Report of the Malaysian National Neonatal Registry 2013

A Study of Critically Ill Babies in Neonatal Intensive Care Units

EDITOR:

- Neoh Siew Hong

WITH CONTRIBUTIONS FROM:

- Irene Cheah Guat Sim
- Chee Seok Chiong
- Jimmy Lee Kok Foo
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- Boo Nem Yun
- Zuraidah Bt Abdul Latif

Perinatal Society of Malaysia

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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.

August 2017

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CONTENTS

FOREWORD

This is the tenth printed edition for the annual report of the Malaysian National Neonatal Registry (MNNR) for the study year 2013. The registry in the year 2013 comprised 37 NICUs in Ministry of Health hospitals, and one from a university hospital.

The steering committee would like to thank the Director General of Health Datuk Dr. Noor Hisham bin Abdullah, the head of Paediatric Service, Dr. Hishamshah bin Mohd Ibrahim, the immediate past head of Pediatric Service, Dato' Dr Hussain Imam bin Haji Muhammad Ismail, 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 online and the MNNR secretariat are to be highly commended.

The MNNR has enabled the readily available data for epidemiology, workload and outcomes to be readily accessible and having an online system data entry that has 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 have 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 2013 were all preterm babies below 32 weeks gestational age, those of birth weight below or equal to 1500 g, all babies who required mechanical ventilation and/or nasal continuous positive airway pressure (nCPAP), all babies with hypoxic ischaemic encephalopathy (HIE) and all neonatal deaths (babies < 28 days old who died in Neonatal Unit, Obstetric Department and other wards). Both inborn and outborn babies were included.

Results:

- In 2013, there were 38 participating hospitals with a total livebirths of 292695. A total of 12880 babies who were in level III NICUs met the study criteria, 11185 (86.8%) were inborn whilst 1695 (13.2%) were outborn babies (Figure 1 & Table 1).

- There were 3456 babies (26.8%) below 32 weeks gestational age (Figure 2 and Table 2).

- Three thousand eight hundred and fourteen babies (29.6%) were of birth weights of 1500 g and below (Figure 3 and Table 3).

- The survival rates of very preterm babies admitted to the MNNR were 15.5% for 24 weeks, 40.0% for 25 weeks, 60.3% for 26 weeks, 72.8% for 27 weeks, 79.1% for 28 weeks, 82.9% for 29 weeks, 90.5% for 30 weeks and 92.0% for 31 weeks (Figure 4 and Table 4).

- The survival rates of babies with birth weight between 501-1000 g and 1001-1500 g were 55.4% and 89.0% respectively (Figure 5 and Table 5).

- Thirty four centres met the standard ($\geq$ 85%) for key performance indicator (KPI) for survival rate of inborn babies between 1000-1499 g birth weight with no lethal congenital abnormalities. Data for this indicator was not available for 2 centres.

- In 2013, 72.4% of mothers who were less than 32 weeks' gestation received antenatal steroids. It was given to mothers of 76.3% of inborn babies and 39.5% of outborn babies below 32 weeks' gestation (Figures 6a, 6b & Table 6). There were marked differences in the use of antenatal steroids across centres for inborns who were less than 32 weeks' gestation, varying from 46.2% to 95.6% (Figures 6a, Table 6)

- Eleven thousand eight hundred and fifty two babies (92.0% of the overall cohort) required respiratory support. Of these, 7845 (66.2%) received invasive ventilation. A total of 8430 babies received nasal continuous positive airway pressure (nCPAP). nCPAP as the only mode of respiratory support was given to 3965 babies.

- Eighty six percent (3198/3718) of babies with birth weight of 1500 g and below required respiratory support, 22.6% (841/3718) had nCPAP as the only mode of respiratory support.

- Early nCPAP after birth was given to 34.7% of inborn babies <32 weeks gestational age. In the larger inborn preterm babies between 32-36 weeks gestational age, 35.9% were stabilised with early nCPAP after delivery.

- Surfactant was given to a total of 3294 babies. Fifty five percent of babies with birth weight of 1500 g and below were treated with surfactant for respiratory distress syndrome. Sixty two percent of preterm babies below 32 weeks gestational age and 24% between 32 and 36 weeks gestational age in the cohort had surfactant therapy.

- The rates of chronic lung disease (the requirement for oxygen supplementation) for the survivors at Day 28 and 36 weeks post-conceptional age were 54.2% and 52.9% respectively for babies between 22-24 weeks gestational age, 54.3% and 44.0% respectively for babies between 25-27 weeks gestational age, and 15.8% and 14.2% respectively for babies between 28-31 weeks gestational age (Figure 8 and Table 8).

- The rates of chronic lung disease (the requirement for oxygen supplementation) for the survivors at Day 28 and 36 weeks post-conceptional age were 59.8% and 42.3% respectively for babies with birth weights $\leq$ 750 g, 41.2% and 30.3% respectively for babies with birth weights 751-1000 g, 16.7% and 10.4% respectively for babies with birth weights 1001-1250 g and, 6.9% and 2.2% respectively for babies with birth weights 1251-1500 g (Figure 9 and Table 9).

- Four hundred and thirty babies or 3.3% of the entire cohort had developed pneumothorax with an associated mortality rate of 33.5%.

- The incidence rate for ventilated meconium aspiration syndrome (MAS) was 3.1 per 1000 live births. There were a total of 913 inborn and 160 outborn babies ventilated for MAS. The overall mortality for babies ventilated for MAS was 10.9%. The mortality rates for inborn and outborn babies ventilated for MAS were 10.4% and 13.8% respectively.

- A total of 665 babies had persistent pulmonary hypertension of the newborn (PPHN) with an overall mortality rate of 41.2%. Inhaled nitric oxide was only given to 23.7% of babies $\geq$ 35 weeks with PPHN.

- Patent ductus arteriosus (PDA) was diagnosed in 1526 inborn babies admitted to the NICUs, 24% of these babies had indomethacin/ibuprofen and 1.6% had PDA ligation. Overall 10.2% and 0.5% of premature babies < 32 weeks gestational age were treated with indomethacin/ibuprofen and PDA ligation respectively (Figure 10 and Table 10).

- Among the 1821 inborn babies with gestational age < 32 weeks who underwent ROP screening before discharge, 61 (3.3%) had ROP stage 3, none had ROP stage 4 or 5. The incidence rates of ROP Stage 3 in this cohort were 18.5%, 8.1% and 1.8% in babies with gestational age of 22-24 weeks, 25-27 weeks and 28-31 weeks respectively (Figure 14 and Table 14).

- Among the 2596 inborn babies with gestational age < 32 weeks who underwent cranial ultrasound examination, 704 (27.1%) had Grade 1 or 2 intraventricular haemorrhage (IVH) and 254 (9.8%) had Grade 3 or 4 IVH. The incidence rates of Grade 3 or 4 IVH were 33.7%, 20.2% and 5.9% in babies with gestational age of 22-24 weeks, 25-27 weeks and 28-31 weeks respectively (Figure 16 and Table 16).

- One hundred and sixty six (5%) of the inborn babies $\leq$ 1500g developed necrotizing enterocolitis (NEC), 31.9% of them required surgery. The incidence of NEC was highest in the smallest babies, 9.7% in babies $\leq$750 g, 6.8% in babies 751-1000 g, 4.9% in babies 1001-1250 g and 2.8% in babies 1251-1500 g (Figure 19 and Table 19).

