Report of the Malaysian National Neonatal Registry 2010

Study of critically ill babies in Neonatal Intensive Care



EDITOR:

• Irene Cheah Guat Sim

WITH CONTRIBUTIONS FROM:

• Chee Seok Chiong • Jimmy Lee Kok Foo • Boo Nem Yun • Soo Thian Lian • Neoh Siew Hong
• Teh Siao Hean • Chin Choy Nyok

Perinatal Society of Malaysia

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Malaysian National Neonatal Registry 2010

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NEONATAL INTENSIVE CARE UNITS

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Important information

Disclaimer

There is a potential that data for previous years printed in this report are different from what were printed in previous reports. This is because analysis for this report is based on latest dataset in the web which may have been updated by SDP.

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CONTENTS

FOREWORD

This is the sixth printed edition for the annual report of the Malaysian National Neonatal Registry for the study year 2010. The registry in the year 2010 comprised 33 out of 40 NICUs in government hospitals, and one from a university hospital. About fifty-six percent of deliveries in Malaysia conducted in the participating hospitals, out of whom 11769 babies in 2010 fulfilled the MNNR study criteria.

The steering committee would like to thank the Director General of Health Datuk Dr. Norhisham Abdullah, the head of Pediatric Activity, Dato. Dr Hussain Imam and the head of Clinical Research Centre, Dr. Goh Pik Pin for their constant support. The commitment and hard work of the individual staff of the participating centres to key in the data on line and the MNNR secretariat are to be highly commended.

The MNNR has enabled the readily available data for epidemiology, workload and outcome to be readily accessible and having an online system data entry that been updated with data entry rules over the years has made data cleaning easier. Thus, it is hope that future reports will be timelier.

Several papers from MNNR data been published and quality intervention workshops have been held where improvement is required based on the registry findings. All the NICUs in this registry have access to their performance as compared to the benchmark and continue to strive to provide better care through audit and quality improvement.

Dr. Irene Cheah Guat Sim

Chairman,

Malaysian National Neonatal Registry

SUMMARY

The inclusion criteria for this study in 2010 were all preterm babies below 32 weeks gestational age, those of birth weight below or equal to 1500 g, all cases with significant congenital anomalies admitted to the NICUs, all babies who were ventilated, all neonatal deaths and a new criteria introduced in 2010 – all infants with hypoxic ischaemic encephalopathy.

In 2010, there was 269,012 births in the 34 participating centres. A total of 11685 babies, who were in level III NICUs, met the study criteria, 9930 were inborn whilst 1797 were outborn infants. There were 3320 preterm babies below 32 weeks gestational age, and 3699 babies were of birth weights of 1500 g and below.

Results:

- In 2010, 67% of mothers who were less than 32 weeks' ges*tation received a*ntena*tal steroids,* an increment from 60% in year 2008. There were marked differences in the use of antenatal steroids across centres, varying from 40-100% of preterm babies below 32 weeks gestational age (GA) (Figures 15a and b, Table 15)
- 10,080 babies (86% of the overall cohort) required some form of respiratory support. Of these, 7608 (75%) received ventilatory support and the rest CPAP support. . Compared to previous years, the proportion of babies requiring ventilatory support had increased by 10% to 41% of those babies of less than or equal 32 weeks' gestation and less than or equal to 1500 g birth weight. Mean ventilator days for those between 751-1000gm birth weight was 15 days, those 1001-1250gm whilst those of birth weight was 8.8 days and those of 1251-1500 gm birth weight was 5.5 days
- Continuous positive airway pressure support as a mode of respiratory support used alone in 25% of the babies, with the highest rate of CPAP only (65%) in the larger preterm babies of more than 32 weeks' gestation and more than 1500 g birth weight.
- Seventy three percent, of babies $\leq$ 1500 gm birth weight (2,717 babies) had Respiratory Distress Syndrome and 80% of them required ventilatory support. Seventy seven percent of them treated with surfactant.
- The rates of chronic lung disease (the requirement for oxygen supplementation) for the survivors between 501-1000 g BW at Day 28 and 36 weeks post-conceptional age were 51% and 29% respectively. The rates among survivors with birth weights 1001-1500g were 16% and 11.6% at Day 28 and 36 weeks post-conceptional age respectively.
- Four hundred and seventy-five babies (4%) of the entire cohort had developed pneumothorax associated with mortality of 40.8%.
- The incidence rate for ventilated meconium aspiration syndrome (MAS) was 3.2 per 1000 live births. The overall mortality for babies ventilated for MAS was 14.4%.
- Eight hundred and ninety babies (3.3 per 1000 live births) who admitted to the 34 participating centres diagnosed to have mild to severe hypoxic ischaemic encephalopathy (HIE). These 890 babies formed 7.6% of the 11727 babies recruited in the MNNR. Death occurred in 18% of the babies with HIE. Mortality was much higher in infants with severe HIE as 61% of them died.
- Among the inborn babies $\leq$1500 g who underwent cranial ultrasound examination, 294 (10.4%) had Grade 3 or 4 of IVH. The combined associated mortality rate from Grade 3 and 4 IVH was 59%.
- Among the 969 inborn babies with gestational age < 32 weeks who underwent ROP screening before discharge, 50 (5%) had ROP stage 3, four (0.4%) had ROP stage 4 and one with ROP stage 5.

- Two hundred and two (7%) of the inborn VLBW babies developed necrotizing enterocolitis (NEC). This was a higher rate than that of year 2008 of 4.2%. Twenty four percent of these babies required surgery.
- 14.4% (1689/11727) of babies in the total cohort had congenital anomalies. Among term babies with congenital anomalies, the mortality rate was 30%.
- Thirteen percent (13%) of babies below 1501 gm birth weight had had one or more episodes of confirmed bacterial sepsis. In this group, mortality rate associated with infection was 30%. The infection rate was highest (22%) in the < 28 weeks gestation group followed by 12% in the 28-31 weeks' group.
- The average survival rate of babies of birth weight between 500-1001 gm was 47.5% and that for babies between 1001-1500 gm birth weights was 86.4%. . Survival rate of inborn live births of birth weight above 1500 gm was 98%.
- The survival rate of babies between 1000-1499 g birth weight in 29 out of the 34 centres were 85% and above, the key performance index for Level III NICUs. There was a variation in survival rate across centres, varying from 80-100%

Study recommendations include collaboration with Obstetrics and Primary Healthcare staff:

- Enhance the use of antenatal steroids and continue with in-utero transfer of high-risk pregnancies.
- Reduce the number of post term deliveries and to reduce the risk of thick meconium stained liquor.
- to review preventable HIE cases

And in the NICUs:

- To continue to promote the use of continuous positive airway pressure as early as possible after birth to reduce need for mechanical ventilation for larger preterm infants
- To reduce the risk of pneumothorax
- To enhance infection control in the NICUs.
- To increase availability of nitric oxide in state hospitals to reduce mortality from PPHN .

To increase ROP screening before or soon after discharge

Report of the Malaysian National Neonatal Registry (MNNR) 2010

1. Organization of the MNNR

1.1 Objectives

The Malaysian National Neonatal Registry was set up in 2002 to study the outcome of sick babies admitted to Neonatal Intensive Care Units (NICUs) in the country. A minimum data set and a data collection system at a national level are important to monitor mortality and morbidity of babies admitted to NICUs.

The Malaysian NNR aims:

1. To determine the frequency and distribution of critically ill neonates in Malaysia. These are useful measures of the health burden of neonatal critical illnesses and its care in the country.
2. To study the mortality and some morbidity outcomes of babies admitted to NICUs in participating hospitals.
3. To calculate the perinatal, neonatal, and stillbirth mortality rates of inborn babies.
4. To compare the outcomes between various centres.
5. To develop indicators for standard of care in various areas e.g. acceptable septicaemic rates in NICUs.
6. To study, in further detail, the outcome of very low birth weight babies.
7. To stimulate and facilitate research on neonatal critical illness and its management.

1.2 Structure

The MNNR consists of a Governance Board, Steering Committee and administrative staff. The Governance Board is to monitor and to direct the functions of MNNR and it meets at least once a year.

The Steering committee consists of nine members, eight of whom elected. The ninth member was appointed based on expertise and involvement in the development of the 'congenital anomalies' section of the registry. This committee is responsible for the general running and decision-making of the Registry and for approving the use of its data.

A Clinical Nurse Manager assisted by a clinical research officer and one clinical research assistants heads the administrative staff at the Neonatal Registry Unit (NRU). Statistical support provided by the CRC.

1.3 Funding

Funding was provided via Clinical Research Centre (CRC) of Ministry of Health, Malaysia, the Perinatal Society of Malaysia & sponsors from industry

2. Data Set

2.1 Participating Centres in 2010:

1. Hospital Ampang
2. Hospital Batu Pahat, Johor
3. Hospital Bintulu, Sarawak
4. Hospital Raja Permaisuri Bainun, Ipoh, Perak
5. Hospital Kajang, Selangor
6. Hospital Keningau, Sabah
7. Hospital Kuala Lumpur
8. Hospital Likas, Kota Kinabalu, Sabah
9. Hospital Melaka, Melaka
10. Hospital Umum Miri, Sarawak
11. Hospital Pulau Pinang, Pulau Pinang
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33. Hospital Tuanku Ja'afar, Seremban, N.S
34. Hospital Universiti Sains Malaysia, Kelantan

Centre numbers allocated to centers were different from the numbers above.

2.2 Registration criteria

The MNNR audit of critically ill babies admitted to Neonatal Units (NNUs) included

A. All babies admitted to a Neonatal Unit who have any of the following criteria:
   1. Had a gestation of <32 weeks i.e. up to 31 weeks + 6 days
   2. Had a birth weight of 1500 g and below.
   3. Required respiratory support (ventilated or required CPAP)
   4. All neonatal deaths (i.e. newborn babies (<28days) who die in the NNU, delivery room i.e. operating theatre, labour room, and in other wards)

.

B. All infants with major congenital anomaly/anomalies
C. All infants with hypoxic ischaemic encephalopathy

Both inborn and outborn babies will be included.

Outborn babies who die before arrival are excluded. Babies who admitted to the NNU at a corrected gestation of > 44/52 not considered a neonatal case and hence omitted from the study.

2.3 Data Collection

The CRF consisted of four sheets (of forms).

- Babies discharged or transferred out to non-paediatric wards (e.g. paediatric surgical wards) in the same hospital or to other hospitals will have only one set of CRF completed and readmission of the same babies into the NNU will require a new set of CRF.
- A baby who was transferred between neonatal and paediatric wards under the same department was considered to be the same admission and the discharge CRF was completed after complete discharge from the hospital. Hardcopy CRFs used and completed CRFs sent to MNNR secretariat after a defined period.

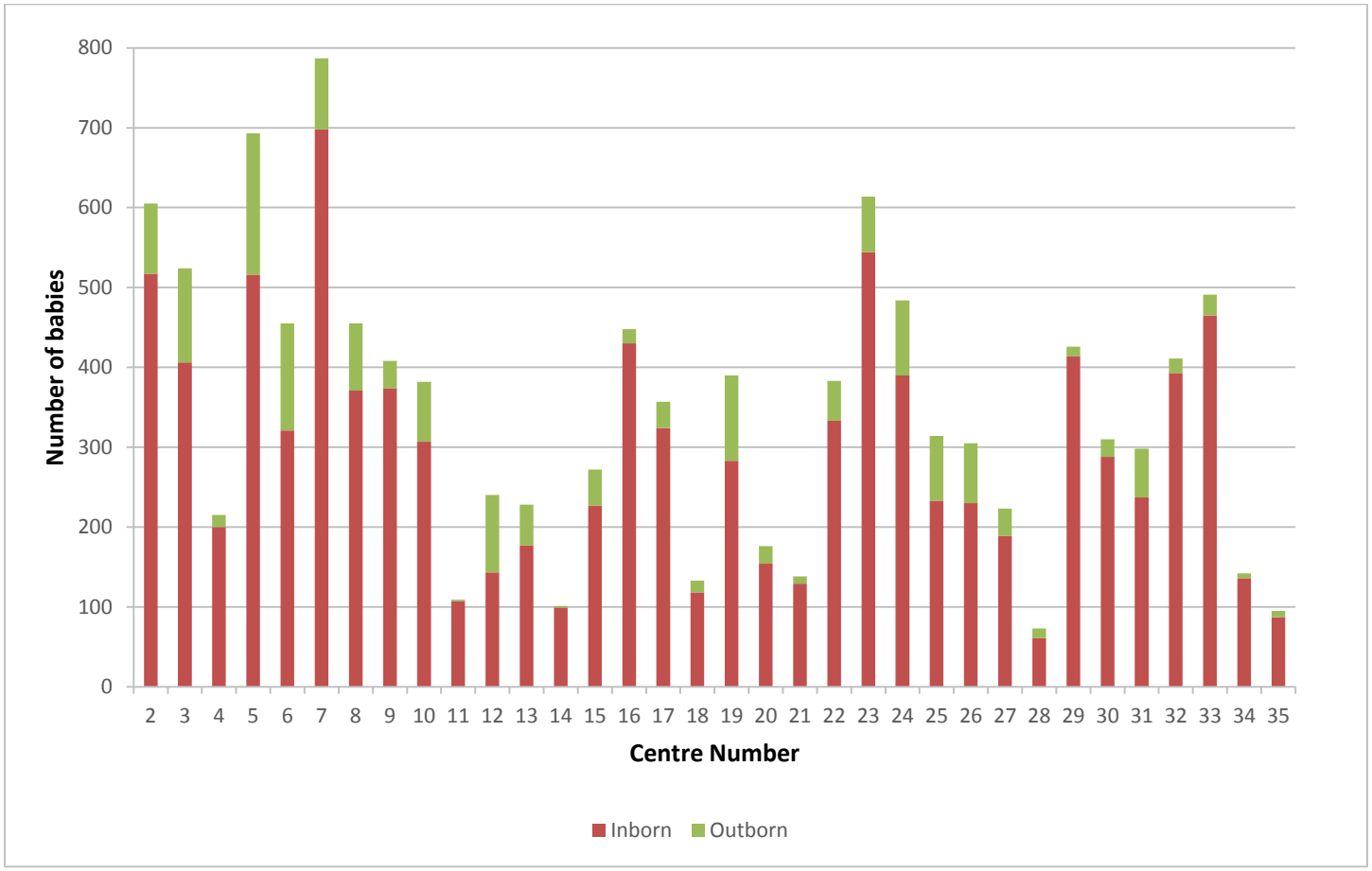
2.4 Data Verification

Missing or anomalous data identified by a manual check at the NRU and then queried and corrected with the respective centre. Further data verification made on data entry onto the main database. Quantification of errors and the implementation of practices via website data entry to minimize errors are continually refined.

RESULTS

Figure 1

No. of babies according to place of birth



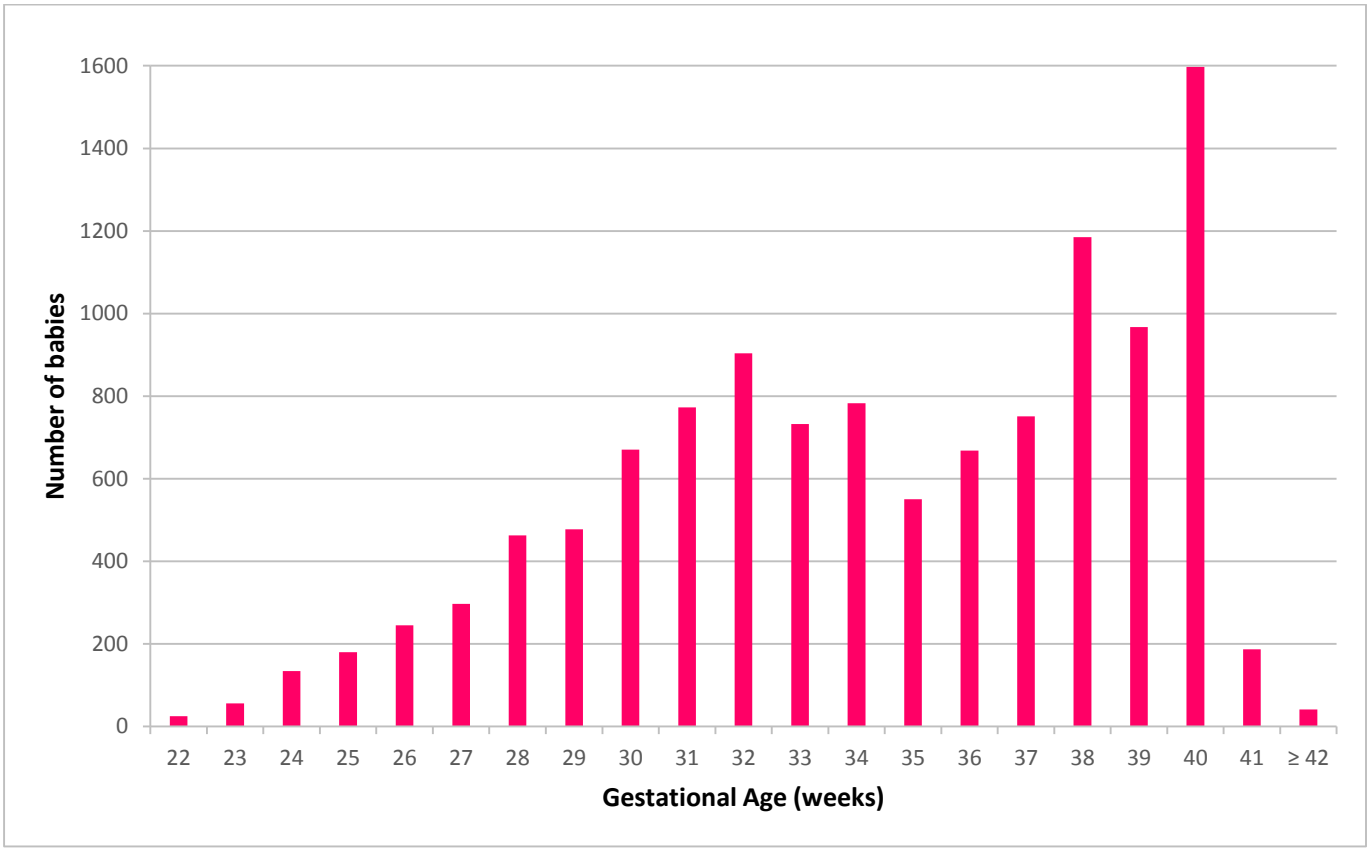
COMMENT: There were 9901 inborn and 1784 outborn in the MNNR.

