

NEONATAL INTENSIVE CARE UNIT HOSPITALIZATION OF VERY LOW BIRTH WEIGHT JAPANESE INFANTS WITH CONGENITAL HEART DISEASE

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ABSTRACT

The lack of study regarding the duration of neonatal intensive care unit (NICU) hospitalization of very low birth weight (VLBW) infants (< 1500g) with congenital heart disease (CHD) necessitated this study. Retrospective data of all infants weighing <1500 g with a gestational age (GA) < 37 weeks at birth were obtained from the NICU of Tokyo Metropolitan Hachioji Children's Hospital in Tokyo, from January, 1997 to December, 2001. Of 1515 admissions, 189 (12.5%) weighed <1500 g at birth, with weight ranging from 377 g to 1496 g (mean 1060.6 g, 283.3 SD). CHD was diagnosed in 20 (10.6%) of infants. The male to female ratio was 1:1.5. In CHD patients, birth weight ranged from 554 g to 1473 g (mean 1029.8 g, 243.5 SD), GA ranged from 24 to 36 weeks (mean 29.4, 3.5 SD) and the length of hospitalization ranged from 3 to 154 days (mean 74.6 days, 43.8 SD; median 68 days). Patent ductus arteriosus was diagnosed in all infants with GA <27 weeks. Three infants (16.7%) with CHD died in NICU. Establishment of the mean duration of NICU hospitalization in CHD infants may help to improve the planning and management of resources required for NICU care and counseling of parents.

Key Words: Neonatal intensive care unit (NICU) hospitalization, congenital heart disease (CHD), Japan

INTRODUCTION

Very low birth weight (VLBW, <1500 g) and extremely low birth weight (ELBW, <1000 g) infants require longer periods of hospitalization in the neonatal intensive care unit (NICU) where specialized staff, sophisticated equipment and specialized hospital management is available, but comes at a high cost.¹ In Japan, 0.66% of total births are categorized as VLBW infants.² The lack of data regarding neonatal intensive care unit (NICU) hospitalization of Japanese VLBW infants with congenital heart disease (CHD), necessitated this study.

METHODS

This study was conducted in Tokyo Metropolitan Hachioji Children's Hospital, Hachioji city, Tokyo, Japan. Five years (January, 1997 to December, 2001) of retrospective data was analyzed to determine the duration of NICU hospitalization. Anthropometric and clinical data were obtained from infants weighing less than 1.5 kg with a gestational age (GA) of less than 37 weeks.³ Birth weight was recorded within 24 hours of birth. CHD, which was diagnosed during NICU hospitalization, was diagnosed based on physical examination,

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Table I : Distribution of birth weight and gestational age (GA) in all infants weighing less than 1500g and infants with congenital heart disease admitted to the neonatal intensive care unit (NICU) of Tokyo Metropolitan Hachioji Children's Hospital in Tokyo, Japan between 1997 and 2001

GA (Weeks)	Birth weight in gram					Total	Percentage
	< 500	500-749	750-999	1000-1249	1250-1499		
22-23	3	2	-	-	-	5 (0)	2.6
24-25	-	16 (1)	14 (2)	-	-	30 (3)	15.9
26-27	1	3	24 (2)	7 (2)	2	37 (4)	19.6
28-32	1	5 (1)	12 (3)	36 (3)	42 (1)	96 (8)	50.8
33-37	-	1 (1)	-	4 (1)	16 (3)	21 (5)	11.1
Total	5 (0)	27 (3)	50 (7)	47 (6)	60 (4)	189 (20)	
Percentage	2.6	14.3	26.5	24.9	31.7	100.0	100.0

Number in bracket () indicates the number of infants with congenital heart disease.

clinical, electrocardiographic, echocardiographic and angiographic studies. Informed consent from the parents or guardians was obtained according to the hospital's regulations.

RESULTS

Of 1515 NICU admissions over a 5 years period, 189 (12.5%) infants weighed less than 1.5 kg at birth, with weight ranging from 377 g to 1496 g and the male to female ratio was 1:0.95. Twenty (10.6%) infants with CHD were admitted to the NICU during the study period (1.3% of all NICU admissions). The male to female ratio of these infants was 1:1.5. The mean birth weight ranged from 554 g to 1473 g (mean 1029.8 g, 243.5 SD; median 1003.5 g), GA ranged from 24 to 36 weeks (mean 29.4, 3.5 SD; median 28.5 weeks) and the duration of NICU hospitalization ranged from 3 to 154 days (mean 74.6 days, 43.8 SD; median 68 days). Of the infants with CHD, 7 (35.0%) had a GA <27 weeks. CHD was diagnosed in 10 infants with VLBW & in 10 infants with ELBW (Table 1). Infants with CHD, extremely low birth weight (ELBW), and GA <27 weeks were hospitalized in the NICU for an average of 84.9, and 65.9 days, respectively.

Patent ductus arteriosus (PDA) was diagnosed in all neonates with GA <27 weeks. Other cardiac anomalies diagnosed during hospitalization included ventricular septal defect (VSD), atrial septal defect (ASD), pulmonary stenosis, coarctation-complex and dextrocardia. PDA was the most common (75%) cardiac condition diagnosed during NICU hospitalization. Five infants with CHD had non-cardiac anomalies. They were: PDA with gastric rupture, double outlet right ventricle & 18-Trisomy with esophageal atresia, VSD & 18-Trisomy with anal atresia, ASD with inguinal hernia, and dextrocardia with scoliosis. Respiratory distress syndrome was diagnosed in 85.7% infants with CHD and GA <27 weeks. Twelve (60.0%) infants with CHD had metabolic disorders. Three infants (16.7%) with CHD died after NICU hospitalization for 13, 8, and 3 days.

DISCUSSION

The median duration of NICU hospitalization of Japanese infants with birth weight <1.5 kg, and CHD, was 68 days. This duration is slightly less than the overall length of NICU hospitalization of all infants with birth weight less than 1500 g in our NICU (mean 81.1 days, 48.4 SD; median 77 days, and range 1-371 days). A wide range in the duration of NICU hospitalization was observed.

By 22 weeks GA, fetal weight reaches an average of 500g & the heart weighs about 4g.⁴ The adaptation of the cardiopulmonary system is one of the most dynamic and sudden physiological changes to occur in human neonates.⁵ Hence, knowledge of length of hospitalization is important not only for the management of infants but also study of course of CHDs in NICU set up.

PDA is the most common congenital heart condition in infants with a birth weight less than 1.5 kg and a GA of <27 weeks. This is more likely to happen in premature neonates with respiratory distress syndrome.⁶ Neonates with CHD may not be diagnosed in the neonatal period for various reasons such as oversight of diagnosis, masking of symptoms due to systemic problems leading to cardiac failure, early intervention, or transfer of the patient to better centers. Previous investigators has highlighted a rapid diagnosis and an appropriate management is the key to reducing mortality and morbidity in delicate neonatal population.⁷

Our study addresses the duration of NICU hospitalization in Japanese neonates with CHD. Establishment of the mean duration of NICU hospitalization in CHD infants may help to improve the planning and management of resources required for NICU care and counseling of parents.

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