- The incidence of blood culture positive early onset sepsis among inborn babies with gestational age of < 32 weeks was 1.7%. The incidence was highest (3.1%) in babies 25-27 weeks gestational age (Figure 20 and Table 20).

- Two hundred and eight inborn babies (7.9%) $\leq$ 1500 g birth weight who survived more than 3 days had one or more episodes of blood culture positive late onset sepsis. The infection rate was highest in the smallest babies, 21.4% in babies $\leq$ 750 g, 13.8% in babies 751-1000 g, 7.8% in babies 1001-1250 g and 4.4% in babies 1251-1500 g (Figure 22 and Table 22).

- The overall incidence of hypoxic iscahemic encephalopathy (HIE) in babies with gestational age of $\geq$ 35 weeks was 2.8/1000 live births. Seven hundred and ninety nine inborn babies and 128 outborn babies were diagnosed to have HIE. The mortality rate in babies with severe HIE was 63.8%.

- 10.2% (1323/12880) of babies in the total cohort had major congenital anomalies. The mortality rate for babies ≥ 35 weeks with major congenital anomalies was 44.6%.

Study recommendations include collaboration with Obstetrics and Primary Healthcare staff:

- To enhance the use of antenatal steroids and continue with in-utero transfer of high-risk pregnancies.
- To reduce the number of post term deliveries and to reduce the risk of thick meconium stained liquor.
- To review preventable causes of HIE.
- To enhance antenatal detection of congenital abnormalities and to provide counselling to parents.

And in the NICUs:

- To continue to promote the use of nasal continuous positive airway pressure as early as possible after birth to reduce the need for mechanical ventilation for the spontaneously breathing preterm babies.
- 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) 2013

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 elected members. This committee is responsible for the general running and decision-making of the Registry and for approving the use of its data.

A Registry Manager assisted by a clinical research assistant heads the administrative staff at the Neonatal Registry Unit (NRU). Statistical support was 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 2013:

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40. Hospital Batu Pahat, Johor
41. Hospital Bintulu, Sarawak
42. Hospital Raja Permaisuri Bainun, Ipoh, Perak
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74. Hospital Tuanku Fauziah, Kangar, Perlis
75. Hospital Tuanku Ja'afar, Seremban, Negeri Sembilan
76. Hospital Universiti Sains Malaysia, Kubang Kerian, 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. Had hypoxic ischaemic encephalopathy
B. 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)

Both inborn and outborn babies were included.
Outborn babies who died before arrival were excluded. Babies who were admitted to the NNU at a corrected gestation of > 44/52 were not considered neonatal cases and hence were 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 would have only one set of CRF completed and readmission of the same babies into the NNU would 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 were used and data from completed CRFs were entered via the MNNR website by the respective SDPs or sent to MNNR secretariat after a defined period for data entry.

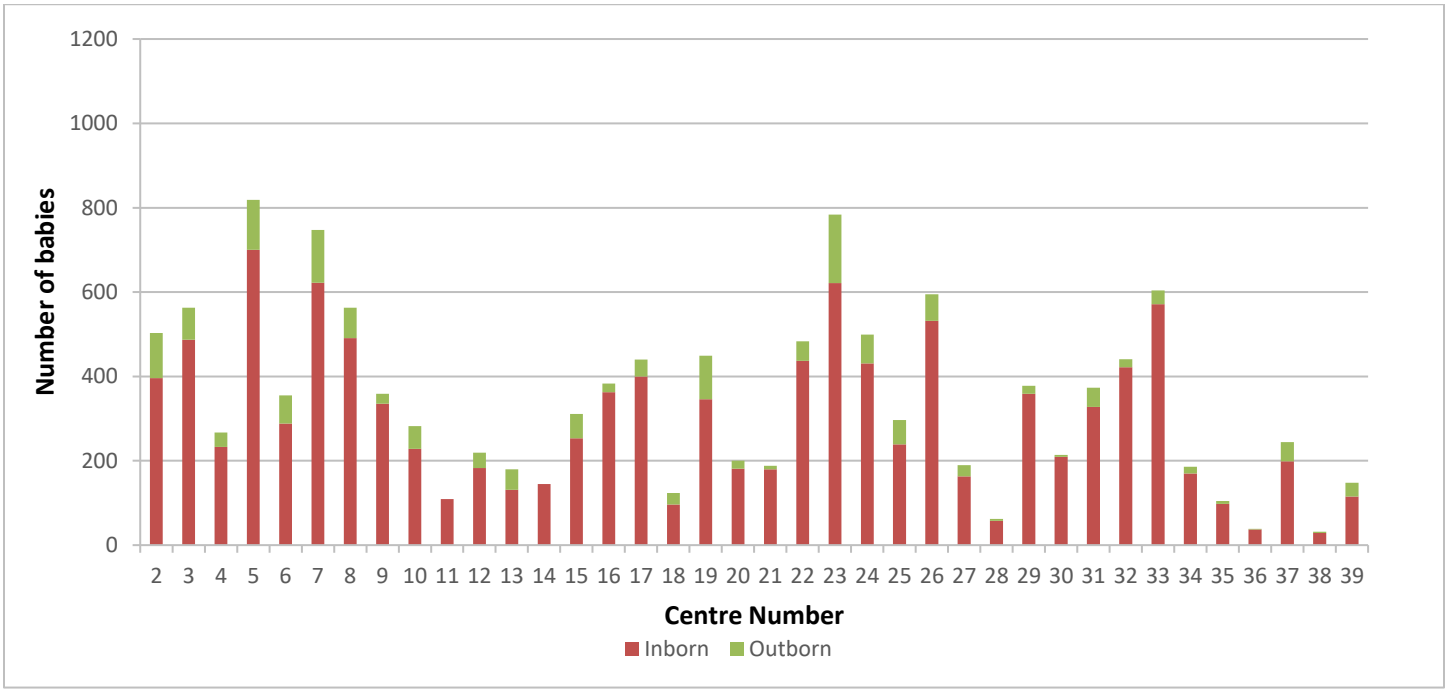
2.4 Data Verification

Missing or anomalous data was identified by manual check and then clarified with the respective centre. Further data verification was 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

Number of babies according to place of birth



COMMENT: There were 11185 inborn babies and 1695 outborn babies in the MNNR.