Table 1:
Admissions to Malaysia National Neonatal Registry (MNNR) participating hospitals

Hospitals		Admission Status		Total
		Inborn	Outborn	
2	n	517	88	605
	(%)	(85.5)	(14.5)	(100)
3	n	406	118	524
	(%)	(77.5)	(22.5)	(100)
4	n	200	15	215
	(%)	(93.0)	(7.0)	(100)
5	n	516	177	693
	(%)	(74.5)	(25.5)	(100)
6	n	321	134	455
	(%)	(70.55)	(29.5)	(100)
7	n	698	89	787
	(%)	(88.7)	(11.3)	(100)
8	n	371	84	455
	(%)	(81.5)	(18.5)	(100)
9	n	374	34	408
	(%)	(91.7)	(8.3)	(100)
10	n	307	75	382
	(%)	(80.4)	(19.6)	(100)
11	n	107	2	109
	(%)	(98.2)	(1.8)	(100)
12	n	143	97	240
	(%)	(59.6)	(40.4)	(100)
13	n	177	51	228
	(%)	(77.6)	(22.4)	(100)
14	n	99	2	101
	(%)	(98.0)	(2.0)	(100)
15	n	227	45	272
	(%)	(83.5)	(16.5)	(100)
16	n	430	18	448
	(%)	(96.0)	(4.0)	(100)
17	n	324	33	357
	(%)	(90.8)	(9.2)	(100)
18	n	118	15	133
	(%)	(88.7)	(11.3)	(100)
19	n	283	107	390
	(%)	(72.6)	(27.4)	(100)
20	n	154	22	176
	(%)	(87.5)	(12.5)	(100)
21	n	129	9	138
	(%)	(93.5)	(6.5)	(100)
22	n	333	50	383
	(%)	(86.9)	(13.1)	(100)
23	n	544	70	614
	(%)	(88.6)	(11.4)	(100)
24	n	390	94	484
	(%)	(80.6)	(19.4)	(100)
25	n	233	81	314
	(%)	(74.2)	(25.8)	(100)
26	n	230	75	305
	(%)	(75.4)	(24.6)	(100)
27	n	189	34	223
	(%)	(84.8)	(15.2)	(100)
28	n	61	12	73
	(%)	(83.6)	(16.4)	(100)
29	n	414	12	426
	(%)	(97.2)	(2.8)	(100)
30	n	288	22	310
	(%)	(92.9)	(7.1)	(100)
31	n	237	61	298
	(%)	(79.5)	(20.5)	(100)
32	n	393	18	411
	(%)	(95.6)	(4.4)	(100)
33	n	465	26	491
	(%)	(94.7)	(5.3)	(100)
34	n	136	6	142
	(%)	(95.8)	(4.2)	(100)
35	n	87	8	95
	(%)	(91.6)	(8.4)	(100)
T	**n**	**9,901**	**1,784**	**11,685**
	(%)	**(84.7)**	**(15.3)**	**(100)**

Figure 2

Frequency distribution of all babies in MNNR according to according to gestational age



COMMENT: For the categories ≥ 32 weeks, the case distribution does not include all livebirths in that respective gestational age group. (See inclusion criteria)

Table 2 :
Frequency distribution of all babies in MNNR according to according to gestational age

Gestational age in completed weeks at birth	Frequency	Percent
22	25	0.2
23	56	0.5
24	134	1.1
25	180	1.5
26	245	2.1
27	297	2.5
28	463	4.0
29	477	4.1
30	670	5.7
31	773	6.6
32	904	7.7
33	732	6.3
34	783	6.7
35	550	4.7
36	668	5.7
37	751	6.4
38	1185	10.1
39	967	8.3
40	1597	13.7
41	187	1.6
≥ 42	41	0.4
Total included	11685	100
Total no. of missing (GA)	0	
Total babies	11685	

Figure 3

Frequency distribution of all babies in MNNR according to according to birth weight

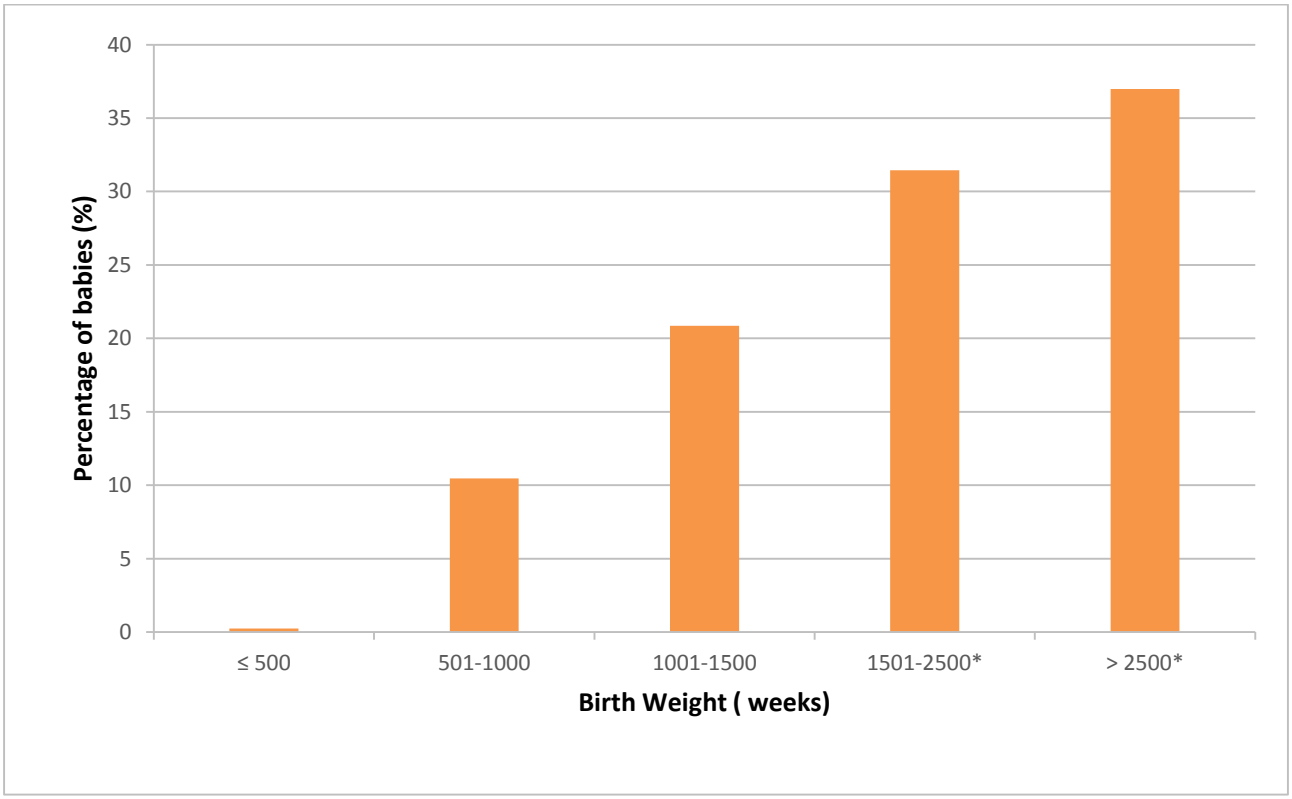


Table 3

Birth weight (grams)	Frequency	Percent from total number of babies
≤ 500	29	0.2
501-1000	1,222	10.5
1001-1500	2,438	20.9
1501-2500*	3,674	31.4
< 2500	4322	37.0
Total included	11685	100
Total no. of missing (BW)	0	
Total babies	11685	

*COMMENT: * For the category >1500 grams birth weight , calculated percentage does not include all live births in the hospitals who do not fit inclusion criteria*.

Figure 4

Survival to Discharge of All Live Births Admitted to MNNR Hospitals According to Gestational Age

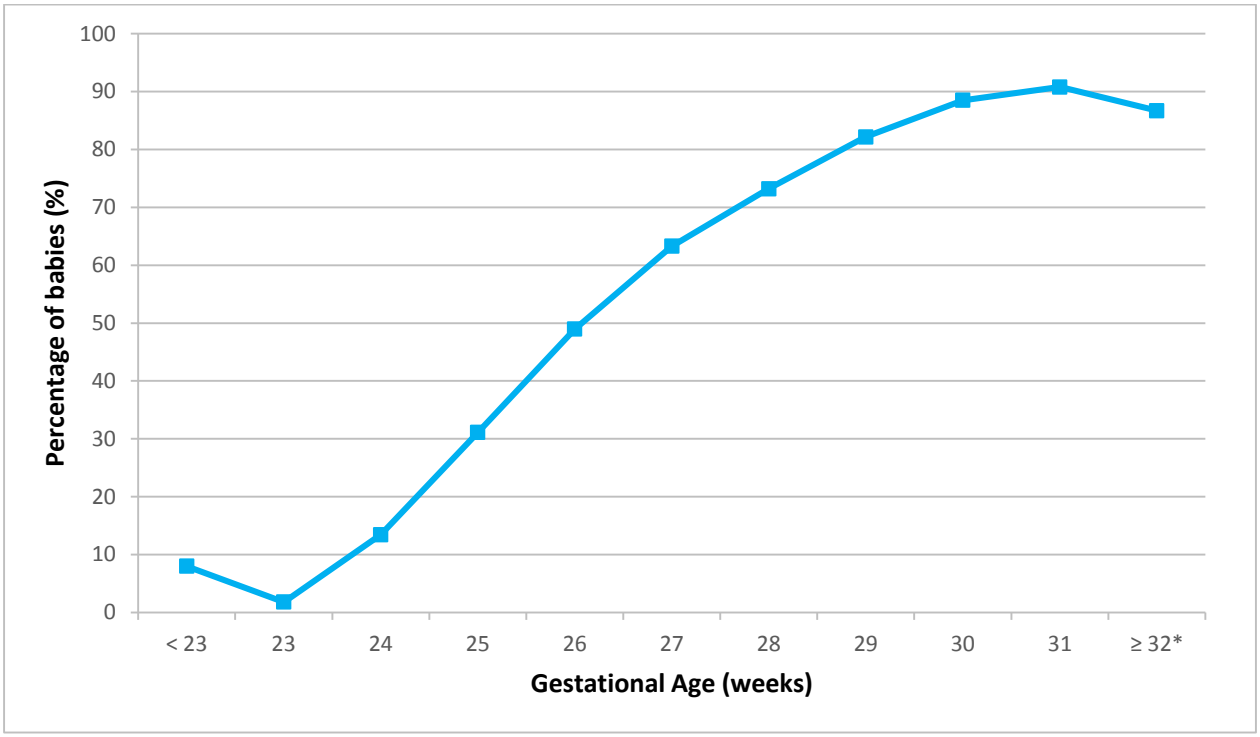


Table 4

Gestational age (completed weeks)	Total number of inborn & outborn babies	Number of survivors	% survival
<23	25	2	8.0
23	56	1	1.8
24	134	18	13.4
25	180	56	31.1
26	245	120	49.0
27	297	188	63.3
28	463	339	73.2
29	477	392	82.2
30	670	593	88.5
31	773	702	90.8
≥32*	8365	7,254	86.7
Total included	11685	9,665	82.7
Total no. of missing (GA)	0		
Total babies	11685		

*COMMENT: *For the category ≥ 32 weeks gestational age, calculated survival rate only include all admitted live births in that category who fullfill inclusion criteria. Includes inborn and outborn babies.*

Figure 5

Survival to discharge of all babies in the MNNR according to birth weight categories

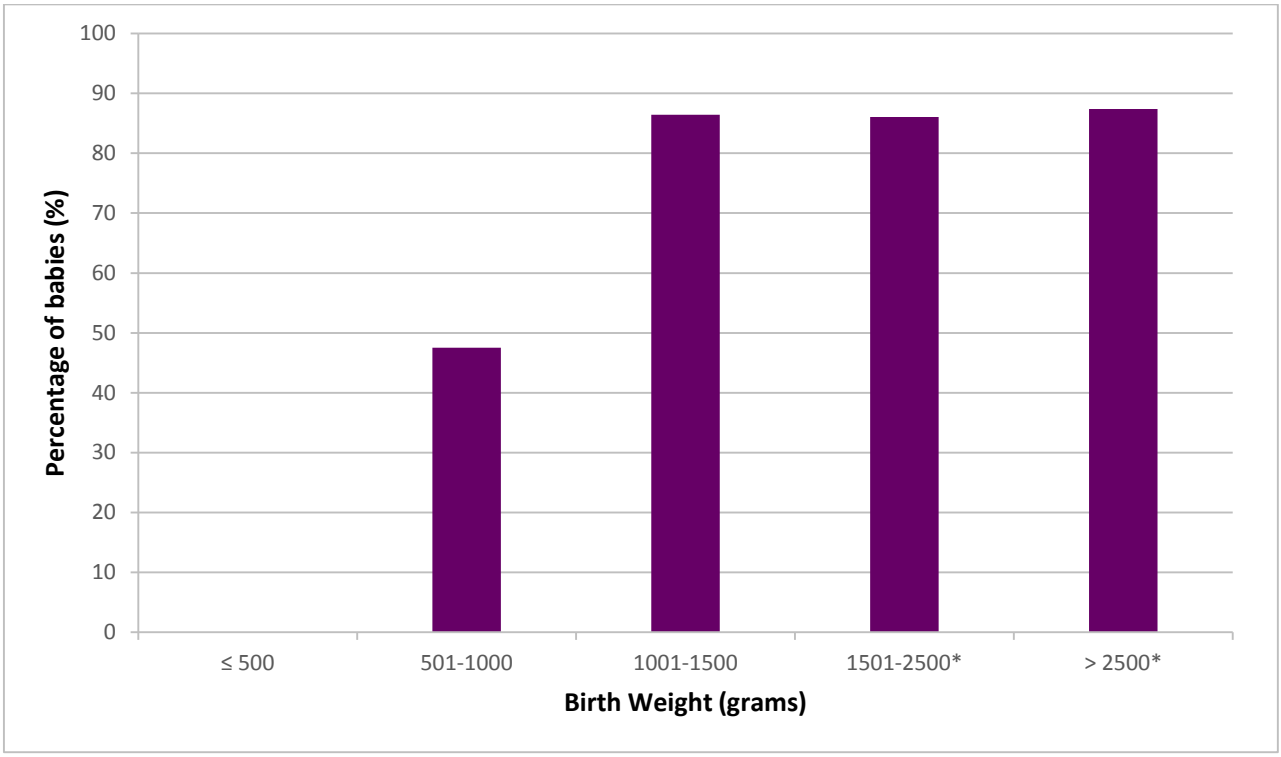


Table 5

Birth weight (grams)	Total number of babies	Number of survivors	% survivors
≤500	29	0	0.0
501-1000	1,222	581	47.5
1001-1500	2,438	2,107	86.4
1501-2500*	3,674	3,161	86.0
>2500*	4,322	3,778	87.4
Total included	11685	9727	83.2
Total no. of missing (BW)	0		
Overall Total babies	11685		

*COMMENT: *For the category more than 1500 gram birth weight, the calculated percentage does not include all live births in the hospitals who do not fit inclusion criteria.*

Figure 6

Prevelance of patent ductus arteriosus (PDA) among all admitted inborn babies in the MNNR by gestational age

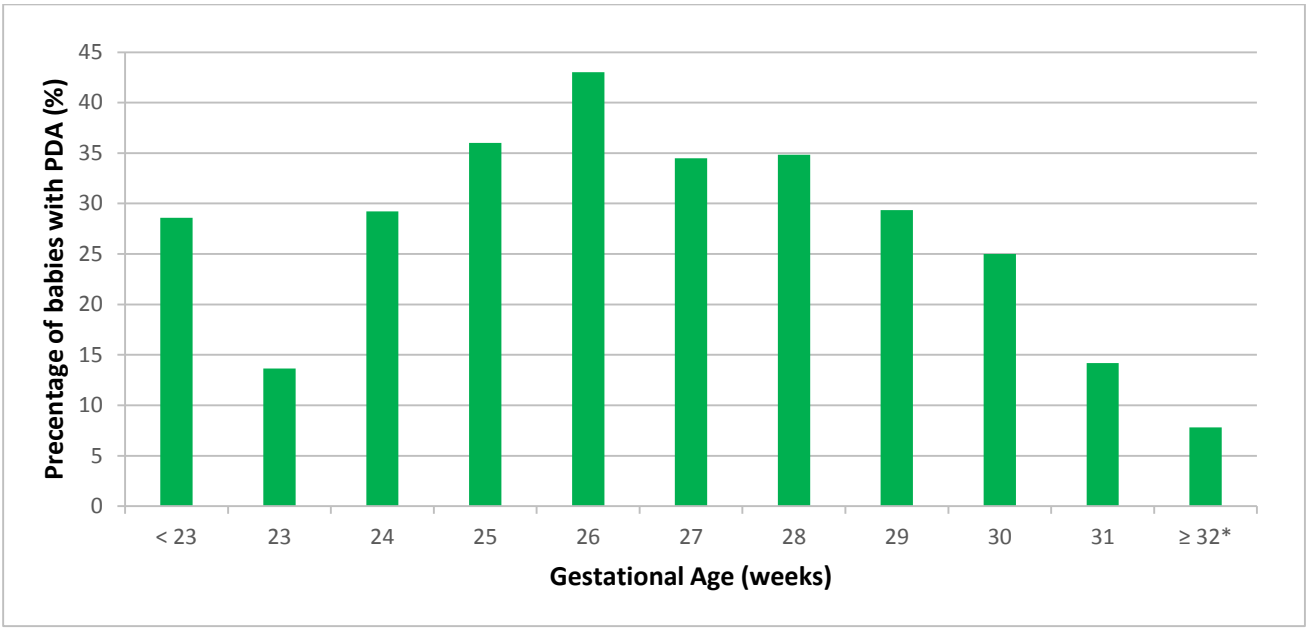


Table 6

Gestational age (completed weeks)	Total number of admitted inborn babies		PDA		Confirmed by ECHO		Indomethacin/ Ibuprofen		Ligation	
	n	%	*n*	%	*n*	%	*n*	%	*n*	%
<23	7	0.1	2	28.6	2	0.0	0	0.0	0	0.0
23	22	0.2	3	13.6	2	66.7	2	66.7	0	0.0
24	65	0.7	19	29.2	18	94.7	12	63.2	0	0.0
25	125	1.3	45	36.0	37	82.2	28	62.2	1	2.2
26	186	2.0	80	43.0	66	82.5	50	62.5	1	1.3
27	232	2.5	80	34.5	68	85.0	54	67.5	0	0.0
28	356	3.8	124	34.8	100	80.6	76	61.3	0	0.0
29	409	4.3	120	29.3	104	86.7	69	57.5	1	0.8
30	572	6.1	143	25.0	127	88.8	79	55.2	0	0.0
31	676	7.2	96	14.2	86	89.6	47	49.0	1	1.0
≥32*	6785	71.9	530	7.8	495	93.4	99	18.7	6	1.1
Total included	9435	100	1224	13.0	1105	89.0	516	41.5	10	0.8
Total no. of missing (GA)	0									
Overall Total babies	9435									

*COMMENT: *For the category ≥ 32 weeks gestation, calculated percentagedoes not include all livebirths in the hospital that do not fit inclusion criteria.*

Figure 7

Prevelance of Patent Ductus Arteriosus (PDA) among all admitted inborn babies in the MNNR by birth weight

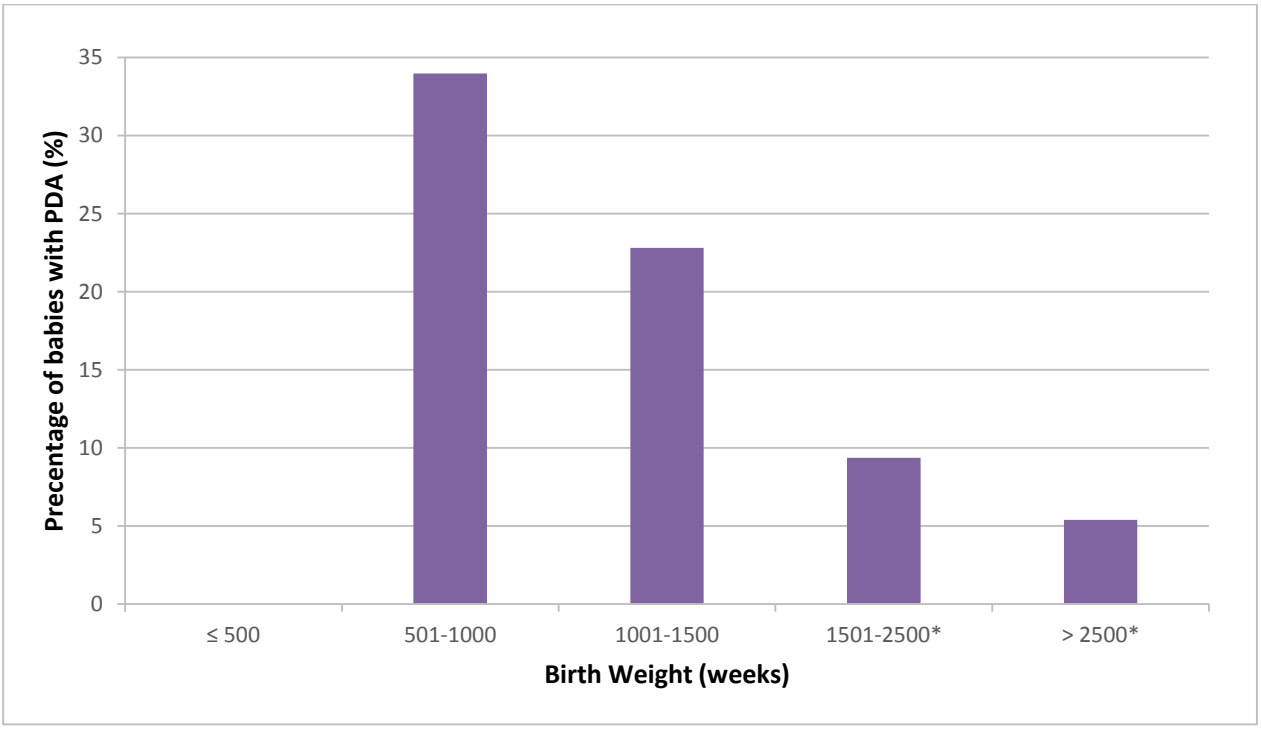


Table 7

Birth weight (grams)	Total number of admitted inborn babies		PDA		Confirmed by ECHO		Indomethacin/ Ibuprofen		Ligation	
	n	%	*n*	%	*n*	%	*n*	%	*n*	%
≤500	5	0.1	0	0.0	0	0.0	0	0.0	0	0.0
501-1000	889	9.4	302	34.0	256	84.8	186	61.6	12	4.0
1001-1500	2060	21.8	470	22.8	407	86.6	205	43.6	9	1.9
1501-2500*	3020	32.0	283	9.4	260	91.9	68	24.0	6	2.1
≥2500*	3458	36.7	187	5.4	182	97.3	12	6.4	4	2.1
Total included	9432	100	1242	13.2	1105	89.0	471	37.9	31	2.5
Total no. of missing (BW)	0									
Total babies	9432									

