrolled subjects, 65 were successfully discharged. Other 9 did not complete the study as 4 of them died and 4 left study in midway.

Median (Range) gestational age for < 7 days was 35 (30-36) and for > 7 days it was 32.50 (28-36) Median (Range) birth weight for < 7 days was 1.896 (1.530-2.360) Kg and for > 7 days it was 1.551 (1.530-2.360) Kg. It may be concluded that birth weight & gestation have independent correlation with length of stay. Therefore units which handle infants with smaller gestation & smaller weight tend to have longer length of stay of these infants. (Table-1)

There was no significant (p>0.05) association of hospital stay with maternal illnesses. The mothers of 12.3% neonates had hypertension and the mothers of 15.4% neonates had hypothyroidism. In hypertensive mothers large number of neonate (62.5%) had >7 days stay (p value = 0.06). The percentage of other illness such as, Diabetes, Oligohydramnios, Hepatitis B, Leaking > 24 hours and Placenta praevia was found in 6.2%, 5%, 2%, 3% and 3% respectively. (Table-2)

Jaundice was most common neonatal illness (60%). Longer hospital stay was higher among those in whom respiratory distress, sepsis and jaundice was present than absent. The hospital stay of >7 days was 23.07 times significantly higher among those in whom respiratory distress was present. (OR=23.07, 95%CI=4.69-113.45, p=0.0001). The hospital stay of >7 days was also 14.08 significantly higher among those in whom sepsis was present.(OR=14.08, 95%CI=3.70-53.49, p=0.0001). Jaundice is also significantly associated with longer hospital stay( OR=12.63,95% CI=2.61-60.91,p=0.0001). Infants having neonatal morbidities & requiring intervention for it require longer length of stay in hospital. (Table-3)

**DISCUSSION**

In the Kotgal study<sup>10</sup>, the mean length of stay for babies between 1000-1250 g was 49 days and for those between 1250-1500 g, it was an average of 33.3 days. However it was noted that one of the reasons behind longer hospital stay of infants in Kotgal study<sup>10</sup> was that though they were similar in weight group, their gestational age was 2 weeks shorter than present study group. In a recent studies from an under resourced setting in Southern Africa, Mokhane et al<sup>11</sup> noted that the mean length of stay was 25 days in 31.2 weeks preterm infants, which is significantly higher than the present study. Once again difference seems largely due to difference in the gestation of infants enrolled in the study.

Present study concluded that low APGAR score, neonatal morbidities as RDS, sepsis and jaundice had a significant association in prolong hospital stay. Pulver et al<sup>12</sup> in their study on late preterm neonates had observed similar significant factors that contribute to prolonged hospital stay.

**RECOMMENDATIONS**

The longer stay in NICU care can be prevented by implementing various interventions as regular antenatal checkups with early and appropriate care of maternal illness and other standard of care like use of tocolytics to prevent delivery of premature and low birth weight baby. Promoting use of antenatal steroids to prevent respiratory distress syndrome, intraventricular hemorrhage and necrotizing enterocolitis, and use of antibiotic for premature rupture of membrane can be effective on survival rate of infants by eliminating prenatal infection.

Identification of key risk factors of prolonged length of stay as gestational age, birth weight, RDS, sepsis would be helpful in resource planning, commissioning of services, to aid clinician in their counseling of parents and to stimulate quality improvement initiatives.

**Table-1: Median gestational and birth weight in < 7 days and > 7 days preterm neonates**

Duration of stay	Gestational age in weeks Median (Range)	Birth weight in Kg Median (Range)
< 7 days	35 (30-36)	1.896 (1.530 – 2.360)
≥ 7 days	32.50 (28-36)	1.551 (0.970 – 2.000)
Average	33.75 (28-36)	1.723 (0.970 - 2.360)

**Table-2: Comparison of duration of hospital stay with maternal illnesses**

Maternal illnesses*	No. of children		Duration of hospital stay in days				OR (95%CI)	p-value
			>7		≤7			
	No.	%	No.	%	No.	%		
Diabetes	4	6.2	0	0.0	4	100.0	-	-
Hypertension	8	12.3	5	62.5	3	37.5	3.92 (0.84-18.28)	0.06
Oligohydramnios	5	7.7	2	40.0	3	60.0	1.33 (0.20-8.63)	0.76
Epilepsy	1	1.5	0	0.0	1	100.0	-	-
Hepatitis B	2	3.1	0	0.0	2	100.0	-	-
Hypothyroidism	10	15.4	3	30.0	7	70.0	0.81 (0.18-	0.78
Leaking > 24 hours	3	4.6	0	0.0	3	100.0	-	-
Placenta praevia	3	4.6	0	0.0	3	100.0	-	-

OR-Odds ratio, CI-Confidence interval, Ref: Reference, \*Multiple response

**Table-3: Comparison of duration of hospital stay with neonatal illnesses**

Neonatal illnesses	No. of children		Duration of hospital stay in days				OR (95%CI)	p-value <sup>1</sup>
			>7		≤7			
	No.	%	No.	%	No.	%		
Respiratory distress	33	50.8	20	60.6	13	39.4	23.07 (4.69-113.45)	0.0001*
Sepsis	17	26.2	13	76.5	4	23.5	14.08 (3.70-53.49)	0.0001*
Jaundice	39	60.0	20	51.3	19	48.7	12.63 (2.61-60.91)	0.0001*
IVH	2	3.1	1	50.0	1	50.0	2.00 (0.11-33.58)	0.62

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