Table 1: Number of babies according to place of birth

Hospitals		Place of Birth		Total
		Inborn	Outborn	
2	n	396	107	503
	(%)	(78.7)	(21.3)	(100)
3	n	487	76	563
	(%)	(86.5)	(13.5)	(100)
4	n	233	34	267
	(%)	(87.3)	(12.7)	(100)
5	n	700	119	819
	(%)	(85.5)	(14.5)	(100)
6	n	288	67	355
	(%)	(81.1)	(18.9)	(100)
7	n	622	125	747
	(%)	(83.3)	(16.7)	(100)
8	n	491	72	563
	(%)	(87.2)	(12.8)	(100)
9	n	335	24	359
	(%)	(93.3)	(6.7)	(100)
10	n	228	54	282
	(%)	(80.9)	(19.1)	(100)
11	n	109	0	109
	(%)	(100.0)	(0.0)	(100)
12	n	183	36	219
	(%)	(83.6)	(16.4)	(100)
13	n	131	49	180
	(%)	(75.4)	(27.2)	(103)
14	n	145	0	145
	(%)	(100.0)	(0.0)	(100)
15	n	253	58	311
	(%)	(81.4)	(18.6)	(100)
16	n	363	20	383
	(%)	(94.8)	(5.2)	(100)
17	n	400	40	440
	(%)	(90.9)	(9.1)	(100)
18	n	96	28	124
	(%)	(77.4)	(22.6)	(100)

Table 1: Number of babies according to place of birth (continued)

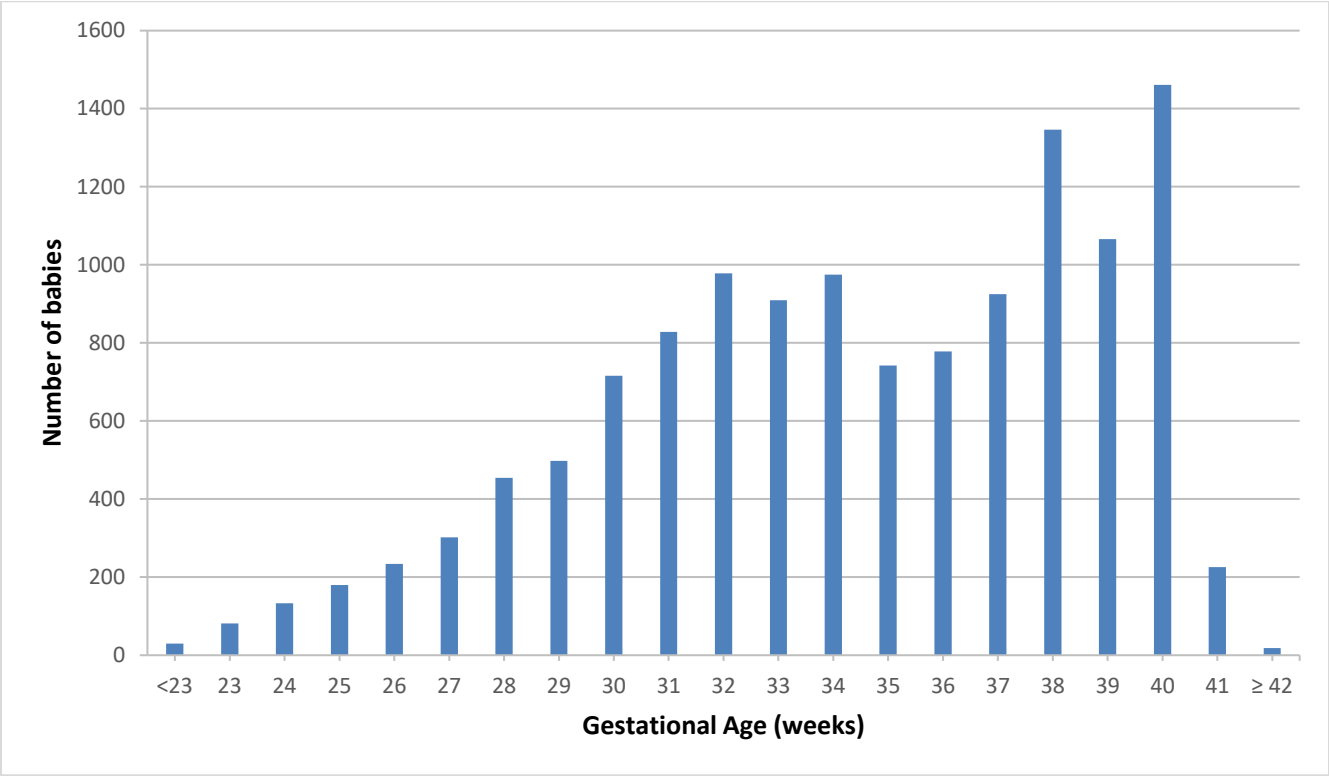
Hospitals		Place of Birth		Total
		Inborn	Outborn	
19	n	346	103	449
	(%)	(77.1)	(22.9)	(100)
20	n	181	19	200
	(%)	(90.5)	(9.5)	(100)
21	n	180	8	188
	(%)	(95.7)	(4.3)	(100)
22	n	437	46	483
	(%)	(90.5)	(9.5)	(100)
23	n	621	163	784
	(%)	(79.2)	(20.8)	(100)
24	n	431	68	499
	(%)	(86.4)	(13.6)	(100)
25	n	239	58	297
	(%)	(80.5)	(19.5)	(100)
26	n	532	63	595
	(%)	(89.4)	(10.6)	(100)
27	n	163	27	190
	(%)	(85.8)	(14.2)	(100)
28	n	58	4	62
	(%)	(93.5)	(6.5)	(100)
29	n	359	19	378
	(%)	(95.0)	(5.0)	(100)
30	n	209	5	214
	(%)	(97.7)	(2.3)	(100)
31	n	328	45	373
	(%)	(87.9)	(12.1)	(100)
32	n	422	19	441
	(%)	(95.7)	(4.3)	(100)
33	n	571	33	604
	(%)	(94.5)	(5.5)	(100)
34	n	170	16	186
	(%)	(91.4)	(8.6)	(100)
35	n	98	7	105
	(%)	(93.3)	(6.7)	(100)

Table 1: Number of babies according to place of birth (continued)

Hospitals		Place of Birth		Total
		Inborn	Outborn	
36	n	37	2	39
	(%)	(94.9)	(5.1)	(100)
37	n	199	45	244
	(%)	(81.6)	(18.4)	(100)
38	n	29	3	32
	(%)	(90.6)	(9.4)	(100)
39	n	155	33	188
	(%)	(82.4)	(17.6)	(100)
TOTAL	**n**	**11185**	**1695**	**(12,880)**
	(%)	**(86.8)**	**(13.2)**	**(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 gestational age

Gestational age in completed weeks at birth	Frequency	Percent
< 23	30	0.2
23	81	0.6
24	133	1.0
25	180	1.4
26	234	1.8
27	302	2.3
28	454	3.5
29	498	3.9
30	716	5.6
31	828	6.4
32	978	7.6
33	909	7.1
34	975	7.6
35	742	5.8
36	778	6.0
37	925	7.2
38	1346	10.5
39	1066	8.3
40	1461	11.3
41	226	1.8
≥ 42	18	0.1
Total included	12880	100
Total no. of babies with missing gestational age	0	
Total no. of babies	12880	