Table 8

Treatment of patent ductus arteriosus (PDA) in admitted inborn babies by gestational age categories

Gestational age at birth (weeks)	Total no. of admitted inborn babies		No. of babies with data available on PDA diagnosis		No. of babies with diagnosed PDA		Confirmed by ECHO		Treatment			
									Indo-methacin/ Ibuprofen		Ligation	
	n	%	*n*	%	*n*	%	*n*	%	*n*	%	*n*	%
22-24	91	3.4	91	100	24	26.4	22	91.7	14	58.3	0	0.0
25-27	543	20.5	543	100	205	37.8	171	83.4	132	64.4	2	1.0
28-31	2013	76.0	2013	100	483	24.0	147	86.3	271	56.1	2	0.4
Total included	2647	100	2647	100	712	26.9	610	85.7	417	58.6	4	0.6

Table 9

Treatment of patent ductus arteriosus (PDA) in admitted inborn babies by birth weight categories

Birth weight (grams)	Total number of admitted inborn babies		No. of babies with data available on PDA diagnosis		No. of babies with diagnosed PDA		Confirmed by ECHO		Treatment			
									Indo-methacin/ Ibuprofen		Ligation	
	n	%	*n*	%	*n*	%	*n*	%	*n*	%	*n*	%
Less than 750	254	8.6	254	100	59	23.2	49	83.1	35	59.3	1	1.7
751-1000	640	21.7	640	100	243	38.0	207	85.2	143	58.8	1	0.4
1001-1250	867	29.4	867	100	267	30.8	226	84.6	157	58.8	2	0.7
1251-1500	1193	40.4	1193	100	203	17.0	181	89.2	102	50.2	1	0.5
Total included	2954	100	2954	100	772	26.1	663	85.9	436	56.6	5	0.6

Figure 10

Incidence of Intraventricular Haemorrhage (IVH) in admitted inborn babies < 32 weeks gestational age

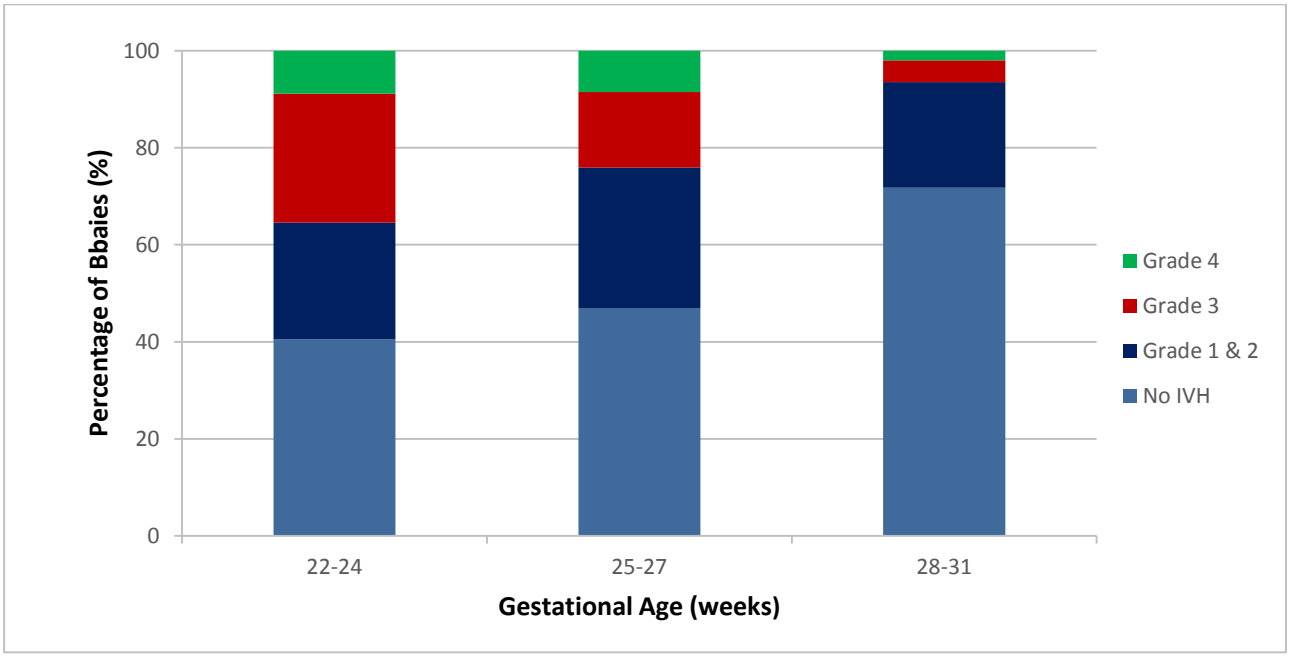


Table 10

Gestational age (completed weeks)		Total no. of admitted inborn babies	Babies with CUS	NO IVH	IVH Grade 1 & Grade 2	IVH Grade 3	IVH Grade 4	No.of babies with CUS	
								Alive	Dead
22-24	n	91	79	32	19	21	7	18	61
	%	3.4	86.8	40.5	24.1	26.6	8.9		
25-27	n	543	528	248	153	82	45	312	216
	%	20.5	97.2	47.0	29.0	15.5	8.5		
28-31	n	2013	1899	1363	413	56	37	1673	226
	%	76.0	94.3	71.8	21.7	4.5	1.9		
Total included	n	2647	2506	1643	585	189	89	2003	503
	%	100	94.7	65.6	23.3	7.5	3.6		
Total no. of missing (GA)	0								
Total babies	2647								

CUS – cranial untrasound

Figure 11

Intraventricular Haemorrhage (IVH) in Inborn Babies ≤ 1500 grams Birth Weight

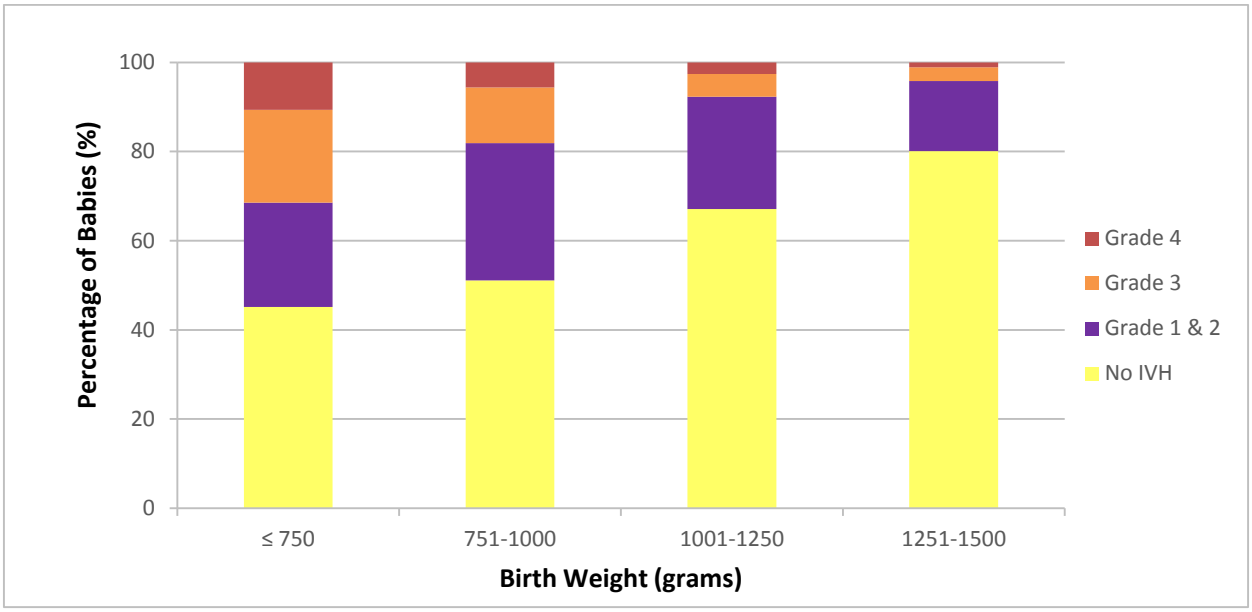


Table 11

Birth weight (grams)		Total no. of admitted inborn babies	Babies with CUS	NO IVH	IVH Grade 1 & Grade 2	IVH Grade 3	IVH Grade 4	No. of babies with CUS	
								Alive	Dead
≤ 750	**n**	254	235	106	55	49	25	69	166
	%	8.6	92.5	45.1	23.4	20.9	10.6		
751-1000	**n**	640	624	319	192	78	35	437	187
	%	21.7	97.5	51.1	30.8	12.5	5.6		
1001-1250	**n**	867	832	558	210	42	22	715	117
	%	29.4	96.0	67.1	25.2	5.0	2.6		
1251-1500	**n**	1193	1076	862	169	33	12	992	84
	%	40.4	90.2	80.1	15.7	3.1	1.1		
Total included	**n**	2954	2767	1845	626	202	94	2213	554
	%	100	93.7	66.7	22.6	7.3	3.4		
Total no. of missing (GA)	0								
Total babies	2954								

Figure 12

Blood culture positive early onset sepsis in admitted inborn babies

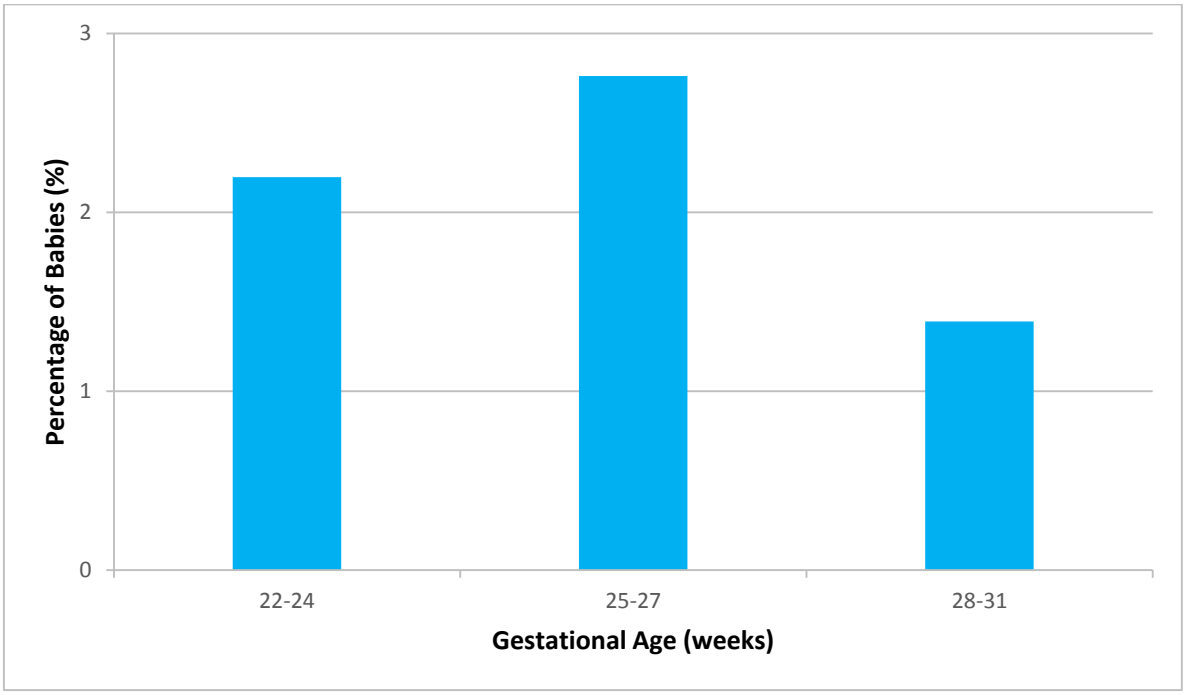


Table 12

Gestational age at birth (completed weeks)	Total number of admitted inborn babies		No. of babies with early infection	
	n	**%**	***n***	**%**
22-24	91	3.4	2	2.2
25-27	543	20.5	15	2.8
28-31	2013	76.0	28	1.4
Total included	2647	100	45	1.7
Total no. of missing (GA)	0			
Total babies	2647			

Figure 13

Incidence of blood culture positive late onset admitted inborn babies (by gestational age)

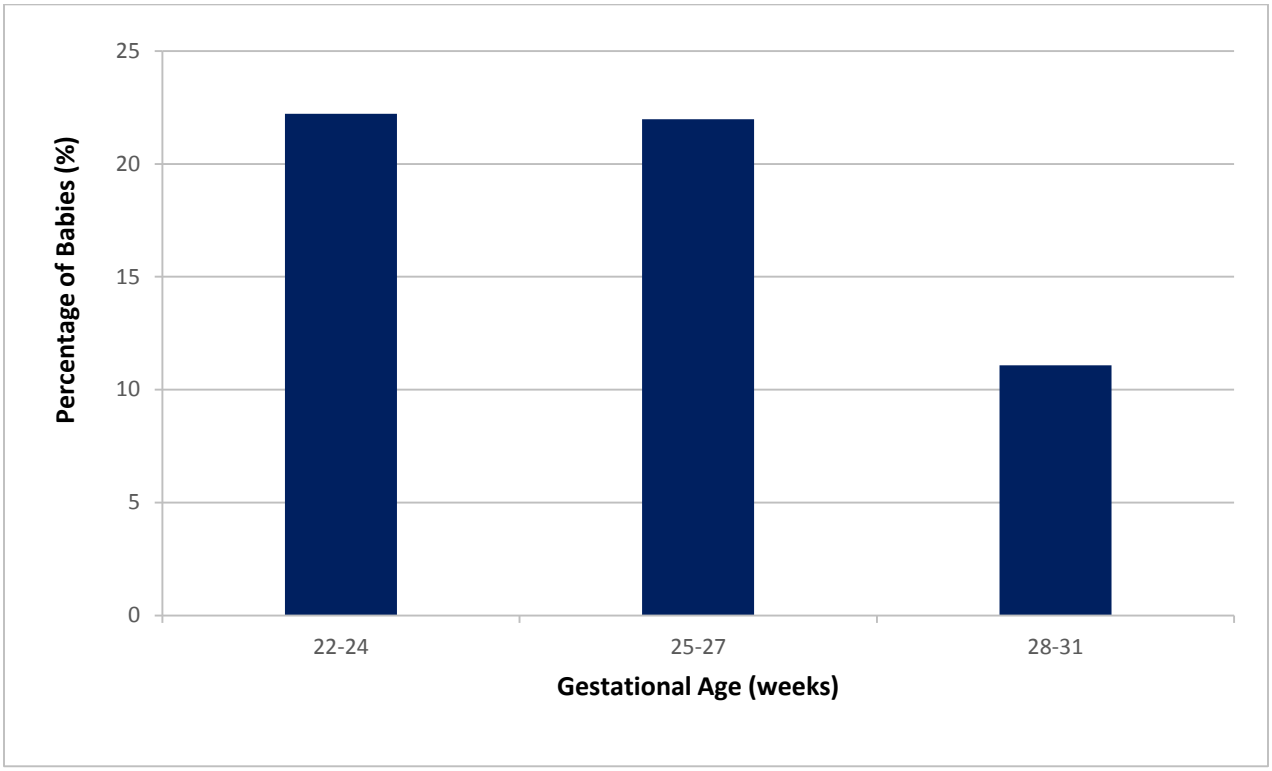


Table 13

Gestational age (weeks)	Total number of admitted inborn babies		No. of babies who survived beyond day 3 after birth		No. of babies with at least one episode of late onset sepsis	
	n	%	*n*	%	n	%
22 – 24	91	3.4	18	19.8	4	22.2
25 – 27	543	20.5	314	57.8	69	22.0
28 – 31	2013	76.0	1746	86.7	193	11.1
Total included	2647	100	2078	78.5	266	12.8
Total no. of missing (GA)	0					
Total babies	2647					

Figure 14

Incidence of blood culture positive late onset sepsis in admitted inborn babies (by birth weight)

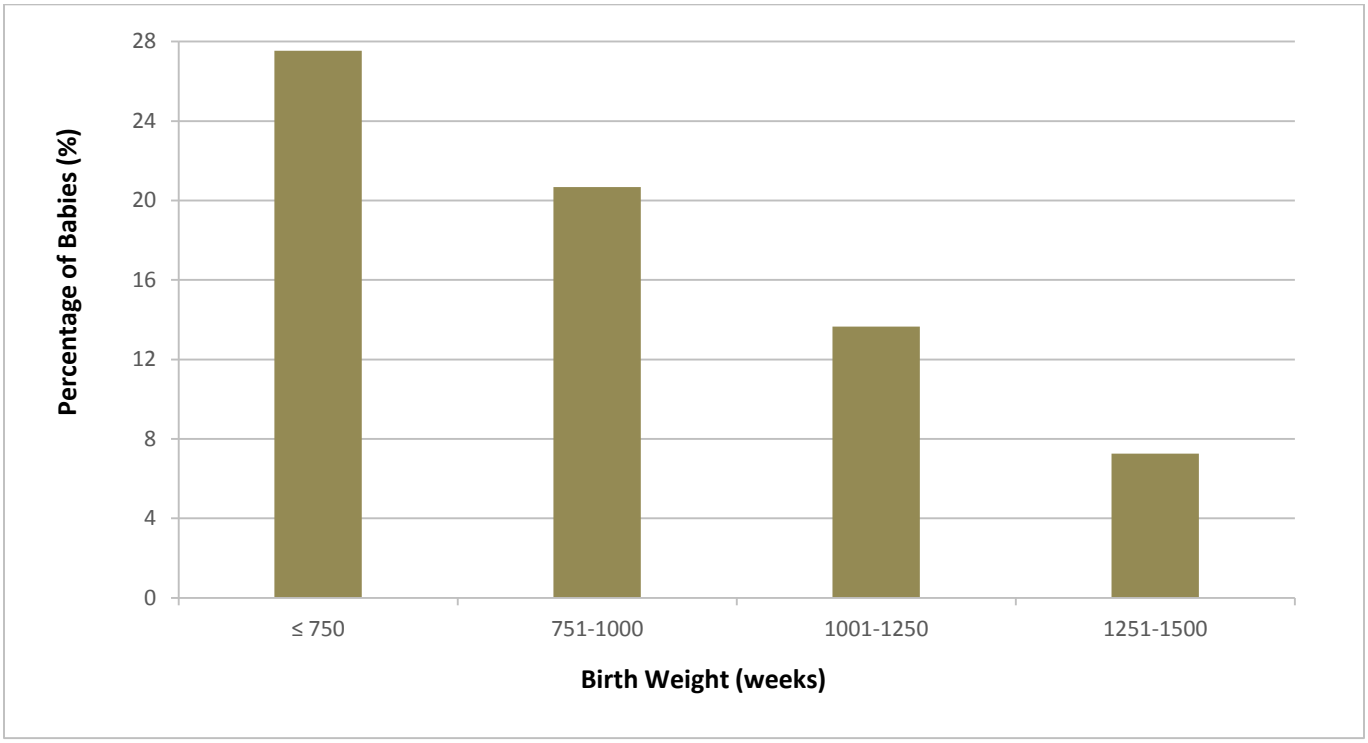


Table 14

Birth weight (grams)	Total number of admitted inborn babies		No. of babies who survived beyond day 3 after birth		No. of babies with at least one episode of late onset sepsis	
	n	%	*n*	%	n	%
≤ 750	254	8.6	69	3.0	19	27.5
751-1000	640	21.7	440	18.9	91	20.7
1001-1250	867	29.4	732	31.4	100	13.7
1251-1500	1193	40.4	1087	46.7	79	7.3
Total included	2954	100	2328	100	289	12.4
Total no. of missing (BW)	0					
Overall total babies	2954					

Figure 15

Incidence of necrotizing enterocolitis (NEC) in admitted inborn babies according to gestational age

