

## Pre-discharge neonatal morbidity and mortality in extremely preterm babies managed at Sri Jayewardenepura Teaching Hospital

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### Abstract

**Introduction:** Global rate of preterm deliveries ranges from 5% to 18%. Out of them, babies with extreme prematurity pose a challenge to neonatologists due to associated high mortality and morbidity. Survival rate of extremely preterm babies is known to be 30-50% worldwide. Up to now Sri Lankan data regarding morbidity and mortality of extremely preterm babies are not available.

**Objectives:** To evaluate pre-discharge neonatal mortality and morbidity in extremely preterm babies managed at Sri Jayewardenepura Teaching Hospital.

**Method:** A retrospective cohort study was conducted from January 2010 to May 2017. Hospital records were utilised to obtain demographic data and details regarding morbidity and mortality. Results were collected to data collection sheet. Data analysis was done using SPSS software.

**Results:** There were 144 extremely preterm babies during the study period. Of them, 106 (73.6%) and 38 (26.3%) had extremely low birth weight and very low birth weight respectively. Ninety nine (68.8%) babies survived while 45 (31.3%) babies died. Of the deaths, 77.3% had occurred within the first two weeks of life. Commonest complications included surfactant deficient lung disease, sepsis, patent ductus arteriosus and hypotension. Average duration of hospital stay was 45 days for the survivors.

**Conclusions:** Overall survival of extremely preterm babies born at Sri Jayewardenepura

Teaching Hospital is 68.8%. Better survival is observed with advancing gestational age and higher birthweight. Commonest complications included SDLD followed by sepsis and PDA.

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(Key words: survival, complications, extreme prematurity)

### Introduction

According to the World Health Organisation (WHO), the global rate of preterm deliveries ranges from 5% to 18% with a wide regional variation and incidence is increasing<sup>1</sup>. Furthermore, it is the most important cause of death during neonatal period, accounting for over 75% of deaths<sup>1</sup>. Babies who are extremely premature, pose a challenge to neonatologists due to associated high mortality and morbidity. Improvement in obstetric and neonatal care has resulted in an improvement in survival of extremely preterm babies<sup>1</sup>. Yet, worldwide, mortality of extremely preterm infants remain at 30-50%<sup>1</sup>. Among survivors, there is a 20-50% risk of morbidity<sup>1</sup>.

According to the Family Health Bureau, neonatal mortality rate of Sri Lanka was 6 per 1000 live births in 2016<sup>2</sup>. Rajindrajith and co-workers have estimated that prematurity accounted for 33.2% of causes of neonatal deaths from 1997-2001<sup>3</sup>. In 2014, the leading causes for infant deaths were recognised to be congenital abnormalities (46%) prematurity (25%) and asphyxia (10%)<sup>4</sup>. There is a paucity of data regarding the survival and morbidity of preterm babies in Sri Lanka. According to Sri Lankan unpublished data, mortality rate is 50% to 100% in babies below 26 weeks of gestation<sup>5</sup>.

In a study conducted in Singapore which assessed mortality of extremely preterm neonates from 2000-2009, a survival rate of 80% was observed. Further, it was noticed that the survival rates have not changed over the studied decade and increasing gestational age was associated with better survival. Major complications identified were chronic lung disease (CLD) in 29%, late onset sepsis in 23%, severe retinopathy of prematurity (ROP) in 21%, Grade 3 to 4 intraventricular haemorrhage (IVH) in 12% and necrotising enterocolitis (NEC) in 9%<sup>6</sup>. Data from the Eunice Kennedy Shriver National


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Institute of Child Health and Human Development Neonatal Research Network on morbidity and mortality of extreme preterm babies born between 2003 and 2007 reveals rates of survival to discharge of 6% at 22 weeks and 92% at 28 weeks. Morbidities identified included surfactant deficient lung disease (SDLD) in 93%, patent ductus arteriosus (PDA) in 46%, severe IVH in 16%, NEC in 11% and late-onset sepsis in 36%<sup>7</sup>. EPICure 2 study emphasises that there are regional variations in the survival of extremely preterm babies, where better outcome is observed in level 3 neonatal units<sup>8</sup>. In a Canadian study to assess survival rates of neonates born at 23 to 30 weeks gestation from 2010 to 2011, 37% had survived without morbidities, 32% and 21% had survived with mild and severe morbidities, respectively and 10% had died. Predictors of survival identified were gestational age, small for gestational age, gender, use of antenatal corticosteroids, receipt of surfactant and mechanical ventilation on first day of admission and Score for Neonatal Acute Physiology version II more than 20<sup>9</sup>.

### Objectives

To evaluate pre-discharge neonatal mortality and morbidity and to identify gestational age specific and birth weight specific survival rates in extremely preterm babies managed at Sri Jayewardenepura Teaching Hospital.

### Method

A retrospective cohort study was conducted at Sri Jayewardenepura Teaching Hospital, which is a tertiary care hospital with 4000 births annually. All the live births of extreme preterm deliveries were included in the study. Extreme prematurity is defined as less than 28 gestation age<sup>10</sup>. Study period was from January 2010 to May 2017. Assessment of gestational age was according to

date of last menstrual period of mother and early dating scan. Where the gestational age was uncertain, maturity assessment done by the neonatologist within the first 24 hours of birth was taken as the gestational age. Data regarding gestational age, birth weight, gender, presence of intrauterine growth restriction, neonatal complications, mortality and duration of hospital stay of survivors were recorded from hospital records. Small for gestational age (SGA) is defined as birth weight less than 10<sup>th</sup> percentile for a particular fetal gestational age<sup>1</sup>. Growth charts published by Royal College of Paediatrics and Child Health were utilised to categorise babies into SGA<sup>11</sup>. Extremely low birth weight was defined as birth weight less than 1000g. Very low birth weight was defined as birth weight between 1000g and 1500g. Permission was obtained from the institutional review board. Data was analysed using SPSS software.