Figure 3

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

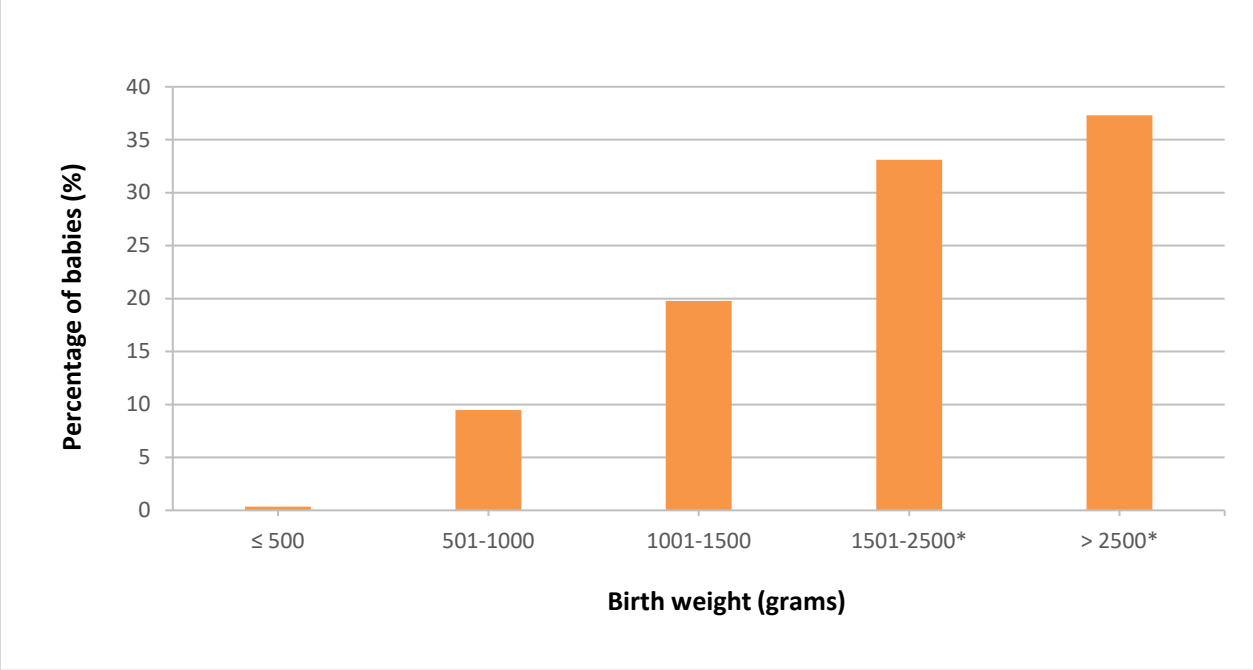


Table 3 :
Frequency distribution of all babies in MNNR according to birth weight (BW) categories

Birth weight (grams)	Frequency	Percent from total number of babies
≤ 500	45	0.3
501-1000	1220	9.5
1001-1500	2549	19.8
1501-2500*	4263	33.1
< 2500	4803	37.3
Total included	12880	100.0
Total no. of babies with missing birth weight	0	
Total no.of babies	12880	

Figure 4

Survival to discharge of all live births admitted to MNNR hospitals according to gestational age

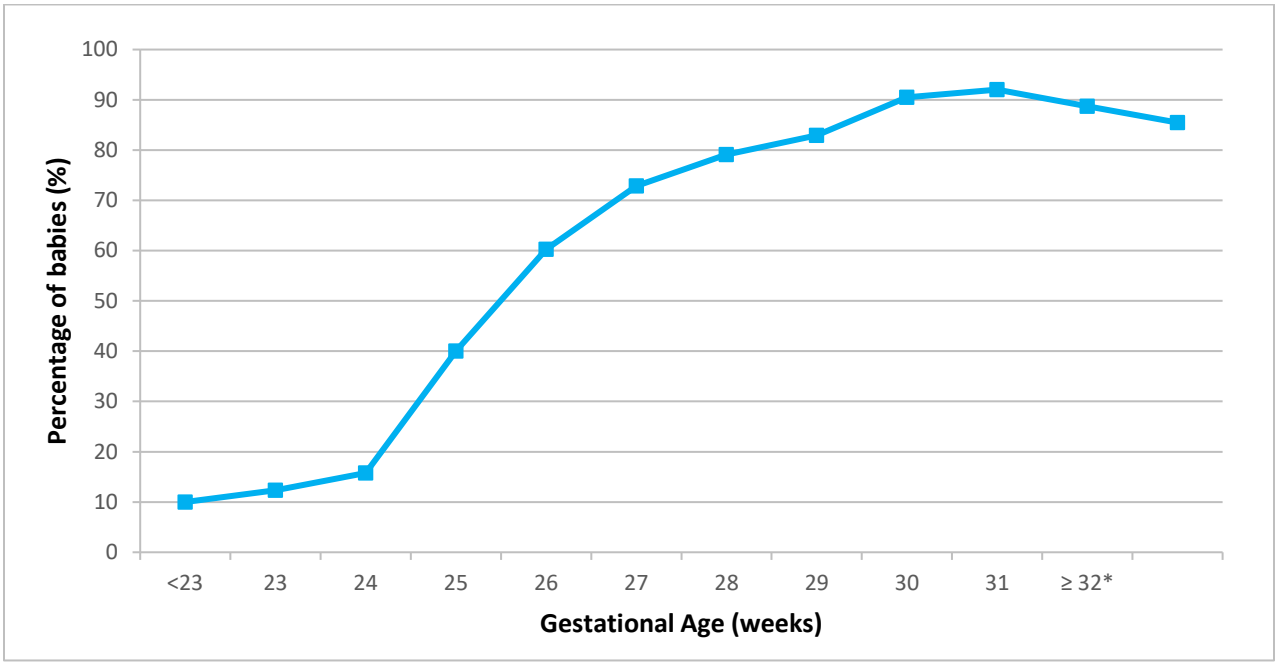


Table 4 :
Survival to discharge of all live births admitted to MNNR hospitals according to gestational age

Gestational age (completed weeks)	Total number of inborn & outborn babies	Number of survivors	% survival
<23	30	3	10.0
23	81	10	12.3
24	133	21	15.8
25	180	72	40.0
26	234	141	60.3
27	302	220	72.8
28	454	359	79.1
29	498	413	82.9
30	716	648	90.5
31	828	672	92.0
≥32*	9424	8360	88.7
Total included	12880	11009	85.5
Total no. of missing (GA)	0		
Total babies	12880		

*COMMENT: * For the category ≥ 32 weeks gestation, calculated survival rate does not include all live births in that category (see inclusion criteria).*

Figure 5

Survival to discharge of all babies admitted to MNNR hospitals according to birth weight categories