Table 15

Gestational age (weeks)	Total number of admitted inborn babies	Babies with NEC		No NEC		Surgical treatment			
						Yes		No	
	n	*n*	*%*	*n*	*%*	*n*	*%*	*n*	*%*
22-24	91	7	7.7	84	92.3	2	28.6	5	71.4
25-27	543	61	11.2	482	88.8	21	34.4	40	65.6
28-31	2013	120	6.0	1893	94.0	20	16.7	100	83.3
Total included	2647	188	7.1	2458	92.9	43	22.9	145	77.1
Total no. of missing (GA)	0								
Overall Total babies	2647								

Comment: NEC refers to those with at least Stage 2 modified Bell's criteria

Figure 16

Incidence of necrotizing enterocolitis (NEC) in admitted inborn babies according to birth weight

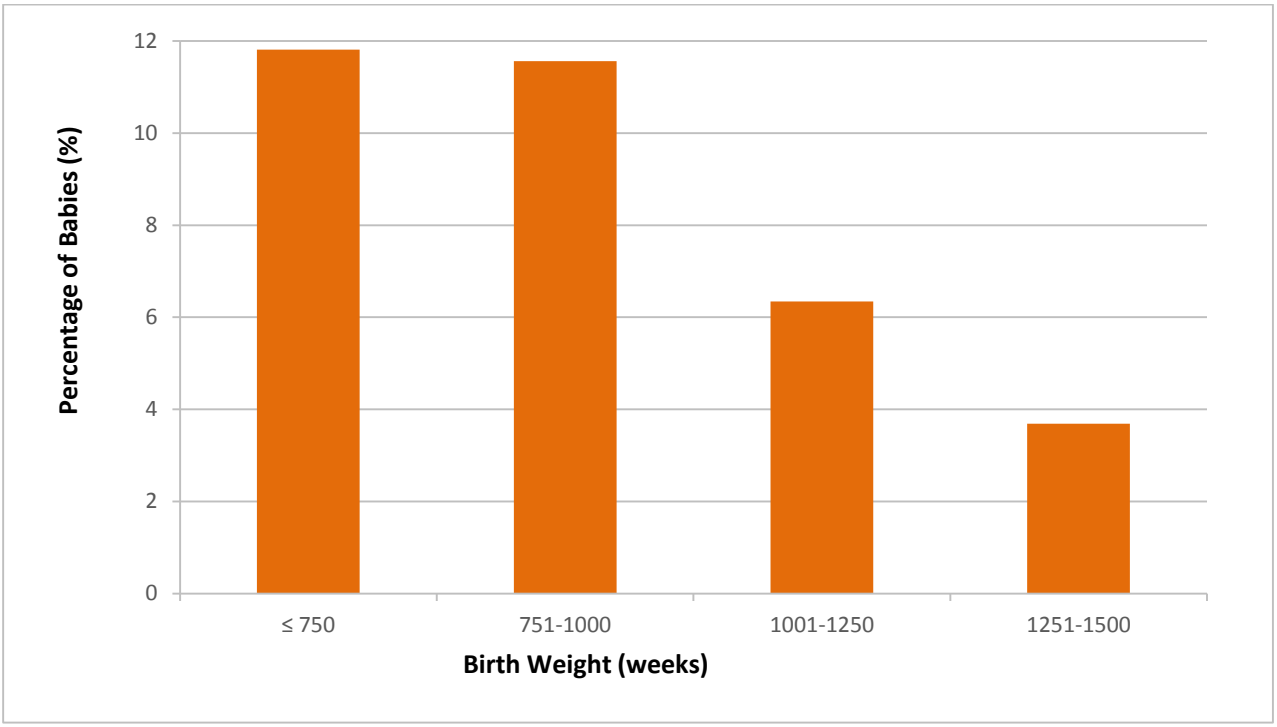


Table 16

Birth weight (grams)	Total number admitted of inborn babies	Babies with NEC		No NEC		Surgical treatment			
						Yes		No	
	n	*n*	*%*	*n*	*%*	*n*	*%*	*n*	*%*
≤ 750	254	30	11.8	224	88.2	5	16.7	25	83.3
751-1000	640	74	11.6	566	88.4	20	27.0	54	73.0
1001-1250	867	55	6.3	812	93.7	13	23.6	42	76.4
1251 - 1500	1193	44	3.7	1149	96.3	10	22.7	34	77.3
Total included	2954	203	6.9	2751	93.1	48	23.6	155	76.4
Total no. of missing (BW)	0								
Overall total babies	2954								

Comment: NEC refers to those with at least Stage 2 modified Bell's criteria

Figure 17a

Antenatal corticosteroid for all inborn babies born at < 32 weeks gestational age according to centres

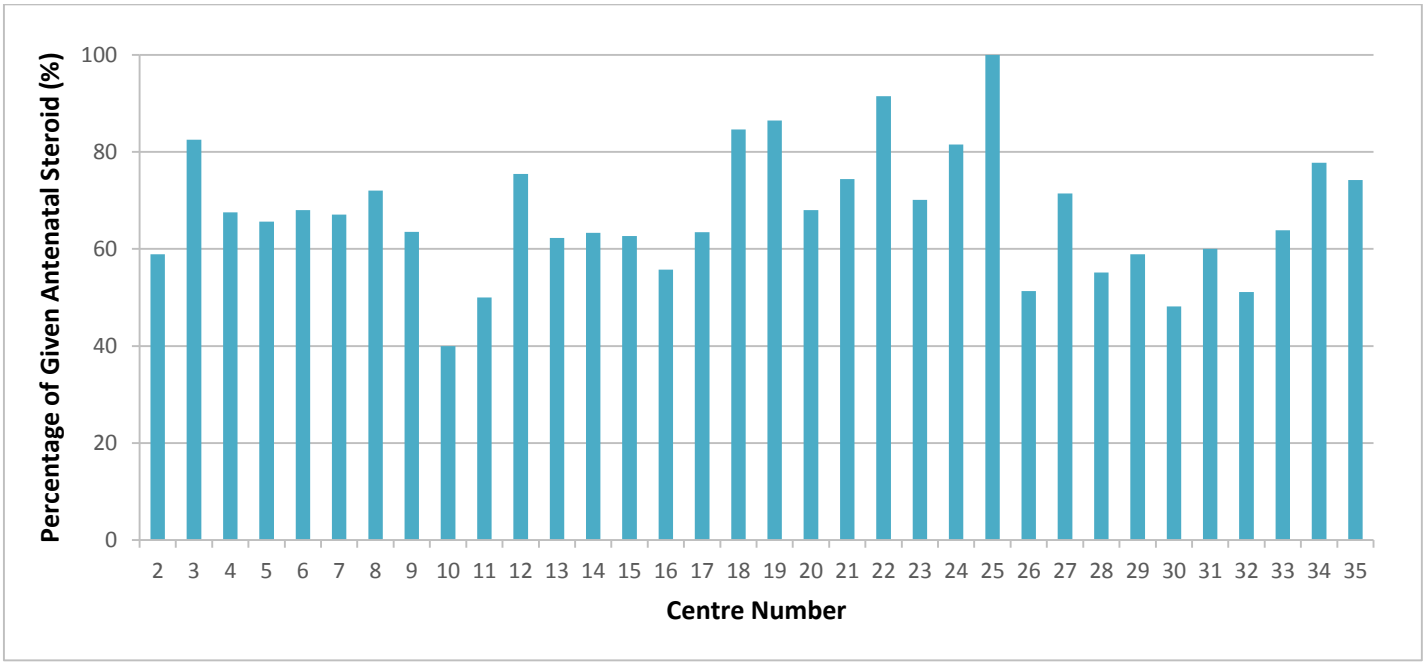


Figure 17b

Antenatal corticosteroid for all outborn babies born at < 32 weeks gestational age according to centres

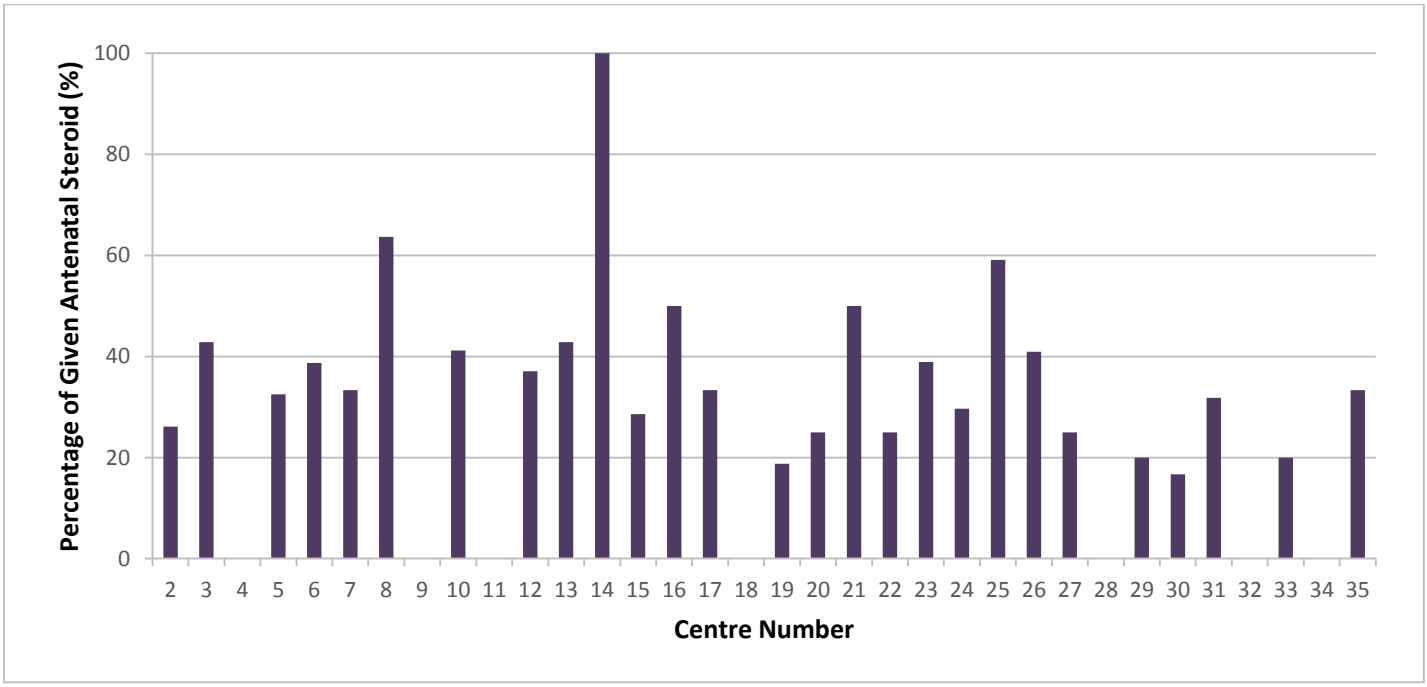


Table 17:
Antenatal corticosteroid for all babies born at < 32 weeks gestational age

Hospitals	Inborn					Outborn				
	Total number of babies		Given Antenatal Steroid		Unknown	Total number of babies		Given Antenatal Steroid		Unknown
	n	%	*n*	%	*n*	*n*	%	*n*	%	*n*
Overall	2865	100	1931	67.4	78	455	100	156	34.3	39
2	180	6.3	106	58.9	21	23	5.1	6	26.1	5
3	149	5.2	123	82.6	10	21	4.6	9	42.9	7
4	37	1.3	25	67.6	0	4	0.9	0	0.0	0
5	198	6.9	130	65.7	0	40	8.8	13	32.5	0
6	100	3.5	68	68.0	1	31	6.8	12	38.7	0
7	152	5.3	102	67.1	0	21	4.6	7	33.3	1
8	118	4.1	85	72.0	3	22	4.8	14	63.6	0
9	107	3.7	68	63.6	1	8	1.8	0	0.0	4
10	70	2.4	28	40.0	1	17	3.7	7	41.2	2
11	38	1.3	19	50.0	1	1	0.2	0	0.0	0
12	53	1.8	40	75.5	1	27	5.9	10	37.0	5
13	53	1.8	33	62.3	9	14	3.1	6	42.9	2
14	30	1.0	19	63.3	0	1	0.2	1	100.0	0
15	83	2.9	52	62.7	5	14	3.1	4	28.6	2
16	122	4.3	68	55.7	4	4	0.9	2	50.0	1
17	93	3.2	59	63.4	1	9	2.0	3	33.3	0
18	39	1.4	33	84.6	0	1	0.2	0	0.0	0
19	111	3.9	96	86.5	0	32	0.7	6	18.8	0

Table 17 (continued):
Antenatal corticosteroid for all babies born at < 32 weeks gestational age

Hospitals	Inborn					Outborn				
	Total number of babies		Given Antenatal Steroid		Unknown	Total number of babies		Given Antenatal Steroid		Unknown
	n	%	*n*	%	*n*	*n*	%	*n*	%	*n*
20	50	1.7	34	68.0	0	4	0.9	1	25.0	1
21	43	1.5	32	74.4	0	6	1.3	3	50.0	0
22	59	2.1	54	91.5	0	8	1.8	2	25.0	0
23	174	6.1	122	70.1	4	18	4.0	7	38.9	1
24	146	5.1	119	81.5	1	27	5.9	8	29.6	1
25	62	2.2	62	100.0	0	22	4.8	13	59.1	0
26	113	3.9	58	51.3	4	22	4.8	9	40.9	1
27	56	2.0	40	71.4	1	8	1.8	2	25.0	0
28	29	1.0	16	55.2	0	4	0.9	0	0.0	0
29	90	3.1	53	58.9	0	5	1.1	1	20.0	0
30	27	0.9	13	48.1	0	6	1.3	1	16.7	1
31	90	3.1	54	60.0	8	22	4.8	7	31.8	4
32	90	3.1	46	51.1	1	2	0.4	0	0.0	1
33	36	1.3	23	63.9	0	5	1.1	1	20.0	0
34	36	1.3	28	77.8	0	3	0.7	0	0.0	0
35	31	1.1	23	74.2	1	3	0.7	1	33.3	0

Figure 18a

Antenatal corticosteroid for all inborn babies born at ≤ 1500 grams birth weight according to centres

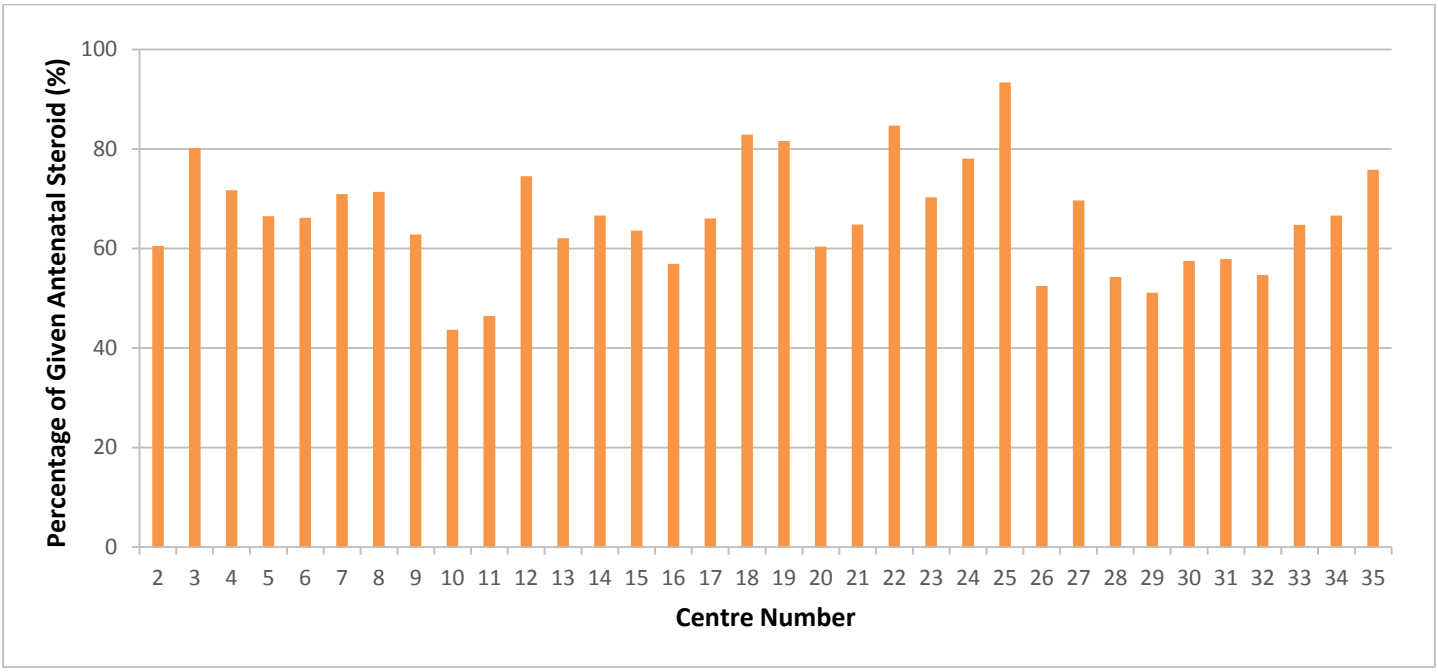


Figure 18b

Antenatal corticosteroid for all outborn babies born at ≤ 1500 grams birth weight according to centres

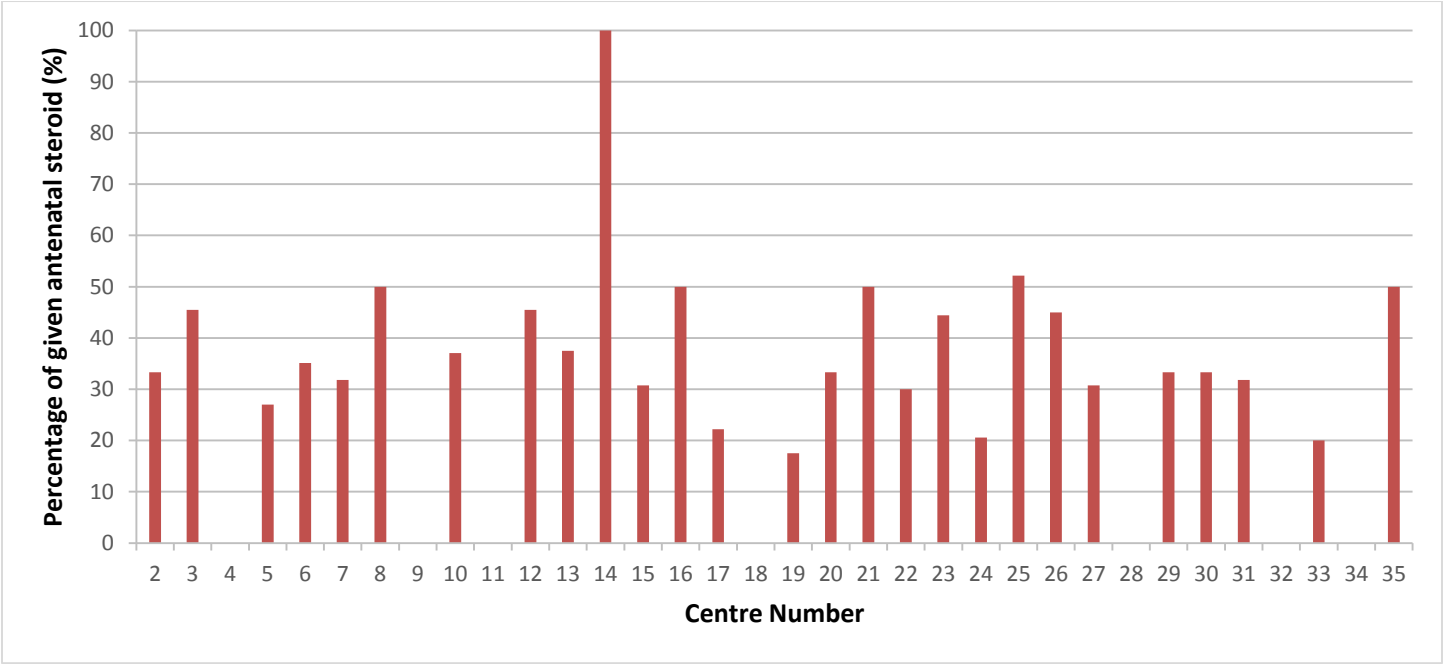


Table 18 :
Antenatal corticosteroidfor all babies born at ≤ 1500 grams birth weight