### Results

There was a total of 144 extremely preterm deliveries during the study period of which 73 (50.7%) were girls and 71 (49.3%) were boys. Seventy four (51.3%) babies were SGA. One hundred and six (73.6%) babies had extremely low birth weight and 38 (26.3%) had very low birth weight. Ninety nine (68.8%) babies survived while 45 (31.2%) babies died. Out of the babies who died, 34 (77.3%) deaths had occurred within the first two weeks of life. Six (13.3%) of deaths occurred after 28 days, but before discharge. In the survivors, the average number of hospital stay was 46 days, 24 (24.2%) babies having a hospital stay exceeding 60 days.

Table 1 describes the gestational age specific survival. Survival rates have progressively increased as the gestational age has increased.

**Table 1: Gestational age specific survival**

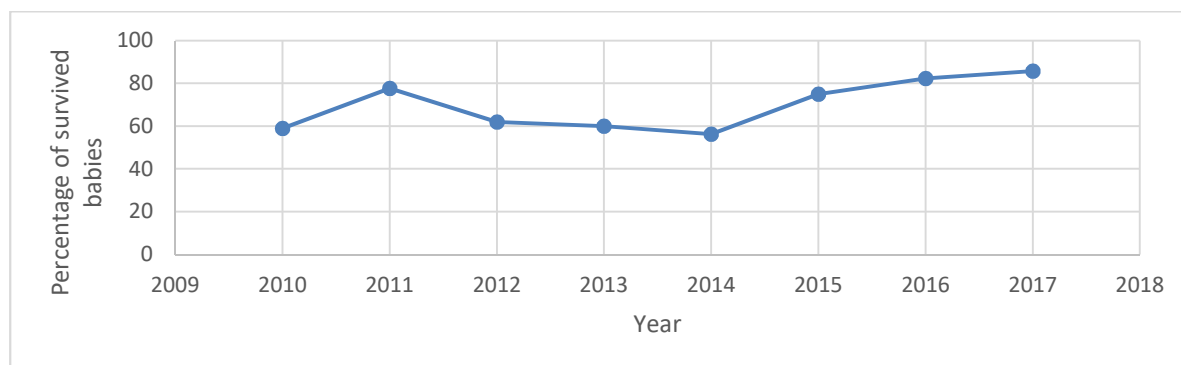
Gestational age	Total number (%) of babies	Number (%) of babies who survived
Less than 25 weeks	12 (08.3)	02 (16.7)
25 weeks	13 (09.0)	03 (23.1)
26 weeks	24 (16.7)	15 (62.5)
27 weeks	41 (28.5)	33 (80.5)
28 weeks	54 (37.5)	46 (85.2)

Table 2 describes birth weight specific survival. None of the babies with birthweight less than 500g has survived in our cohort. Better survival is observed with better birth weights.

Figure 1 depicts the trend of survival over the study period and demonstrates that survival has improved over the years.

**Table 2: Survival according to birth weight**

Birth weight	Total number of babies	Number (%) of babies survived
Less than 500g	02	0 (0)
500g-1000g	104	65 (62.2)
>1000 g	38	34 (89.5)



**Figure 1: How survival has changed over the study period**

All babies had SDLD and 134 babies (93.1%) required mechanical ventilation and surfactant administration. Twenty nine (20.1%) babies had hypotension needing inotrope administration. Grade 3 and 4 IVH was present in 20 (13.9%) babies. Eleven (7.6%) and 7 (4.9%) babies had pneumothorax and pulmonary haemorrhage respectively. Thirty six (25%) babies had sepsis and 37 (25.7%) babies had PDA. Seven babies with PDA required surgical closure while 30 (81.1%) babies were medically managed successfully. Only 4 (2.8%) babies had NEC. CLD was observed in 17 (11.8%) babies.

#### Discussion

Our statistics show that 50% survival rate could be obtained in babies born at 26 weeks of gestation or more. However, studies with larger number of babies managed at different centres across the island are needed before drawing crucial decisions on viability.

Overall survival of 68.8% in our study cohort is comparable to survival rates described in the rest of the world<sup>1,7</sup>. Rates of survival tend to increase with increasing gestational age, survival rate which is only 16.7% at less than 25 weeks of gestation reaching 85.1% at 28 weeks of gestation. This has been demonstrated in previous studies as well. Further, the overall survival rates have improved during the study duration. Improved knowledge and experience regarding managing preterm babies, better obstetrics care, implementation of infection control strategies, use of advanced ventilation methods and improvement in nursing skills in managing extremely preterm babies might have contributed to this success. However, survival of babies born at 25 weeks or less remains very low.

Our babies show low incidence of NEC compared to western statistics; however the incidence of sepsis is higher in our population of neonates. Therefore, infection control should be optimised in our neonatal units. As the survival is improving we need to focus more on long term outcome of these babies, particularly, neurodevelopmental outcome.

Instituting early developmental care in the neonatal intensive care unit, prevention of development of IVH and ROP should get more attention. Further studies are needed to evaluate the long-term morbidities of survivors.

#### Conclusions

Overall survival of extremely preterm babies born at Sri Jayewardenepura Teaching Hospital is 68.8%. Better survival is observed with advancing gestational age and higher birthweight. Commonest complications included SDLD followed by sepsis and PDA.

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