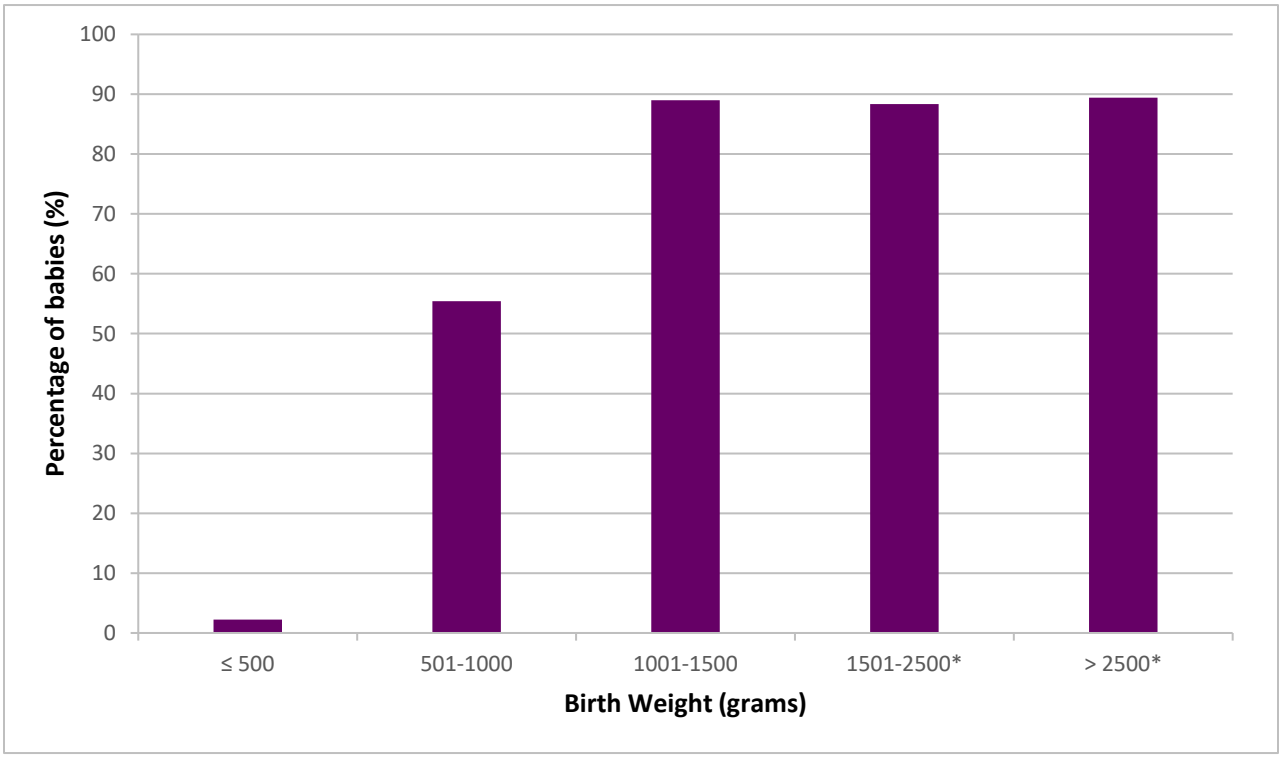


Table 5 :
Survival to discharge of all babies admitted to MNNR hospitals according to birth weight categories

Birth weight (grams)	Total number of inborn &outborn babies	Number of survivors	% survivors
≤500	45	1	2.2
501-1000	1220	676	55.4
1001-1500	2549	2269	89.0
1501-2500*	4263	3767	88.4
>2500*	4803	4296	89.4
Total included	12880	11009	85.5
Total no. of missing (BW)	0		
Overall Total babies	12880		

*COMMENT: * For the category > 1500 gram birth weight, calculated survival rate does not include all live births in that category (see inclusion criteria).*

Figure 6a

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

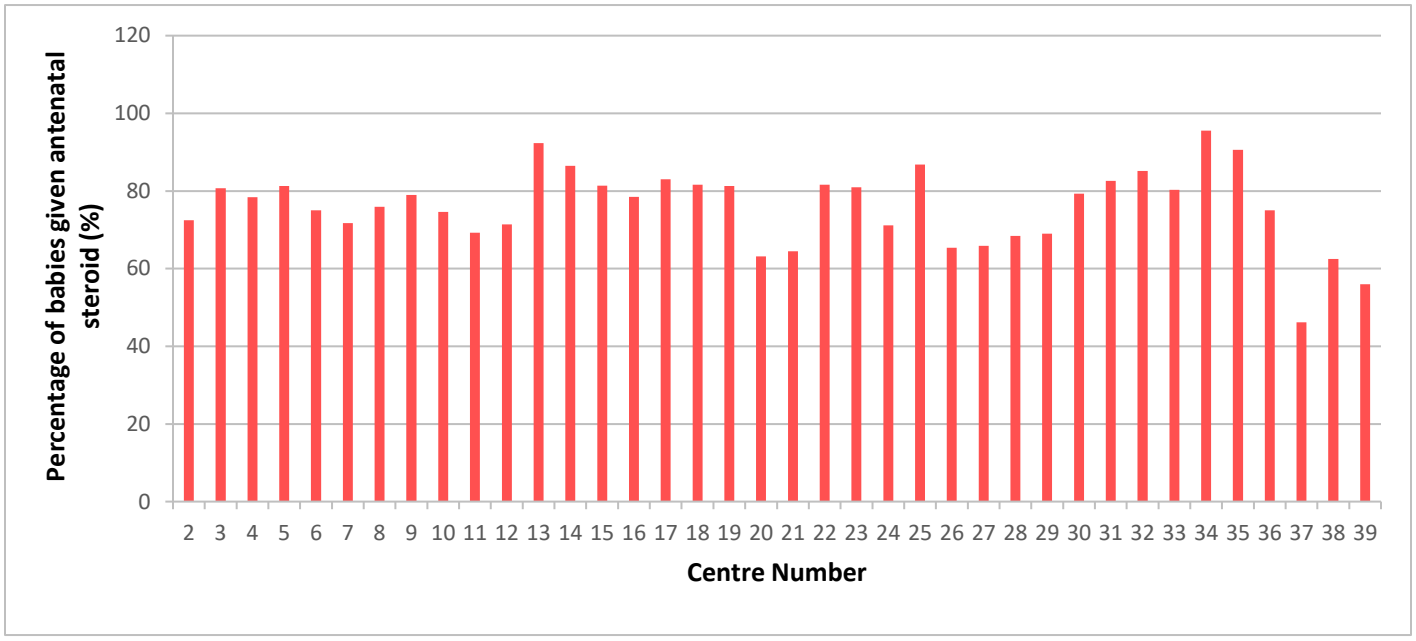


Figure 6b

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

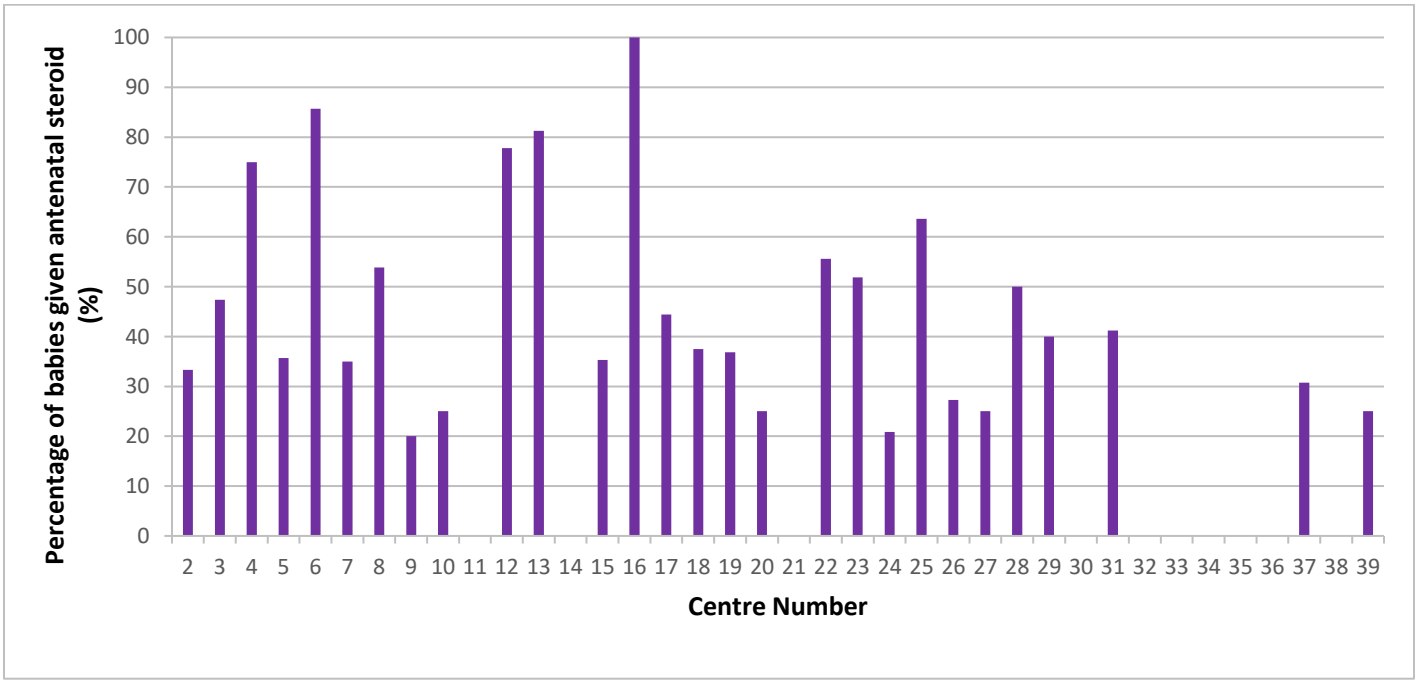


Table 6:
Antenatal corticosteroid for all babies born at < 32 weeks gestational age according to centres