Hospitals	Inborn					Outborn				
	Total number of babies		Given Antenatal Steroid		Unknown	Total number of babies		Given Antenatal Steroid		Unknown
	n	%	*n*	%	*n*	*n*	%	*n*	%	*n*
Overall	3193	100	2136	66.9	86	496	100	166	33.3	46
2	185	5.8	112	60.5	18	24	4.8	8	33.3	6
3	167	5.2	134	80.2	12	22	4.6	10	45.5	9
4	46	1.4	33	71.7	0	3	0.6	0	0.0	0
5	203	6.4	135	66.5	1	37	7.5	10	27.0	0
6	145	4.5	96	66.2	1	37	7.5	13	35.1	0
7	172	5.4	122	70.9	0	22	4.4	7	31.8	1
8	112	3.5	80	71.4	5	18	3.6	9	50.0	0
9	113	3.5	71	62.8	1	8	1.6	0	0.0	4
10	87	2.7	38	43.7	1	27	5.4	10	37.0	2
11	28	0.9	13	46.4	1	1	0.2	0	0.0	0
12	55	1.7	41	74.5	1	33	6.7	15	45.5	6
13	58	1.8	36	62.1	9	16	3.2	6	37.5	2
14	39	1.2	26	66.7	0	2	0.4	2	100.0	0
15	77	2.4	49	63.6	5	13	2.6	4	30.8	2
16	123	33.9	70	56.9	3	4	0.8	2	50.0	1
17	109	3.4	72	66.1	2	9	1.8	2	22.2	0
18	41	1.3	34	82.9	0	1	0.2	0	0.0	0
19	125	3.9	102	81.6	0	40	8.1	7	17.5	0

Table 18 (continued):
Antenatal corticosteroid for allbabies born at ≤ 1500 grams birth weight

Hospitals	Inborn					Outborn				
	Total number of babies		Given Antenatal Steroid		Unknown	Total number of babies		Given Antenatal Steroid		Unknown
	n	%	*n*	%	*n*	*N*	%	*n*	%	*n*
20	53	1.7	32	60.4	0	3	0.6	1	33.3	1
21	54	1.7	35	64.8	0	6	1.2	3	50.0	0
22	85	2.7	72	84.7	0	10	2.0	3	30.0	0
23	182	5.7	132	70.3	5	18	3.6	8	44.4	1
24	169	5.3	132	78.1	2	34	6.9	7	20.6	3
25	76	2.4	71	93.4	0	23	4.6	12	52.2	0
26	139	4.4	73	52.5	5	20	4.0	9	45.0	0
27	56	1.8	39	69.6	1	13	2.6	4	30.8	0
28	35	1.1	19	54.3	1	4	0.8	0	0.0	0
29	90	2.8	46	51.1	1	6	1.2	2	33.3	0
30	40	1.3	23	57.5	0	6	1.2	2	33.3	2
31	95	3.0	55	57.9	6	22	4.4	7	31.8	4
32	86	2.7	47	54.7	2	2	0.4	0	0.0	1
33	71	2.2	46	64.8	0	5	1.0	1	20.0	0
34	48	1.5	32	66.7	0	3	0.6	0	0.0	0
35	29	0.9	22	75.9	2	4	0.8	2	50.0	0

Figure 19

Incidence of retinopathy of prematurity (ROP) in admitted inborn babies by gestational age

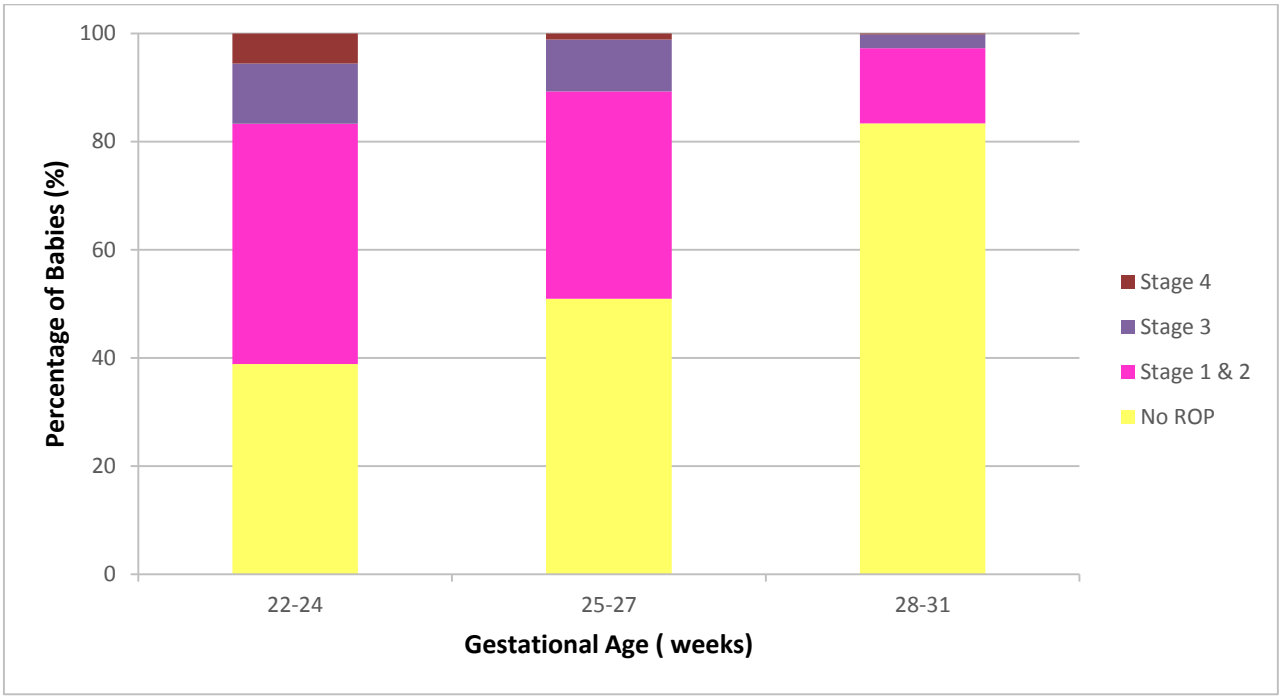


Table 19

Gestational age at birth (weeks)	Total number of admitted inborn babies		No. of babies alive at 6 weeks		No. of babies with known eye examination results		Retinopathy of prematurity							
							No ROP		ROP Stage 1 & 2		ROP Stage 3		ROP Stage 4 & 5	
	n	%	*n*	%	*n*	%	*n*	%	*n*	%	*n*	%	*n*	%
22-24	91	3.4	22	24.2	18	19.8	7	38.9	8	44.4	2	11.1	1	5.6
25-27	543	20.5	337	62.1	271	49.9	138	50.9	104	38.4	26	9.6	3	1.1
28-31	2013	76.0	1777	88.3	1082	53.8	902	93.4	151	14.0	27	2.5	2	0.2
Total Included	2647	100	2136	80.7	1371	51.8	1047	76.4	263	19.2	55	4.0	6	0.4

Comment: Percentage of ROP is based on number of babies having had screening eye examinations. Percentage of babies with eye examinations based on total number of babies admitted according to each gestational age category

Figure 20

Incidence of retinopathy of prematurity (ROP) in admitted inborn babies by birth weight

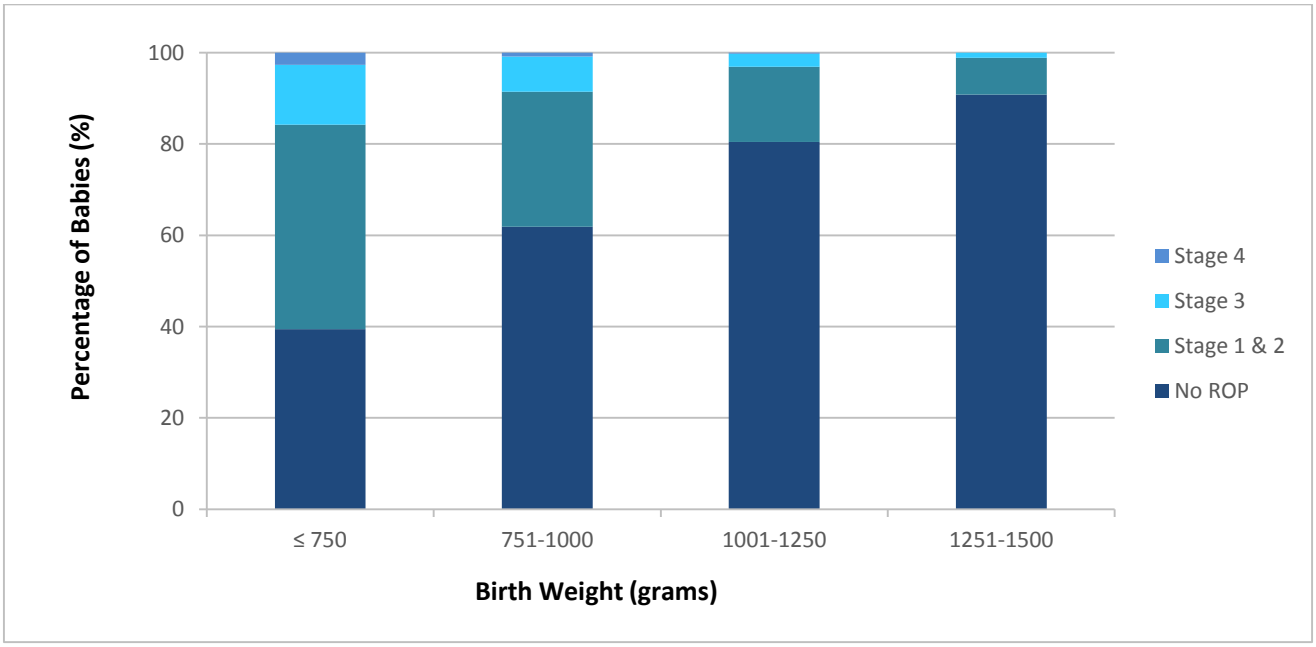


Table 20

Birth weight (grams)	Total no of admitted inborn babies		No. of babies alive at 6 weeks		No. of babies with known eye examination results		Retinopathy of prematurity							
							No ROP		Stage 1 & 2		Stage 3		Stage 4 & 5	
	n	%	*n*	%	*n*	%	*n*	%	*n*	%	*n*	%	*n*	%
≤ 750	254	8.6	82	32.3	76	92.7	30	39.5	34	44.7	10	13.2	2	2.6
751-1000	640	21.7	463	72.3	375	81.0	232	61.9	111	29.6	29	7.7	3	0.8
1001-1250	867	29.4	747	86.2	553	74.0	445	80.5	91	16.5	16	2.9	1	0.2
1251-1500	1193	40.4	1098	92.0	533	48.5	484	90.8	43	8.1	6	1.1	0	0.0
Total included	2954	100	2390	80.9	1537	52.0	1191	77.5	279	18.2	61	4.0	6	0.4

Comment: Babies screened for ROP after discharge are not included

Figure 21

Cryotherapy / laser therapy for admitted inborn babies with retinopathy of prematurity (by gestational age)

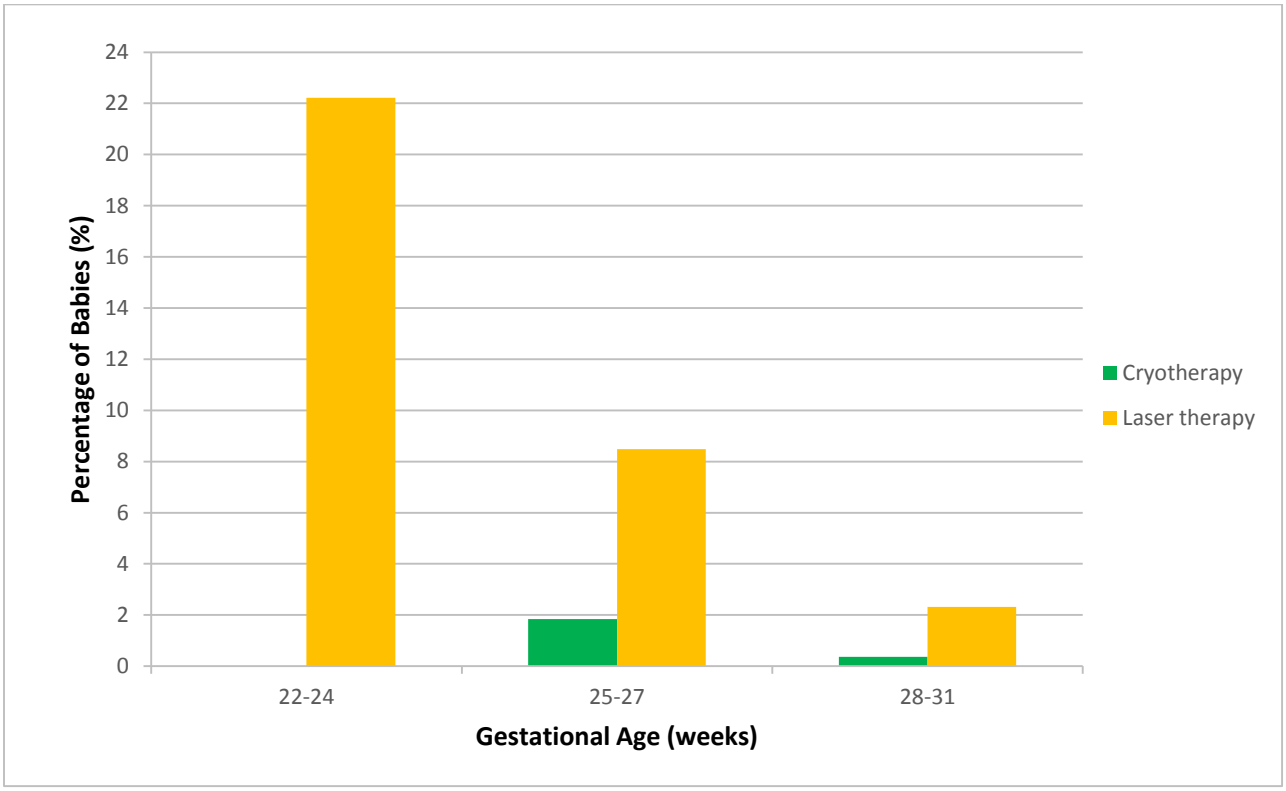


Table 21

Gestational age at birth (weeks)	Total number of admitted inborn babies		No. of babies with known eye examination results		Cryotherapy		Laser therapy	
	n	%	*n*	%	*n*	%	*n*	%
22-24	91	3.4	18	19.8	0	0.0	4	22.2
25-27	543	20.5	271	49.9	5	1.8	23	8.5
28-31	2013	76.0	1082	53.8	4	0.4	25	2.3
Total included	2647	100	1371	51.8	9	0.7	52	3.8
Total no. of missing (GA)	0							
Overall Total babies	2647							

Figure 22

Cryotherapy / laser therapy for admitted inborn babies with retinopathy of prematurity (by birth weight)

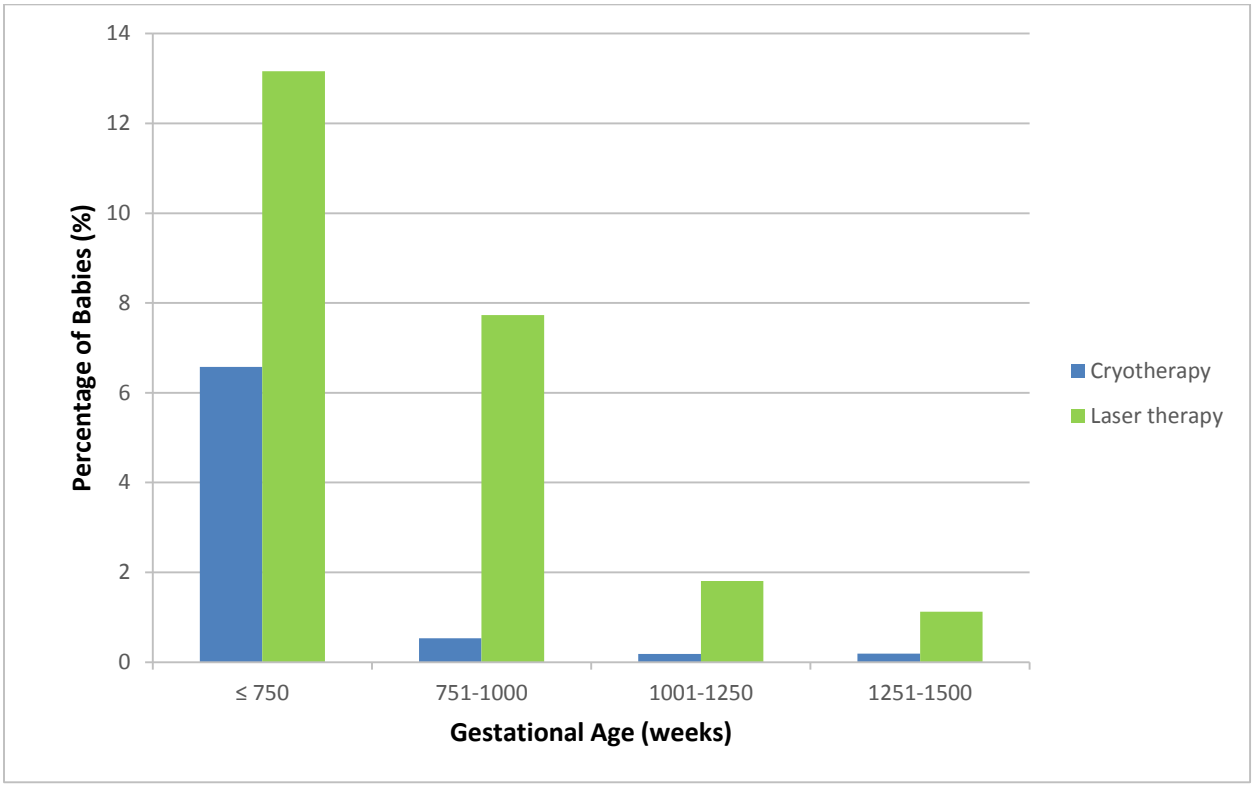


Table 22

Birth weight (grams)	Total number of admitted inborn babies		No. of babies with known eye examination results		Cryotherapy		Laser therapy	
	n	%	*n*	%	*n*	%	*n*	%
≤ 750	254	8.6	76	29.9	5	7.6	9	13.2
751-1000	640	21.7	375	58.6	2	0.6	29	7.7
1001-1250	867	29.4	553	63.8	1	0.2	10	1.8
1251-1500	1193	40.4	533	44.7	1	0.5	6	1.1
Total included	2954	100	1537	52.0	9	0.8	55	3.6
Total no. of missing (BW)	0							
Overall Total babies	2954							

Figure 23

Incidence of oxygen dependency among admitted inborn babies with gestational age < 32 weeks

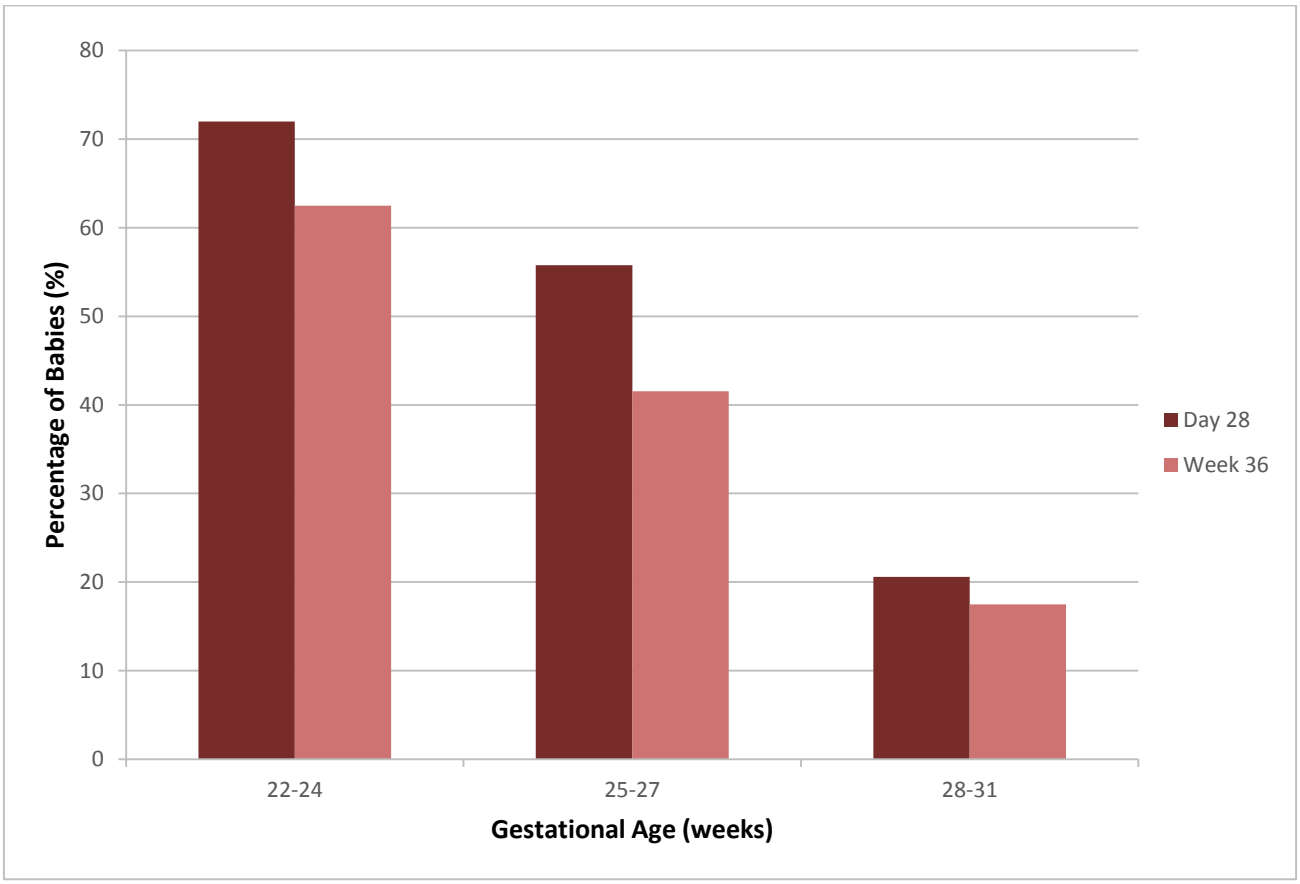


Table 23 :
Incidence of oxygen dependency among admitted inborn babies with gestational age < 32 weeks