Hospitals	Inborn				Outborn			
	Total number of babies		Given Antenatal Steroid		Total number of babies		Given Antenatal Steroid	
	n	%	*n*	%	*n*	%	*n*	%
Overall	3089	100	2358	76.3	367	100	145	39.5
2	109	3.5	79	72.5	12	3.3	4	33.3
3	140	4.5	113	80.7	19	5.2	9	47.4
4	37	1.2	29	78.4	4	1.1	3	75.0
5	246	8.0	200	81.3	28	7.6	10	35.7
6	76	2.5	57	75.0	7	1.9	6	85.7
7	166	5.4	119	71.7	20	5.4	7	35.0
8	141	4.6	107	75.9	13	3.5	7	53.8
9	100	3.2	79	79.0	10	2.5	2	20.0
10	63	2.0	47	74.6	12	3.3	3	25.0
11	26	0.8	18	69.2	0	0	0	0.0
12	49	1.6	35	71.4	9	2.5	7	77.8
13	39	1.3	36	92.3	16	4.4	13	81.3
14	37	1.2	32	86.5	0	0	0	0.0
15	75	2.4	61	81.3	17	4.6	6	35.3
16	107	3.5	84	63.2	1	0.3	1	100.0
17	100	3.2	83	64.4	9	2.5	4	44.4
18	38	1.2	31	81.6	8	2.2	3	37.5
19	112	3.6	91	81.0	19	5.2	7	36.8

Table 6 (continued):

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

Hospitals	Inborn				Outborn			
	Total number of babies		Given Antenatal Steroid		Total number of babies		Given Antenatal Steroid	
	n	%	*n*	%	*n*	%	*n*	%
20	57	1.8	36	63.2	4	1.1	1	25.0
21	45	1.5	29	64.4	3	0.8	0	0.0
22	76	2.5	62	81.6	9	2.5	5	55.6
23	147	4.8	119	81.0	27	7.4	14	51.9
24	170	5.5	121	71.2	24	6.5	5	20.8
25	76	2.5	66	86.8	11	3.0	7	63.6
26	176	5.7	115	65.3	11	3.0	3	27.3
27	41	1.3	27	65.9	12	3.3	3	25.0
28	19	0.6	13	68.4	2	0.5	1	50.0
29	113	3.7	78	69.0	5	1.4	2	40.0
30	29	0.9	23	79.3	0	0.0	0	0.0
31	115	3.7	95	82.6	17	4.6	7	4.2
32	101	3.3	86	85.1	5	1.4	0	0.0
33	71	2.3	57	80.3	9	2.5	0	0.0
34	45	1.5	43	95.6	3	0.8	0	0.0
35	32	1.0	29	90.6	3	0.8	0	0.0
36	4	0.1	3	75.0	1	0.3	0	0.0
37	78	2.5	36	46.2	13	3.5	4	30.8
38	8	0.3	5	62.5	0	0.0	0	0.0
39	25	0.8	14	56.0	4	1.1	1	25.0

Figure 7a

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

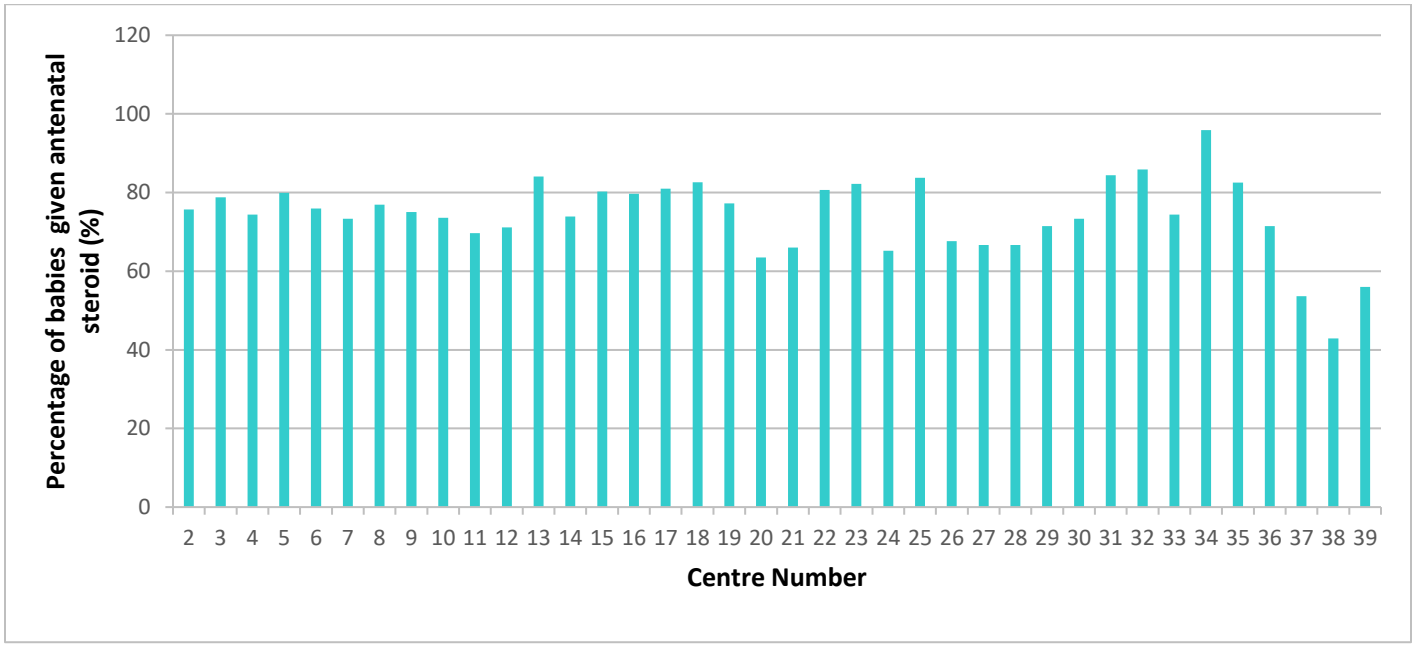


Figure 7b

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

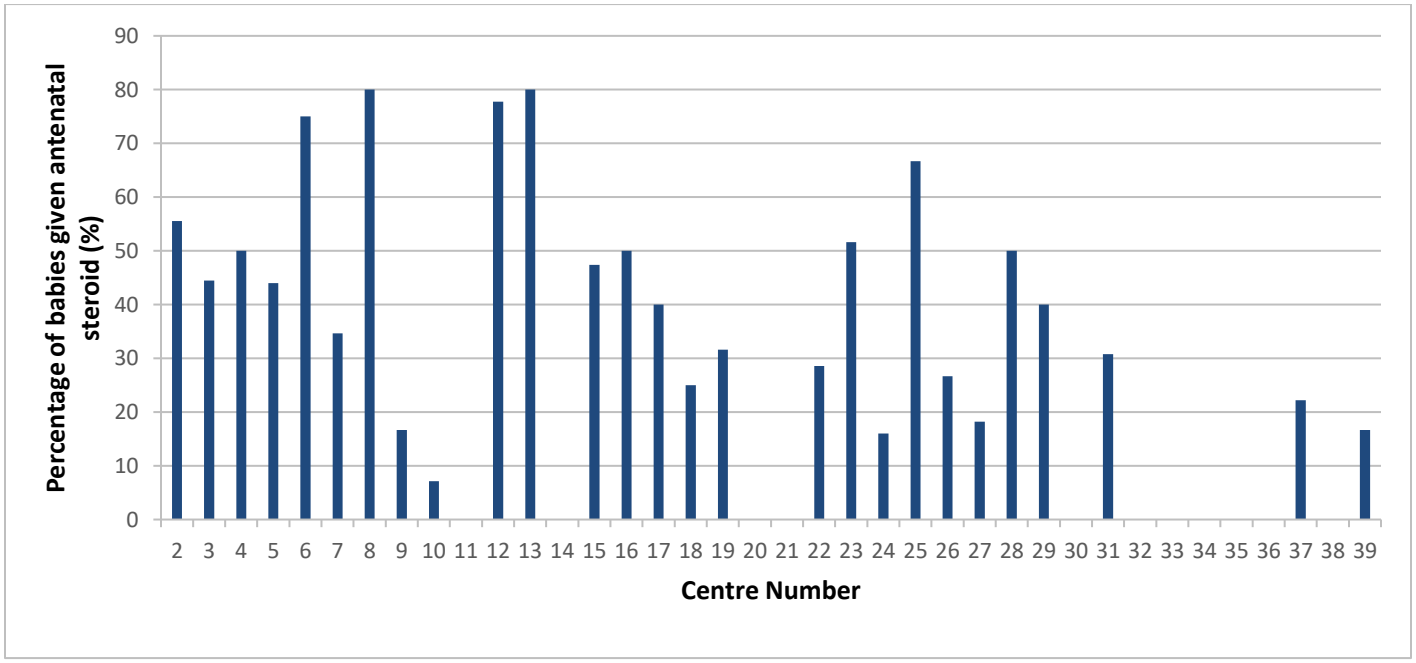


Table 7 :
Antenatal corticosteroid for all babies born at ≤ 1500 grams birth weight according to centres

Hospitals	Inborn				Outborn			
	Total number of babies		Given Antenatal Steroid		Total number of babies		Given Antenatal Steroid	
	n	%	*n*	%	*n*	%	*n*	%
Overall	3429	100	2594	75.6	385	100	144	37.4
2	111	3.2	84	75.7	9	2.3	5	55.6
3	160	4.7	126	78.8	18	4.7	8	44.4
4	39	1.1	29	74.4	8	2.1	4	50.0
5	274	8.0	219	79.9	25	6.5	11	44.0
6	104	3.0	79	76.0	8	2.1	6	75.0
7	176	5.1	129	73.3	26	6.8	9	34.6
8	160	4.7	123	76.9	10	2.6	8	80.0
9	116	3.4	87	75.0	12	3.1	2	16.7
10	87	2.5	64	73.6	14	3.6	1	7.1
11	33	1.0	23	69.7	0	0.0	0	0.0
12	52	1.5	37	71.2	9	2.3	7	77.8
13	44	1.3	37	84.1	15	3.9	12	80.0
14	46	1.3	34	73.9	0	0.0	0	0.0
15	76	2.2	61	80.3	19	4.9	9	47.4
16	123	3.6	98	79.7	4	1.0	2	50.0
17	105	3.1	85	81.0	10	2.6	4	40.0
18	46	1.3	38	82.6	8	2.1	2	25.0
19	123	3.6	95	77.2	19	4.9	6	31.6

Table 7 (continued):

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

Hospitals	Inborn				Outborn			
	Total number of babies		Given Antenatal Steroid		Total number of babies		Given Antenatal Steroid	
	n	%	*n*	%	*n*	%	*n*	%
20	63	1.8	40	63.5	4	1.0	0	0.0
21	50	1.5	33	66.0	2	0.5	0	0.0
22	93	2.7	75	80.6	7	1.8	2	28.6
23	152	4.4	125	82.2	31	8.1	16	51.6
24	178	5.2	116	65.2	25	6.5	4	16.0
25	80	2.3	67	83.8	12	3.1	8	66.7
26	201	5.9	136	67.7	15	3.9	4	26.7
27	42	1.2	28	66.7	11	2.9	2	18.2
28	27	0.8	18	66.7	2	0.5	1	50.0
29	112	3.3	80	71.4	5	1.3	2	40.0
30	30	0.9	22	73.3	1	0.3	0	0.0
31	122	3.6	103	84.4	13	3.4	4	30.8
32	113	3.3	97	85.8	4	1.0	0	0.0
33	82	2.4	61	74.4	8	2.1	0	0.0
34	48	1.4	46	95.8	4	1.0	0	0.0
35	40	1.2	33	82.5	2	0.5	0	0.0
36	7	0.2	5	71.4	1	0.3	0	0.0
37	82	2.4	44	53.7	18	4.7	4	22.2
38	7	0.2	3	42.9	0	0.0	0	0.0
39	25	0.7	14	56.0	6	1.6	1	16.7