Gestational age at birth (weeks)		Total no of admitted inborn babies	babies alive at day 28	Babies with oxygen dependency beyond day 28 among survivors	Babies alive at 36 weeks postmenstrual age	Babies with oxygen dependency beyond 36 weeks among survivors
22-24	***n***	91	25	18	16	10
	%	3.4	27.5	72.0	17.6	62.5
25-27	***n***	543	337	188	219	91
	%	20.5	62.1	55.8	40.3	41.6
28-31	***n***	2013	1390	286	864	151
	%	76.0	69.1	20.6	42.9	17.5
Total included	***n***	2647	1752	492	1099	252
	%	100	66.2	28.1	41.5	22.9
Total no. of missing (GA)		0				
Total babies		2647				

Figure 24

Incidence of oxygen dependency among admitted inborn babies with birth weight ≤ 1500 grams

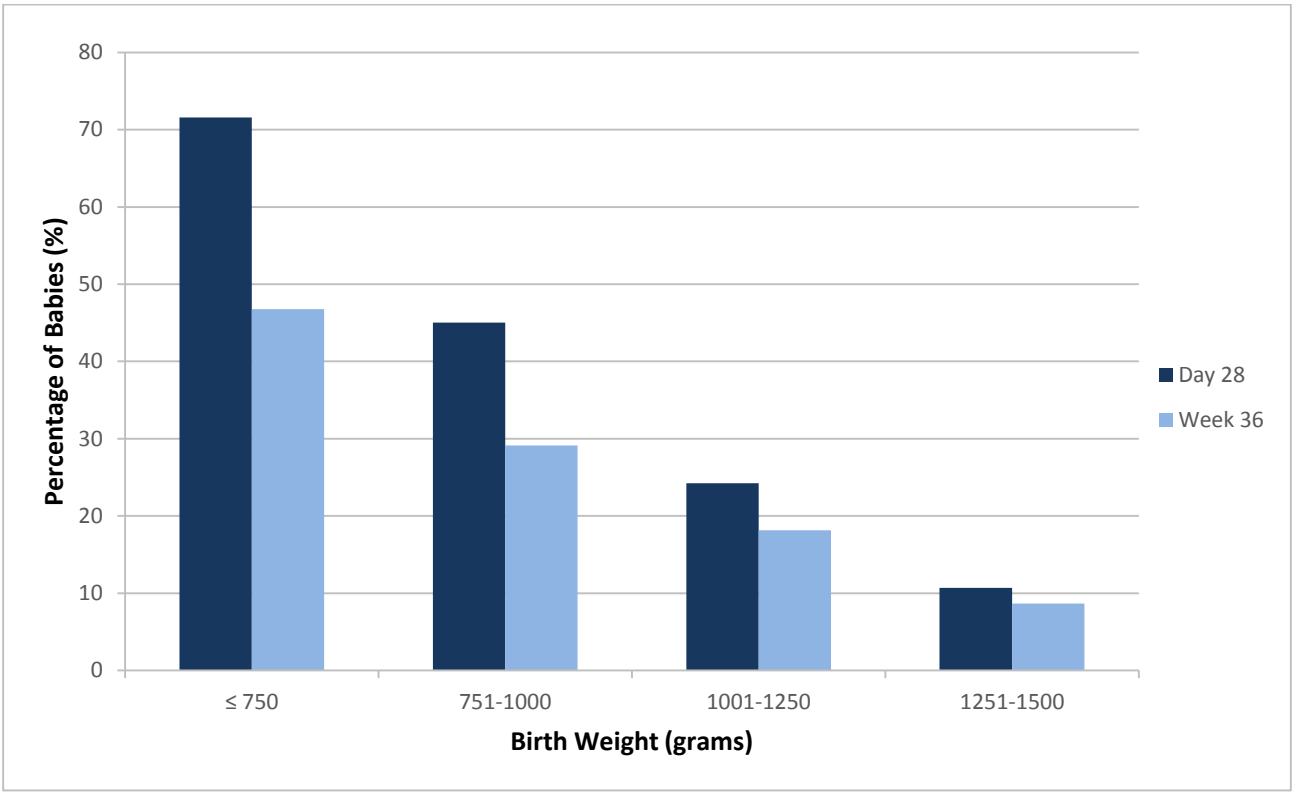


Table 24:
Incidence of oxygen dependency among admitted inborn babies with birth weight ≤ 1500 grams

Birth Weight (grams)		Total no of admitted inborn babies	Babies alive at 28	Babies with oxygen dependency beyond day 28 among survivors	Babies alive at 36 weeks postmenstrual age	Babies with oxygen dependency beyond 36 weeks among survivors
≤ 750	*n*	254	88	63	77	36
	%	12.9	34.6	71.6	30.3	46.8
751-1000	*n*	640	464	209	378	110
	%	21.3	72.5	45.0	59.1	29.1
1001 - 1250	*n*	867	722	175	573	104
	%	27.6	83.3	24.2	66.1	18.2
1251 - 1500	*n*	1193	786	84	682	59
	%	38.2	65.9	10.7	57.2	8.7
Total Included	*n*	2954	2060	531	1710	309
	%	100	69.7	25.8	57.9	18.1
Total no. of missing (GA)		0				
Total babies		2954				

Table 25a

Gestational age specific mortality or significant morbidity in admitted inborn babies (five morbidities)

Gestational age at birth (weeks)		Total no. Of admitt-ed inborn babies	Surviv ed	No. with any one morbiditi es prior to discharge among survivors	No. with any two morbiditi es prior to discharge among survivors	No. with any three morbiditi es prior to discharge among survivors	No. with any four morbiditi es prior to discharge among survivors	No. with any five morbiditi es prior to discharge among survivors	No. without any five morbiditi es prior to discharge among survivors
22-24	n	91	18	8	4	1	0	0	5
	%	3.4	19.8	44.4	22.2	5.6	0.0	0.0	27.8
25-27	n	543	315	109	48	10	1	0	147
	%	20.5	58.0	34.6	15.2	3.2	0.3	0.0	46.7
28-31	n	2013	1750	315	90	13	0	0	1334
	%	76.0	87.0	18.0	5.1	0.7	0.0	0.0	76.1
Total Included	n	2647	2085	432	142	24	1	0	1486
	%	100	78.8	20.7	6.8	1.2	0.0	0.0	71.3
Total no. of missing (GA)	-								
Total babies	2647								

i. PDA requiring surgical ligation

ii. Stage 3 or 4 ROP

iii. Oxygen dependency at 36 weeks or discharge

iv. Confirmed sepsis

v. NEC

Table 25b

Birth Weight specific mortality or significant morbidity in admitted inborn babies (five morbidities)

Gestational age at birth (weeks)		Total no. of admitted inborn babies	Number Survived	No. with any one morbidities prior to discharge among survivors	No. with any two morbidities prior to discharge among survivors	No. With any three morbidities prior to discharge among survivors	No. With any four morbidities prior to discharge among survivors	No. without any four morbidities prior to discharge among survivors
≤ 750	n	254	69	23	19	6	0	21
	%	8.6	27.2	33.3	27.5	8.7	0.0	30.4
751 - 1000	n	640	441	133	61	10	0	237
	%	21.7	68.9	30.2	13.8	2.3	0.0	53.7
1001 - 1250	n	867	735	172	41	8	1	513
	%	29.4	84.8	23.4	5.6	1.1	0.1	69.8
1251 – 1500	n	1193	1090	148	32	1	0	909
	%	40.4	91.4	13.6	2.9	0.1	0.0	83.4
Total included	n	2954	2335	476	153	25	1	1680
	%	100	79.0	20.4	6.6	1.1	0.0	71.9
Total no. of missing (GA)	-							
Overall Total babies	2954							

i. PDA requiring surgical ligation

ii. Stage 3 or 4 ROP

iii. Oxygen dependency at 36 weeks or discharge

iv. Confirmed sepsis

v. NEC

Table 26

Days on ventilatory support (by birth weight) for admitted inborn babies discharged directly home from network hospitals

Birth weight (grams)	Total number of admitted inborn babies		No. of inborn babies number ventilated		Ventilatory Days						
	n	%	*n*	%	Mean	SEM	Min	1st Quartile	Medi-an	3rd Quartile	Max
≤ 750	254	8.6	192	75.6	16.5	1.9	1	2	5	19	204
751-1000	640	21.7	487	76.1	15.2	1.1	0	2	6	16	230
1001-1250	867	29.4	472	54.4	8.8	0.6	1	2	4	10	142
1251-1500	1193	40.4	421	35.3	5.5	0.4	0	1	2	6	148
Total included	2954	100	1572	53.2	10.4	0.4	0	1	2	4	230
Total no. of missing (BW)	-										
Total no. of babies discharged home	2954										

Figure 27a

Duration of hospital stay according to gestational age in inborn babies

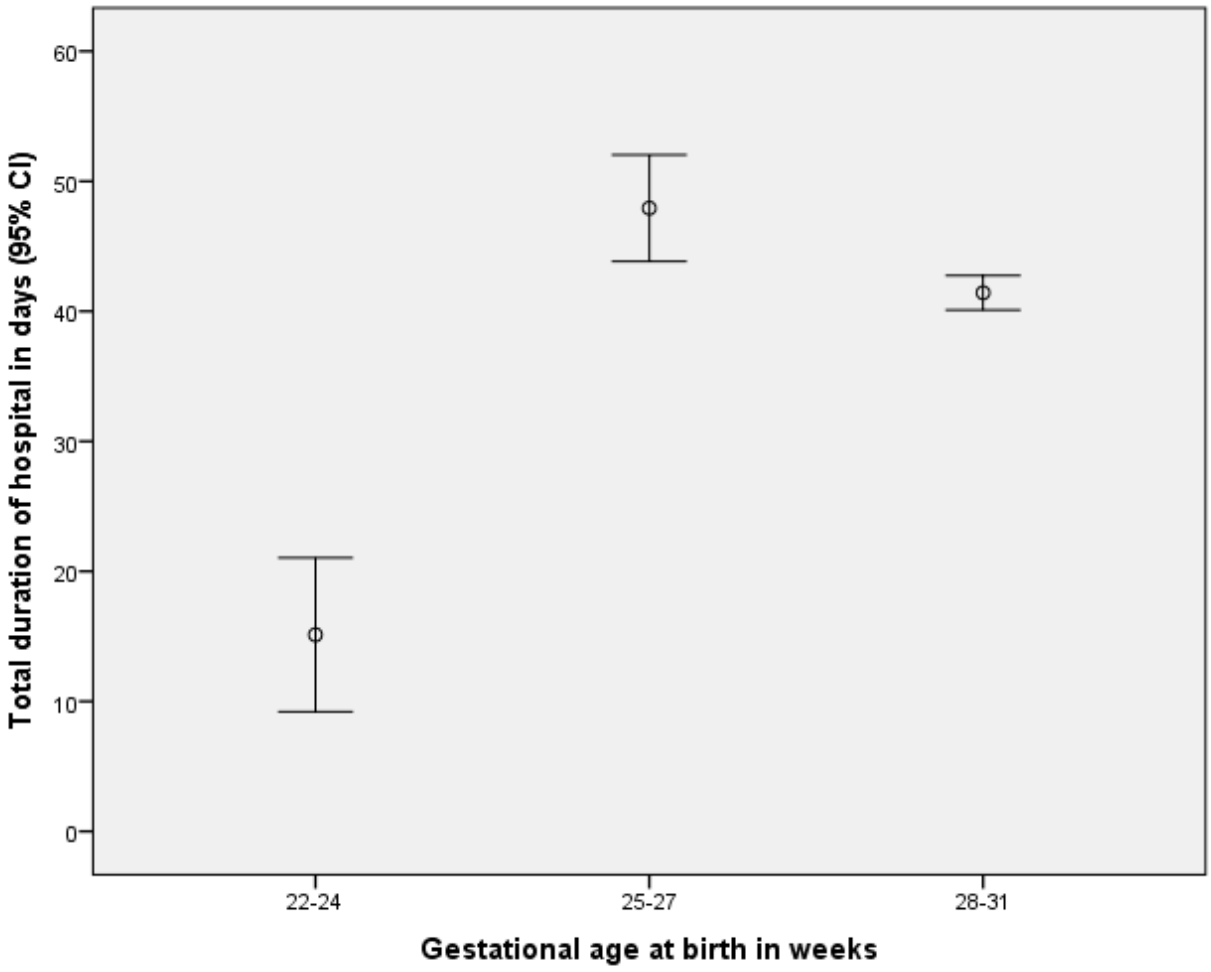


Table 27a :
Duration of hospital stay according to gestational age in inborn babies

Gestational age (weeks)	Total no. of inborn babies		Inborn babies discharged alive		Mean	SEM	Min	1st Quartile	Median	3rd Quartile	Max
	n	%	*n*	%							
22-24	91	3.4	18	19.8	15.1	3.0	0	0	0	3	314
25-27	543	20.5	315	58.0	47.9	2.1	0	2	43	78	365
28-31	2013	76.0	1752	87.0	41.4	0.7	0	23	37	55	362
Total included	2647	100	2085	78.8	41.1	0.7	0	13	36	58	365

Total no. of missing (GA)	-
Total no. of babies discharged home from network hospitals	2085
Total no. of babies who died or were transferred out	562
Total babies	2647

Figure 27b

Duration of hospital stay according to birth weight in inborn babies

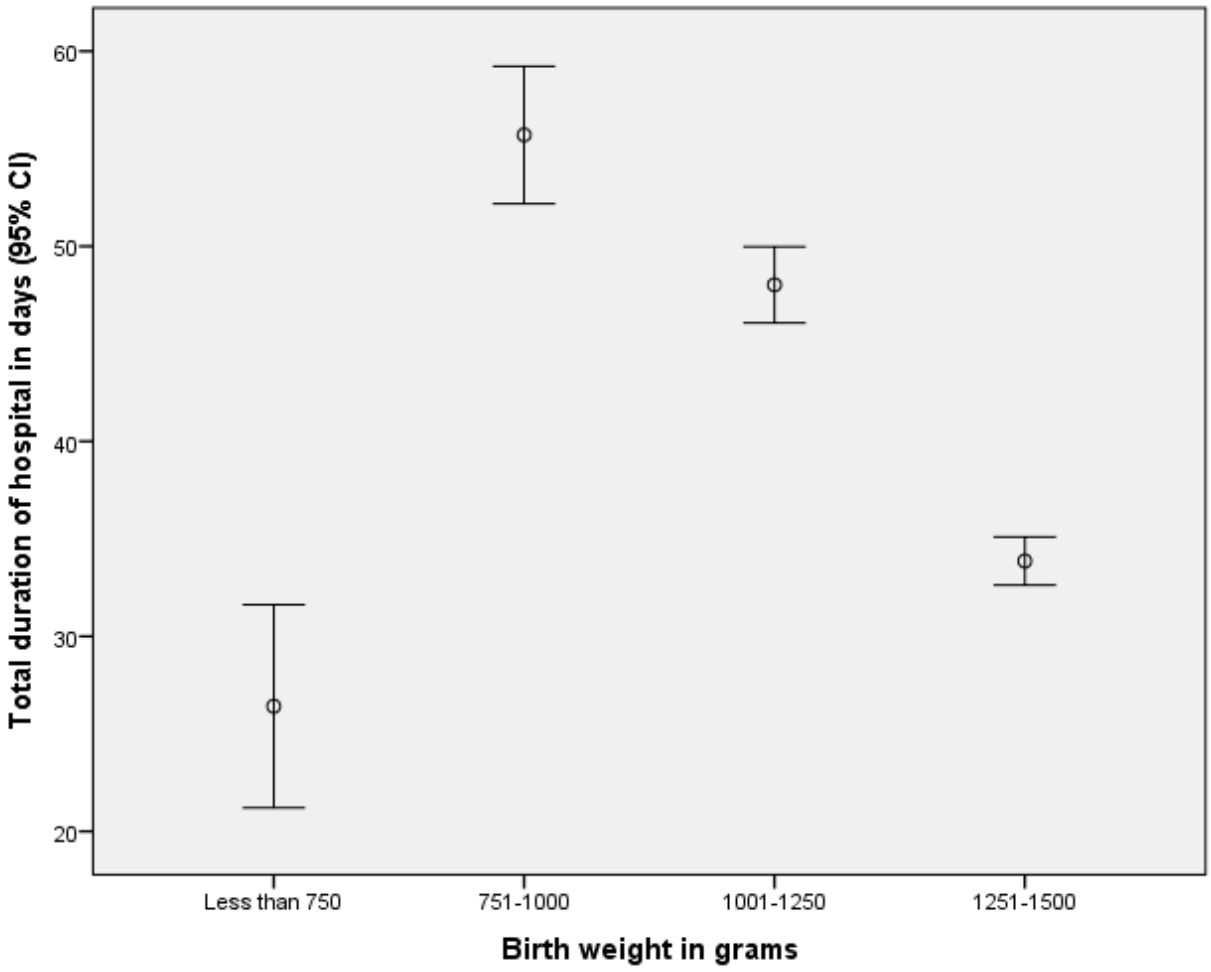


Table 27b :
Duration of hospital stay according to birth weight in inborn babies

Birth Weight (grams)	Total no. of inborn babies		Inborn babies discharged alive		Mean	SEM	Min	1st Quartile	Median	3rd Quartile	Max
	n	%	*n*	%							
≤ 750	254	8.6	69	27.2	26.4	2.7	0	0	1	11	365
751 -1000	640	21.7	441	68.9	55.7	1.8	0	9	58	80	365
1001 - 1250	867	29.4	735	72.7	48.0	1.0	0	35	18	60	362
1251 - 1500	1193	40.4	1090	84.8	33.9	0.6	0	25	32	41	404
Total included	2954	100	2335	91.4	41.5	0.7	0	17	37	57	404
Total no. of missing (GA)	-										
Total no. of babies discharged home from network hospitals	2335										
Total no. of babies who died or were transferred out	619										
Total babies	2954										

APPENDICES

Appendix 1 Level of Neonatal Care

(Adapted from Committee on Foetus and Newborn, Levels of Neonatal Care, Paediatrics, Vol. 114 no. 5, November 2004, p.1345)

Level I Neonatal Care (Basic), well- newborn nursery: has the capability to:

- Provide neonatal resuscitation at every delivery
- Evaluate and provide postnatal care to healthy newborn infants
- Stabilise and provide care for infants born at 35 to 37 weeks gestation who remain physiologically stable
- Stabilise newborn infants who are ill and those born at <35 weeks gestation, until transfer to a hospital that can provide the appropriate level of neonatal care

Level II Neonatal Care (Specialty), Special care nursery: Level II units are subdivided into two categories on the basis of their ability to provide assisted ventilation including continuous positive airway pressure

1. ***Level II A*** *has the capability to:*
   - Resuscitate and stabilise preterm and/or ill infants before transfer to a facility at which newborn intensive care is provided
   - Provide care for infants born at >32 weeks gestation and weighing ≥1500 g (1) who have physiologic(al) immaturity such as apnoea of prematurity, inability to maintain body temperature, or inability to take oral feeding or (2) who are moderately ill with problems that are anticipated to resolve rapidly and are not anticipated to need subspecialty service on an urgent basis
   - Provide Care for infants who are convalescing after intensive care

2. ***Level II B*** *has the capabilities* of a Level IIA nursery and the additional capability to provide mechanical ventilation for brief durations (<24 hours) or continuous positive airway pressure

Level III (Subspecialty) Neonatal Intensive Care Unit (NICU): Level III units subdivided into three categories:

3. ***Level III A NICU*** has the capability to
   - Provide comprehensive care for infants born at >28 weeks gestation and weighing >1000 g
   - Provide sustained life support limited to conventional mechanical ventilation
   - Perform minor surgical procedures such as placement of central venous catheters or inguinal hernia repair

4. ***Level III B NICU*** has the capability to provide
   - Comprehensive care for extremely low birth weight infants (≤1000 g and ≤28 weeks gestation)
   - Advanced respiratory support such as high-frequency ventilation and inhaled nitric oxide
   - Prompt and on-site access to a full range of paediatric medical subspecialties
   - Advanced imaging, with interpretation on an urgent basis, including computed tomography, magnetic resonance imaging, and echocardiography Paediatric surgical specialists and paediatric anaesthesiologists on- site or at a closely related institution to perform major surgeries such as ligation of patent ductus arteriosus and repair of abdominal wall defects, necrotising enterocolitis with bowel perforation, trachea-oesophageal fistula and/or oesophageal atresia and myelomeningocele

5. ***Level III C NICU*** has the capabilities of a Level III B NICU and which is located within an institution that has the capability to provide extracorporeal membrane oxygenation (ECMO) and surgical repair of complex congenital cardiac malformation that requires cardiopulmonary bypass.

Appendix 2 Data Definitions

DATA DEFINITIONS AND CRITERIA

Centre Name*:* Name of participating hospital

Date of Admission (dd/mm/yy): Date of first admission to the participating site

State if it is a new case, or a readmission and to specify the referring centre (*Referral from :*) if relevant.

Case Status:

'New case': First time admission to the NNU concerned will be considered as a new case.

'Readmission': Subsequent admission of the same baby to the same NNU will be considered as a readmission.

'Transfer from': Case transferred from another hospital and being admitted to NNU for first time.

SECTION 1: Patient Particulars

1. ***Name of mother***: Name as in hospital record
2. ***Name of baby (optional)***: Name as in hospital record, if relevant
3. ***RN of baby****:* Registration Number at participating hospital. If the baby dies in Labour room and has no RN, then use the mother's RN.
4. ***Mother's I/C Number****:* MyKad number or Other ID document no. If "Other" please specify type of document.
5. ***a) Date of Birth****:* dd/mm/yy ***b) Time of Birth*****:** To state 24-hour format (mandatory for death cases) Estimate time of death if patient died at home and time accurately not known.
6. ***Ethnic group***: Malay / Chinese / Indian / Orang Asli / Bumiputra Sabah / Bumiputra Sarawak / Non-citizen (specific country) / Other Malaysian: If Bumiputra Sabah or Bumiputra Sarawak please specify the indigenous group.
7. ***Maternal Age****:* Age in completed years.
8. ***GPA***: Gravida, Para, Abortion (of current pregnancy before delivery of this child). to state number of ectopic pregnancies (Ectopic pregnancy also considered as an abortion)
9. ***Maternal Diabetes:*** State 'yes' or 'no' if mother had insulin-dependent diabetes (regardless of whether it is gestational or pre-gestational) State 'unknown' if so
10. ***Maternal Hypertension:*** State 'yes' or 'no' if mother had hypertension (regardless of whether it is chronic or pregnancy induced) State 'unknown' if so
11. ***Maternal Chorioamnionitis:*** State 'yes' or 'no' if mother had chorioamnionitis. State 'unknown' if so.

SECTION 2: Birth History

12. ***Antenatal steroids**:* State 'yes' or 'no' if this has been given (regardless of number of doses or when it was given). State 'unknown' if so
13. ***Intrapartum antibiotics**:* If systemic antibiotics were given to the mother in the 24 hours prior to delivery, record as 'Yes'. This includes antibiotics given only enterally or parenterally, excluding topical antibiotics. State 'unknown' if so
14. ***Birth weight (grams)**:* Weight in grams at birth hospital. If there are discrepant values, use the birth hospital value for outborn babies. If birth weight is unavailable, use the first weight taken up to 24 hours of life. If birth weight is only listed as an estimate, record the estimate, but make a note on the CRF that this is an approximate birth weight.
15. **a)** ***Gestation (weeks)**:* Best estimate of gestational age at birth given in full weeks. Preferences among estimates should be 1) obstetric estimate according to delivering obstetrician. (US date to be selected if done earlier than 25 weeks if there is a discrepancy with the Last Menstrual Period (LMP) date. Otherwise, use LMP date 2) New expanded Ballard scoring. If there is no definite estimate but baby referred to as term baby, enter 40.

    b) ***Gestional age based on:*** LMP, Ultrasound, Neonatal assessment or unknown – mandatory if patient died.
16. ***Growth status**:* based on Intrauterine Growth Curves (Composite Male / Female) chart. SGA <10th centile; AGA 10-90th centile; LGA >90th centile.
17. ***Gender***: Indicate Male, Female or Ambiguous/Indeterminate.
18. ***Place of birth**:*

Inborn – born in the same hospital as the participating site. If born within the wards of participating hospital also considered as inborn. 9 unless in ambulance – born before arrival (BBA)

Outborn – Born in another place (includes BBA) and transferred after birth to NNU of the participating site. Includes those born in hospital compound but not wards.

- Home
- Health Clinic
- Government Hospital with specialist – General/District
- Government Hospital without specialist
- University Hospital
- Private Hospital/maternity home<50 beds with/without specialist
- Private Hospital/maternity home>50 beds
- Alternative Birthing Centre (ABC) – Urban/Rural
- Enroute / During transport
- Others (please specify)
- Unknown

19. ***Multiplicity**:* To indicate as singleton, twins, triplets or others i.e. quadruplets, etc.

20. ***Mode of Delivery**:* Tick as relevant. All caesarians are considered as such without differentiation into upper or lower segment. For breech presentation in caesarian sections, tick Caesarian only.
    Tick as 'emergency' if there is a reason for the Caesarian section that has an emergency indication.

21. ***Apgar Score at 1 min and 5 min:*** Enter the apgar score at 1 min and 5 min as noted in the labour and delivery record. Score even if baby was intubated by 5 minutes of life. Score 'unknown' if so, not because baby was not scored once intubated.

22. ***Initial Resuscitation:*** Tick 'Yes' for all intervention that apply at birth for inborn cases only. For outborn babies, tick 'No' to all. If the babies left in the labour room for 30 minutes and required initial resuscitation only after that, it is not reconsidered as initial resustication:

    a) Oxygen
    b) Bag-mask vent
    c) Endotracheal Tube Ventilation
    d) Cardiac Compression
    e) Adrenaline

23. ***Admission Temperature:*** Temperature on admission to one decimal point in degree Celcius. Mandatory field for admission to Neonatal Ward.

SECTION 3: Neonatal Events

24. ***Ventilatory support***: Tick 'Yes' if any respiratory support was given

    a) CPAP – if infant given Continuous Positive Airway Pressure (CPAP) applied through nose at any time of birth.

Note: Nasal IMV (Intermittent Mandatory Ventilation) and nasal SIMV considered forms of nasal CPAP for the purpose of this definition. High floW nasal cannula not considered as nasal CPAP.

    b) Conventional Ventilation – intermittent positive pressure ventilation through an endotracheal tube a conventional ventilator (IMV rate < 240/min) at any time after leaving the delivery room.

    c) HFOV – High frequency oscillatory ventilation as delivered by an oscillator

    d) Nitric oxide – gas administered via a ventilator at any time

25. ***Total Duration of Ventilatory support***: State to next complete day i.e. < 24 hours is 1 day and 2 days 4 hours is 3 days, excluding days on CPAP only.

26. ***Surfactant***: Indicate whether exogenous surfactant given or not. If 'yes' indicate whether given at < 1 hour, 1 -2 hours or > 2 hours postnatal age.

27. ***Post Natal Steroids for CLD***: Indicate given or not for chronic lung disease (CLD). Steroids given for other purposes e.g. hypotension and laryngeal oedema were not included.

28. Parenteral Nutrition: Nutrition given intravenously. Parenteral nutrition must include amino acids with or without fats, hence plain dextrose saline infusion in not parenteral nutrition.

SECTION 4: Problems / Diagnoses

Mandatory fields are included for some diagnoses/procedures that are very important in the care of VLBW and sick infants. Definitions of these conditions are as shown below (AFTER SECTION 5). Other diagnoses or problems not given in the list can be referred to 'WHO 1992 ICD-10; Volume 1 document' and to be written in the space provided under '*Others'.*

NA in the CRF means data is not applicable or not available. There should not be too many 'Not available' data

SECTION 5: Outcome

47a. Date of discharge*:* Enter the exact date

47b. Time of death: State as 24-hour format. Mandatory for death cases – give best-estimated time if of death if exact time not known.

48. Weight (grams) and growth status on discharge/ death:

a) Weight in grams. For weight on death is the last weight taken when the baby is alive

b) Indicate growth status based on Intrauterine Growth Curves (Composite Male / Female)

49. Feeding at discharge/death: Enteral feeding received at the time of discharge

Tick 'Never Fed' – if infants did not received any enteral feeding at discharge

Tick 'Human milk only' – in infants received human milk by breast-fed or expressed breast milk at discharge.

Tick 'Formula only' – if infants received formula milk at discharge

Tick 'Human milk with formula' – if infants received both human milk and formula milk at discharge

50. Total Duration of hospital stay (Neonatal/Paeds Care): State to next complete day i.e. < 24 hours is 1 day and 10 days 6 hours is 11 days.

50. Outcome*:* Alive or Dead – Alive at discharge or died before discharge.

If child alive, state Place of discharge to**:** Home, Other Non-Paeds Ward, Social Welfare home or 'Still hospitalised as of 1st birthday'. If transferred to other hospitals, specify the name of hospital and reason for transfer.

Post- transfer disposition: If a case is transferred to another hospital in the MNNR network, complete the CRF up to current status and send form with the baby. The referral centre will complete a new CRF and this will be analysed together with the CRF of the referring hospital. **If the case is transferred to another hospital out of the NNR network,** the referring unit **must get the final 'outcome' of the baby** from the unit that the case was referred to. **This includes ROP findings after discharge.**

If child died, tick 'Yes' or 'No' whether the infant died within 12 hours or less from the time of admission to the NICU.

Place of Death: Labour Room/OT, In Transit Neonatal Unit or others, specify.

DEFINITIONS OF CERTAIN SPECIFIED DIAGNOSES
(Modified from ICD 10)

Diagnosis	Definition
Respiratory	
Meconium aspiration syndrome	Tick 'yes' if all 5 criteria are satisfied: a. Presence of meconuim stained amniotic fluid at birth b. Respiratory distress onset within 1 hour of birth. Respiratory distress defined as presence of one of the following signs: tachypnoea, grunting, nasal flaring, or intercostals retract. c. PaO_2 < 50 mmHg in room air, central cyanosis in room air or requirement for supplemental O_2 to maintain a PaO_2 > 50 mmHg d. Abnormal CXR compatible with meconium aspiration: Findings including coarse irregular or nodular pulmonary densities, areas of diminished aeration or consolidation alternating with area of hyperinflation, or generalized hyperinflation. e. Absence of culture proven early onset bacterial sepsis or pneumonia (i.e. negative blood culture within 72 hours of birth.
Pulmonary haemorrhage	Originating in the perinatal period (as diagnosed clinically by pink or red frothy liquid draining from mouth or arising from the trachea between the vocal cord or suctioned through the endotracheal tube. Diagnosis also may be made on autopsy finding of haemorrhage in the lungs).
Pneumonia	Infection of the lungs acquired prepartum, intrapartum, at birth or after birth. (Diagnosed with / without cultures). Diagnosis made clinically and supported by CXR findings.
Transient Tachypnoea of Newborn	Benign disease of near-term, term or large premature infants with respiratory distress shortly after delivery resolving within 3 days.

Pulmonary Interstitial Emphysema	Dissection of air into the perivascular tissues of lung from alveolar overdistention or overdistention of smaller airways evident on CXR as linear or cast like lucencies with a history of requiring increasing ventilatory support.
Respiratory distress syndrome (RDS).	Defined as: A. PaO_2 < 50mmHg in room air, central cyanosis in room air, or a requirement for supplemental O_2 to maintain a PaO_2 > 50mmHg AND B. A chest radiograph consistent with RDS (low lung volumes and reticulogranular appearance to lung fields, with or without air bronchograms)
Pneumothorax	Presence of extrapleural air diagnosed by chest radiograph or needle aspiration (thoracocentesis).
Supplemental oxygen State if required at Day 28 and 36 weeks corrected gestation	Receipt of continuous enriched oxygen concentration >0.21% by oxyhood, nasal cannula, nasal catheter, facemask or other forms of respiratory support. 'Continuous' means that the patient is receiving oxygen throughout the time period and not just in brief episodes as needed i.e. during feeds. 'Blow-by' oxygen dose not counted unless it is the mode of oxygen administration used in a transport situation. Do not score oxygen given as part of a hyperoxia test.
Cardiovascular Persistent Pulmonary Hypertension (PPHN)	Failure of normal pulmonary vasculature relaxation at or shortly after birth, resulting in impedance to pulmonary blood flow, which exceeds systemic vascular resistance, such that deoxygenated blood shunted to the systemic circulation.
Patent ductus arteriosus (PDA)	Clinical evidence of left to right PDA shunt documented by continuous murmur, hyperdynamic precordium, bounding pulses, wide pulse pressure congestive heart failure, increased pulmonary vasculature or cardiomegaly by CXR, and/or increased O_2 requirement of ECHO evidence of PDA with documentation of left to right ductal shunting.

Necrotising enterocolitis (NEC) (Stage 2 and above) If 'yes' and managed surgically, tick 'Surgical Rx'	NEC according to Bell's criteria stage 2 or higher **Stage 1:** Suspected (History of perinatal stress, systemic signs of ill health i.e. temperature instability, lethargy, apnoea, Gastro Intestinal Tract (GIT) manifestations i.e. poor feeding, increased volume of gastric aspirate, vomiting, mild abdominal distension, faecal occult blood with no anal fissure). **Stage 2:** Confirmed (Any features of stage 1 plus persistent occult or gastrointestinal bleeding, marked abdominal distension, abdominal radiograph, intestinal distension, bowel wall oedema, unchanging bowel loops, pneumatosis intestinalis, portal vein gas). **Stage 3:** Advanced (Any features of stages 1 or 2 plus: deterioration in vital signs, evidence of shock or severe sepsis, or marked gastrointestinal haemorrhage, or abdominal radiograph showing any features of stage 2 plus pneumoperitoneum).
Retinopathy of prematurity (ROP) Maximum stage of ROP in left/right eye as defined by the International Committee on ROP (ICROP). Score according to the grade of ROP assigned on an eye exam done by an ophthalmologist. If there is no explicit grade listed, then score according to the descriptions given by the ICROP. State if laser, cryotherapy or vitrectomy was done. If screening was not done, state 'No' and indicates whether an appointment for retinal examination was given.	Enter the worst stage documented **Stage 0:** No Evidence of ROP **Stage 1**: Demarcation Line **Stage 2**: Ridge **Stage 3**: Ridge with Extraretinal Fibrovascular Proliferation **Stage 4**: Retinal Detachment
Intraventricular haemorrhage (IVH)	If ultrasound of brain done on or before 28 days of life, enter the worst grade

If present, state if VP shunt/reservoir was inserted Tick 'No; if no IVH before or day 28 Tick 'Not Applicable' for term infant Indicate if ultrasound not done before or on day 28.	**Grade 1:** Subependymal germinal matrix (GM) haemorrhage only **Grade 2:** IVH without ventricular dilation **Grade 3:** IVH with ventricular dilation **Grade 4:** IVH with parenchymal involment
Central Venous Line	Presence of any of three types of catheters: 1) Umbilical catheters 2) Percutaneously inserted central catheters 3) Surgically placed Broviac catheter that terminates at or close to the heart or in one of the great vessels. Those great vessels considered are: ○ Aorta ○ Superior vena kava ○ Brachiocephalic veins ○ Internal jugular veins ○ Subclavian veins ○ Inferior vena kava ○ External iliac veins ○ Common femoral veins
Central Venous Catheter (CVC) associated infection	All 3 criteria to be present: 1. A recognized pathogen isolated from one blood culture or a known skin pathogen isolated from two blood cultures (e.g. coagulase negative staphylococcus sp.) 2. One or more clinical signs of infection such as fever, hypothermia, apnea and bradycardia 3. A central venous catheter in place for at least 48 hours prior to the time the blood culture is drawn
Catheter associated ischaemic event:	Catheter related events leading to ischaemia which includes catheter occlusion and acute problems related to large vessel obstruction, including organ and limb dysfunction as well as embolic events. This ischaemia includes transient (e.g. vasospasm) as well as permanent events (e.g. gangrene).

Seizures	Clinical evidence of subtle seizures, or of focal / multifocal, clonic or tonic seizures, confirmed by 2 or more clinicians or diagnosed by EEG. Used synonymously with fits or convulsions.
Infections Tick 'Yes'if there is evidence clinical or confirmed sepsis. State whether the onset of first confirmed sepsis was below and on day 3 of life or after day 3 of life. State the organism cultured: • Group B streptococcus • MRSA • CONS • ESBL • Fungal • Staphylococcus aureus • Klebsiella • Pseudomonas • Acinetobacter • Others, specify	***Confirmed sepsis*** Clinical evidence of sepsis plus culture-proven infection e.g.: positive blood, urine, or CSF culture or positive bacterial antigen test. Includes congenital pneumonia if blood culture was positive. <u>For CONS:</u> Place a tick if the infant has ALL 3 of the following: 1. CONS is recovered from a blood culture obtained from either a central line, or a peripheral blood sample AND 2. Signs of generalized infection (such as apnoea, temperature instability, feeding intolerance, worsening respiratory distress or haemodynamic instability) AND 3. Treatment with 5 or more days of IV antibiotics after the above cultures were obtained. If the patient died, was discharged, or transferred prior to completion of 5 days or more of IV antibiotics, this condition would still be met if the intention was to treat for 5 or more days. <u>For FUNGAL infection</u>: Place a tick only if a fungus was recovered from a blood culture obtained from either a central line or peripheral blood sample after day 3 of life.
Neonatal meningitis	Signs of clinical sepsis and evidence of meningeal infection as shown in cerebrospinal fluid findings (i.e. cytology, biochemistry or microbiologic(al) findings).
Hypoxic ischaemic encephalopathy (HIE)	HIE requires the presence of all 3 of the following criteria:

	1. Presence of a clinically recognized encephalopathy within 72 hours of birth. Encephalopathy is defined as the presence of 3 or more of the following findings within 72 hours after birth: a. Abnormal level of consciousness: hyperalertness, lethargy, stupor or coma b. Abnormal muscle tone: hypertonia, hypotonia or flaccidity c. Abnormal deep tendon reflexes: increased, depressed or absent d. Seizures: subtle, multifocal or focal clonic e. Abnormal Moro reflex: exaggerated, incomplete or absent f. Abnormal suck: weak or absent g. Abnormal respiratory pattern: periodic, ataxic or apnoeic h. Oculomotor or papillary abnormalities: skew deviation, absent or reduced Doll's eye or fixed unreactive pupils **AND** 2. Three or more supporting findings from the following list: a. Arterial cord pH<7.00 b. Apgar score at 5 minutes of 5 or less c. Evidence of multi-organ system dysfunction – dysfunction of one or more of the following systems within 72 hours of birth: i. Renal: Oliguria or acute renal failure. ii. GI: necrotizing enterocolitis, hepatic dysfunction iii. Haematologic: thrombocytopaenia, disseminated intravascular coagulopathy. iv. Endocrine: hypoglycaemia, hyperglycaemia, hypercalcaemia, syndrome of inappropriate ADH secretion (SIADH). v. Pulmonary: persistent pulmonary hypertension vi. Cardiac: myocardial dysfunction, tricuspid insufficiency. d. Evidence of foetal distress on antepartum monitoring: persistent late decelerations, reversal of end-diastolic flow on Doppler flow studies of the umbilical artery or a biophysical profile of 2 or less

HIE severity If the infants diagnosed with HIE, record the worst stage observed during the first 7 days following birth based on the infant's level of consciousness and response to arousal maneuvers such as persistent gentle shaking, pinching, shining a light or ringing of a bell: Tick "none" if there is no HIE Tick '"Mild, Moderate, Severe " according to the definition	e. Evidence of CT, MRI, technetium or ultrasound brain scan performed within 7 days of birth of diffuse or multifocal ischaemia or of cerebral oedema. f. Abnormal EEG: low amplitude and frequency, periodic, paroxysmal or isoelectric. **AND** 3. The absence of an infectious cause, a congenital malformation of the brain or an inborn error of metabolism, which could explain the encephalopathy. *HIE severity* a. Mild (normal or hyperalert) – infants in this category are alert or hyperalert with either a normal or exaggerated response to arousal. b. Moderate (lethargic or stupor) – infants in this category are arousable but have a diminished response to arousal maneuvers c. Severe (deep stupor or coma) – infants in this category are not arousable in response to arousal maneuvers
Intraventricular haemorrhage (IVH) If present, state if VP shunt/reservoir was inserted	If ultrasound of brain done on or before 28 days of life, enter the worst grade **Grade 1:** Subependymal germinal matrix (GM) haemorrhage only **Grade 2:** IVH without ventricular dilation **Grade 3:** IVH with ventricular dilation **Grade 4:** IVH with parenchymal involment

Major Congenital Abnormalities If Yes, state: 1. 'Known Syndrome', 2. 'Not a Recognised Syndrome' 3. 'Isolated major abnormality' Tick types of abnormalities found for recognisable syndrome, non-recognisable ones or isolated major congenital abnormality Please specify if there are abnormalities not listed.	A major congenital abnormality is defined as any abnormality of prenatal origin that if uncorrected or uncorrectable, significantly impairs normal physical or social function or reduce normal life expectancy Any abnormalities of prenatal origin that are present at birth, and do not have surgical, medical or cosmetic importance at the time of examination during the newborn period is a minor congenital abnormality and NOT included in this registry. Examples include isolated findings such as 'low-set ears', sacral dimple or single transverse palmar crease". Please refer to WHO ICD 10 for definitions of various abnormalities.
Inborn of Metabolism (IEM) If 'Yes', state either clinical diagnosis or confirmed diagnosis Specify the confirmed diagnosis, if any	For final diagnosis, tick 'yes' only if tandem spectrometry is not available to confirm diagnosis and there are signs such as encephalopathy not otherwise explained, hypogylceamia, seizures, with or without associated family history or parental consanguineous marriage.

National Neonatal Registry

MONTHLY BIRTH CENSUS

Hospital : ……

Month : …… Year : …….

Total Births : ……. LiveBirths: ……. Stillbirths: ……..…

Birth Weight (grams)	No. of Stillbirths	No. of Live Births	No. Admitted to Neonatal Unit	**No. who Died in Delivery Room
< 500				
500 – 600				
601 – 700				
701 – 800				
801 – 900				
901 – 1000				
1001 – 1250				
1251 – 1500				
1501 – 2000				
2001 – 2500				
>2500				
TOTAL				

Births versus Mode of Delivery

Mode of Delivery	No. of Stillbirths	No. of Live Births	No. Admitted to Neonatal Unit	**No. who Died in Delivery Room
Spontaneous Vertex (SVD)				
Breech				
Forceps				
Ventouse				
Lower Segment Caesarean Section (LSCS) Elective				
LSCS Emergency				
TOTAL				

Births versus Ethnic Group

Ethnic Group		No. of Stillbirths	No. of Live Births	No. Admitted to Neonatal Unit	**No. who Died in Delivery Room
Malay					
Chinese					
Indian					
Orang Asli					
Bumiputra Sabah - specify ethnic group					
Bumiputra Sarawak – specify ethnic group					
Foreigner					
Other Malaysian					
TOTAL					

Remarks:

……

……

Name of Site Coordinator: ……

Chop: Date: ……

MALAYSIAN NATIONAL NEONATAL REGISTRY (CRF 10)

Centre Name: _____

_____

_____

Date of Admission: | | | | (dd/mm/yy)

○ Stillbirth ○ Livebirth

○ New Case ○ Readmission

○ Transfer from, if relevant: .....

MNNR No. (Office use): | | / | |

Centre: | |

Admitted to neonatal ward: ○ Yes → (Proceed to complete all sections in this CRF) ○ No → (Proceed to complete [Sections 1, 2, 4(No. 45) and 5])

Instruction: Where check boxes ☐ are provided, check (✓) one or more boxes. Where radio buttons ○ are provided, check (✓) one box only.

SECTION 1 : PATIENT PARTICULARS & MATERNAL HISTORY

1. Name of mother: *	
2. Name of baby (optional):	
3. RN of baby: *	
4. Mother's I/C number: *	MyKad: | | | | | | - | | - | | | |
	Other ID document No:
	Specify document type (if others): ○ Passport ○ Armed Force ID ○ Driver's License ○ Old IC ○ Hospital RN ○ Father's I/C ○ Work Permit number ○ Police ID Card ○ Immigration permit ○ Others, specify: .....
5a. Date of birth of baby: * (dd/mm/yyyy)	| | / | | / | | | | **5b. Time of birth:** (24-hour format) | | | | (mandatory for death cases)
6. Ethnic group of * mother:	○ Malay ○ Indian ○ Bumiputra Sabah, specify: ..... ○ Other Malaysian
	○ Chinese ○ Orang Asli ○ Bumiputra Sarawak, specify: ..... ○ Non-citizen, specify country: .....
7. Maternal age: *	| | (years)
8. GPA: (current pregnancy before delivery of this child)	* Gravida: | | * Parity: | | * Abortion: | |
9. Maternal diabetes (including * gestational diabetes):	○ Yes ○ No ○ Unknown
10. Maternal hypertension, chronic * pregnancy induced:	○ Yes ○ No ○ Unknown
11. Maternal chorioamnionitis: *	○ Yes ○ No ○ Unknown

SECTION 2 : BIRTH HISTORY

12. Antenatal steroid: *	○ Yes ○ No ○ Unknown
13. Intrapartum * antibiotic:	○ Yes ○ No ○ Unknown
14. Birth weight: *	| | | | (grams)
15a. Gestation: *	| | (weeks) **15b. Gestational age based on: (if patient died)** ○ LMP ○ Ultrasound ○ Neonatal assessment ○ Unknown
16. Growth status: *	○ SGA ○ AGA ○ LGA
17. Gender: *	○ Male ○ Female ○ Ambiguous/ Indeterminate
18. Place of birth: *	○ Inborn ○ Outborn → ○ Home ○ Health clinic ○ Government hospital with specialist → ○ District ○ General ○ Government hospital without specialist ○ University hospital ○ Private hospital/ maternity home <50 beds with specialist ○ Private hospital/ maternity home <50 beds without specialist ○ Private hospital/maternity home >50 beds ○ Alternative Birthing Centre → ○ Urban ○ Rural ○ Enroute/ During transport ○ Others, specify:..... ○ Unknown
19. Multiplicity: *	○ Singleton ○ Twin ○ Triplet ○ Others, specify: .....
20. Final mode of * delivery:	○ Vaginal delivery → ○ SVD ○ Breech ○ Others, specify: →
	○ Instrumental → ☐ Vacuum ☐ Forcep ○ Unknown
	○ Caesarean section → ○ Elective ○ Emergency

21. Apgar score at 1 * min and 5 min (1-10) :	a) Score at 1 min:	| ☐ Unknown	b) Score at 5 min: (Please score even if the baby is intubated)	| ☐ Unknown	
22. Initial resuscitation : *	a) Oxygen:	○ Yes ○ No	d) Cardiac compression:	○ Yes	○ No
	b) Bag-mask vent:	○ Yes ○ No	e) Adrenaline:	○ Yes	○ No
	c) Endotracheal tube vent:	○ Yes ○ No			

23. Admission temperature: * (mandatory only if admitted to Neonatal Ward) \| \| . \| (°C)

SECTION 3 : NEONATAL EVENT

24. Respiratory support:	○ Yes → ☐ CPAP ☐ Conventional ventilation ☐ HFOV ☐ Nitric oxide **Nasal CPAP before ETT ventilation:** ○ Yes ○ No ○ No
25. Total duration of ventilatory support: (Do not count the days on CPAP only)	☐☐☐ (days)
26. Surfactant:	○ Yes → ○ < 1 hr ○ 1- 2 hrs ○ > 2 hrs ○ No
27. Post natal steroid for CLD:	○ Yes ○ No
28. Parenteral nutrition:	○ Yes ○ No

SECTION 4 : PROBLEMS / DIAGNOSES

29. Respiratory :	☐ Meconium aspiration syndrome ☐ Transient tachypnoea of newborn ☐ Pulmonary haemorrhage ☐ Pulmonary interstitial emphysema ☐ Pneumonia ☐ Unknown
30. RDS: *	○ Yes ○ No
31. Pneumothorax: *	○ Yes → **Pneumothorax developed during mechanical ventilation:** ○ Yes ○ No ○ No
32. Supplemental oxygen at: *	**a) Day 28:** ○ Yes ○ No **b) 36 weeks corrected age :** ○ Yes ○ No
33.Cardiovascular: *	**PPHN:** ○ Yes ○ No ○ Unknown
34. PDA: *	○ Yes → **a) ECHO done:** ○ Yes ○ No **b) Indomethacin/Ibuprofen:** ○ Yes ○ No **c) Ligation:** ○ Yes ○ No ○ No
35. NEC (Stage 2 and above): *	○ Yes → **Surgical treatment:** ○ Yes ○ No ○ No
36. ROP: Retinal Exam Done: *	○ Yes *(If yes, worst stage of ROP):* → **a) Date of first screening:** ☐☐/☐☐/☐☐ (dd/mm/yy) **b) Post conceptional age at screening:** ☐☐ (autocalculate) **c)** ○ No ROP ○ Stage 1 ○ Stage 2 ○ Stage 3 ○ Stage 4 ○ Stage 5 **d) Laser therapy:** ○ Yes ○ No **e) Cryotherapy:** ○ Yes ○ No **f) Vitrectomy:** ○ Yes ○ No ○ No → **Appointment given:** ○ Yes ○ No ○ Not applicable
37. IVH: *	○ Yes *If yes, worst grade :* → ○ Grade 1 ○ Grade 2 ○ Grade 3 ○ Grade 4 ☐ VP shunt / reservoir insertion ○ No ○ Not applicable (term infant) ☐ Ultrasound not done
38. Central venous line:	○ Yes ○ No
39. Catheter associated infection:	○ Yes ○ No
40. Catheter associated ischaemic event:	○ Yes → ○ Vasospasm ○ Gangrene ○ Organ dysfunction ○ No

SECTION 4 : PROBLEMS / DIAGNOSES (cont.)

41. Seizures: * ○ Yes ○ No

42. Confirmed sepsis: * ○ Yes → ○ No

I) For first episode:
○ On or before day 3 of life ○ After day 3 of life

II) Type of organism: (can tick more than one)
☐ Group B Streptococcus ☐ Fungal ☐ Acinetobacter
☐ MRSA ☐ Staphylococcus aureus ☐ Others, specify:
☐ CONS ☐ Klebsiella
☐ ESBL organisms ☐ Pseudomonas

43. Neonatal meningitis: ○ Yes ○ No

44. HIE (≥36 weeks): * ○ None ○ Mild ○ Moderate ○ Severe

45. Congenital anomalies: *

45a. Major congenital anomalies:

○ Yes → ○ No → (Proceed to No.46):

○ Syndrome (known)
☐ Down
☐ Edward
☐ Patau
☐ Others, specify (Please refer to ICD 10):

○ Not a recognised syndrome
○ Isolated major abnormality

45b. Types of abnormalities (Check all that are present. Applies to all including 'known syndromes', 'not a recognised syndrome' or 'isolated major abnormality')

☐ CVS → ○ Cyanotic ○ Acyanotic
☐ ECHO done

☐ CNS → ○ Hydrocephalus
○ Hydrancephaly
○ Holoprosencephaly
○ Others (Refer to ICD 10):

☐ Neural Tube Defect → ☐ Spina bifida
☐ Anencephaly
☐ Encephalocoele
☐ Others (Refer to ICD 10):

☐ Skeletal dysplasia
☐ Respiratory
☐ GIT
☐ Hydrops
☐ Renal
☐ Cleft → ○ Lip ○ Palate ○ Lip and palate
☐ Others, specify
☐ None of the above

46. Inborn Errors of Metabolism (IEM): ○ Yes → Specify diagnosis: ○ No

SECTION 5 : OUTCOME

47a. Date of discharge / transfer/ death: * ☐☐/☐☐/☐☐ (dd/mm/yy) **47b. Time of death:** (24-hour format) ☐☐☐☐ (mandatory for death cases)

48. Weight and growth status on discharge / death: *
a) Weight: ☐☐☐☐ (grams)
b) Growth status: ○ SGA ○ AGA ○ LGA

49. Feeding at discharge / death: ○ Never fed ○ Human milk only ○ Formula only ○ Human milk with formula ○ No data / Unknown

50. Total duration of hospital stay (Neonatal / Paeds Care): ☐☐☐ (in completed days) (autocalculate)

51. Outcome:

○ Alive → **Place discharged to:**
○ Home
○ Social welfare home
○ Other non Paeds Ward
○ Still hospitalized as of 1st birthday
○ Transfer to other hospitals →

a) Name of hospital:

b) Reason for transfer:
○ Growth / Stepdown care ○ Acute medical / diagnostic services ○ Social/ Logistic reason
○ Lack of NICU bed ○ Others, specify:
○ Chronic/Palliative care ○ Surgery

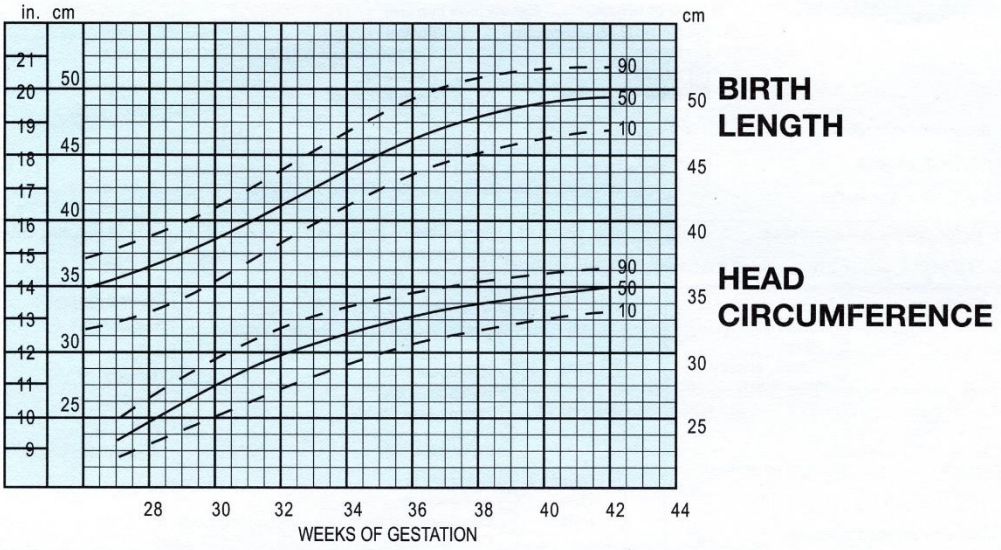
c) Post transfer disposition: (Please fill this section if place transferred is not part of the NNR Network)
○ Home ○ Transferred again to another hospital
○ Death ○ Readmitted to your hospital

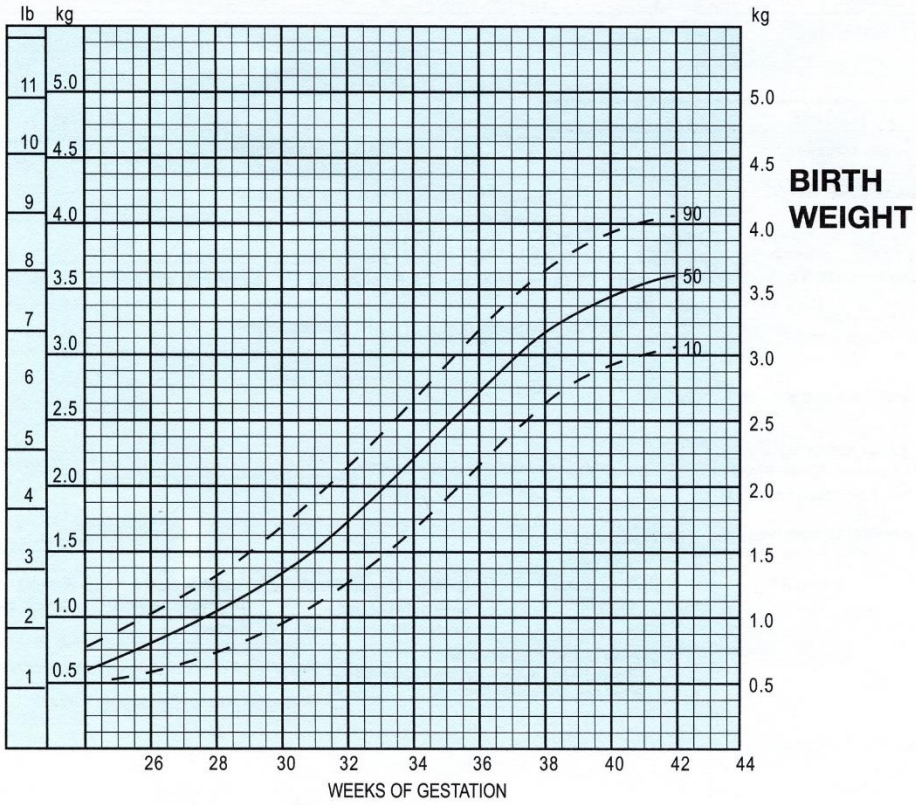
○ Dead → a) Died within 12 Hours of admission: (autofill)
○ Yes
○ No

b) Place of death:
○ Labour room/OT ○ Neonatal unit
○ In transit ○ Others, specify:

Name : _____ Signature : _____ Date: ☐☐☐ (dd/mm/yy)

INTRAUTERINE GROWTH CURVES (COMPOSITE MALE / FEMALE) (APPENDIX 2)





Data Source: W.H. Kitchen et al Revised intrauterine growth curves for an Australian hospital population.
Aust. Paediatr. J. *(1983) 19:157-161.*

Appendix 5 Presentations

POSTER, ABSTRACT AND PAPER PRESENTIONS

1. Cheah IGS. Perinatal database management. 16th Congress of the Federation of Asia Oceania Perinatal Societies (FAOPS). New Delhi, India, 2010

2. Neoh SH. Survival of VLBW infants in SDP hospitals 2010. Presented at the MNNR SDP Meeting, Selayang Hospital, Selangor Malaysia, 2012

3. Boo NY. Hypothermia- Incidence and Outcome 2010 data. Presented at the MNNR SDP Meeting, Selayang Hospital, Selangor Malaysia, 2012

4. Ramli N. Intraventricular haemorrhage – Associated risk factors and impact on survival 2010. Presented at the MNNR SDP Meeting, Selayang Hospital, Selangor Malaysia, 2012

5. Cheah IGS. Retinopathy of prematurity – screening and outcome. Presented at the MNNR SDP Meeting, Selayang Hospital, Selangor Malaysia, 2012

6. Lee JKF. Meconium aspiration – risk factors, difference in survival between centres or with availability of HFOV/HFJ and NO. Presented at the MNNR SDP Meeting, Selayang Hospital, Selangor Malaysia, 2012

7. Chee SC. Respiratory support at birth - surfactant usage and antenatal steroids, use of CPAP only at birth. Presented at the MNNR SDP Meeting, Selayang Hospital, Selangor Malaysia, 2012

8. Cheah IGS. Respiratory support of preterm infants in NICU - ventilation of preterm infants and outcome. Presented at the MNNR SDP Meeting, Selayang Hospital, Selangor Malaysia, 2012

9. Lee JKF. NEC – risk factors and outcome amongst SDP centres. Presented at the MNNR SDP Meeting, Selayang Hospital, Selangor Malaysia, 2012

10. Teh SH. Respiratory support of term infants and outcome. Presented at the MNNR SDP Meeting, Selayang Hospital, Selangor Malaysia, 2012