Figure 8

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

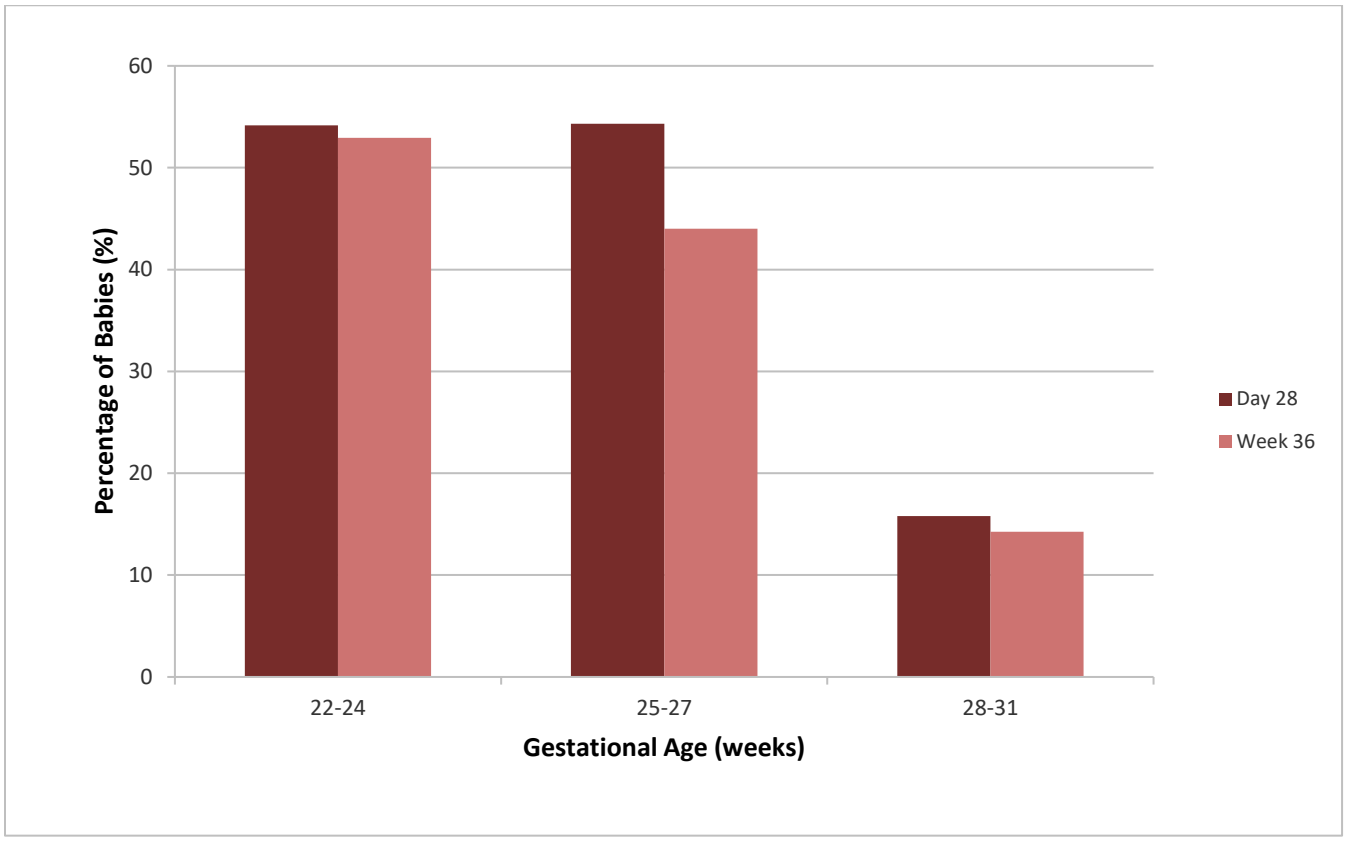


Table 8 :
Incidence of oxygen dependency among admitted inborn babies with gestational age < 32 weeks

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*	177	24	13	17	9
	%	5.9	13.6	54.2	9.6	52.9
25-27	*n*	605	370	201	275	121
	%	20.2	61.2	54.3	45.5	44.0
28-31	*n*	2207	1545	244	983	140
	%	73.8	70.0	15.8	44.5	14.2
Total included	*n*	2989	1939	458	1275	270
	%	100	64.9	23.6	42.7	21.2
Total no. of missing (GA)		0				
Total babies		2989				

Figure 9

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

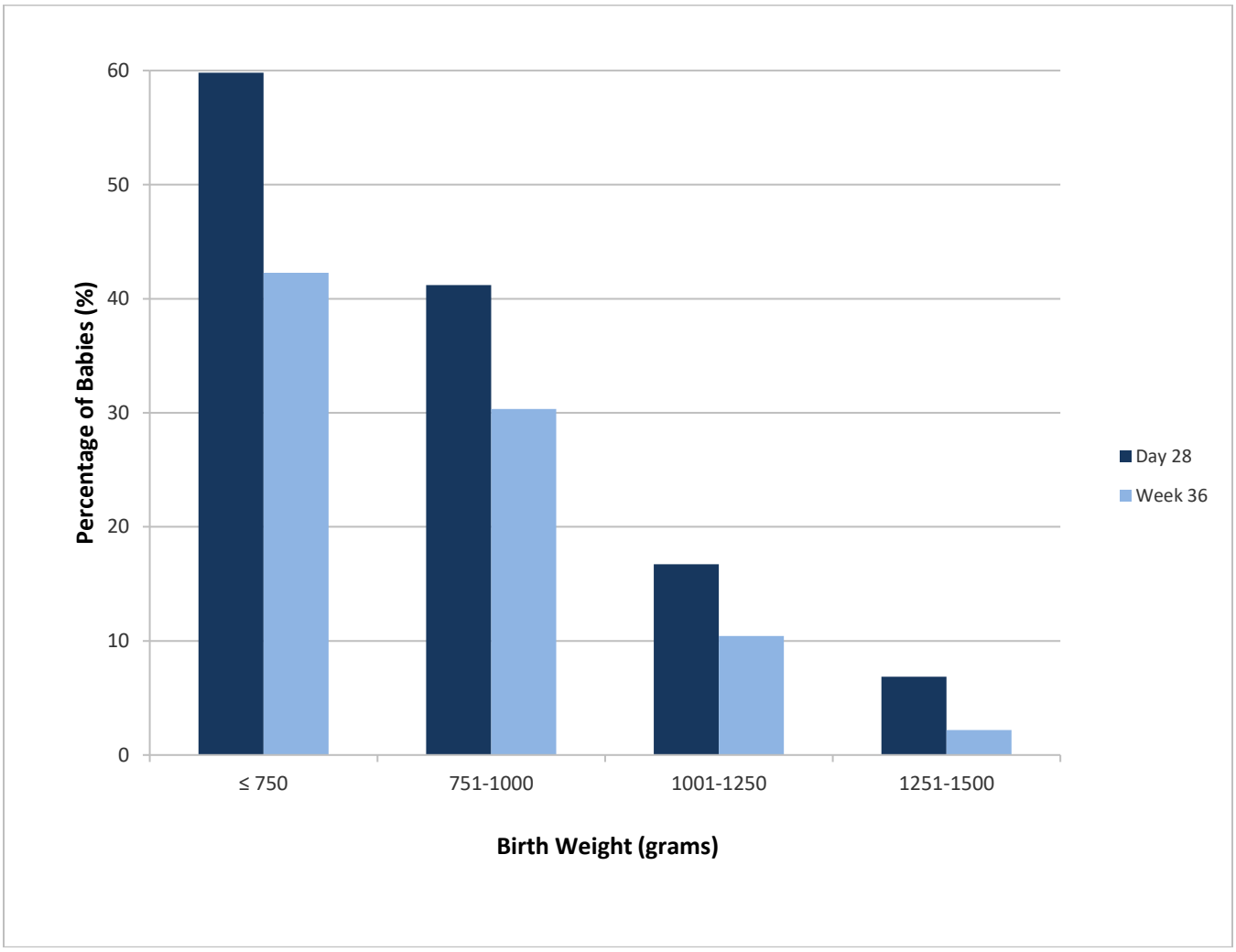


Table 9:
Incidence of oxygen dependency among admitted inborn babies with birth weight ≤ 1500 grams

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*	372	102	61	97	41
	%	11.2	27.4	59.8	26.1	42.3
751-1000	*n*	696	505	208	445	135
	%	20.9	72.6	41.2	63.9	30.3
1001 - 1250	*n*	938	759	127	585	61
	%	28.1	80.9	16.7	62.4	10.4
1251 - 1500	*n*	1329	904	62	778	17
	%	39.9	68.0	6.9	58.5	2.2
Total Included	*n*	3335	2270	458	1905	254
	%	100	68.1	20.2	57.1	13.3
Total no. of missing (GA)		0				
Total babies		3335				

Figure 10

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

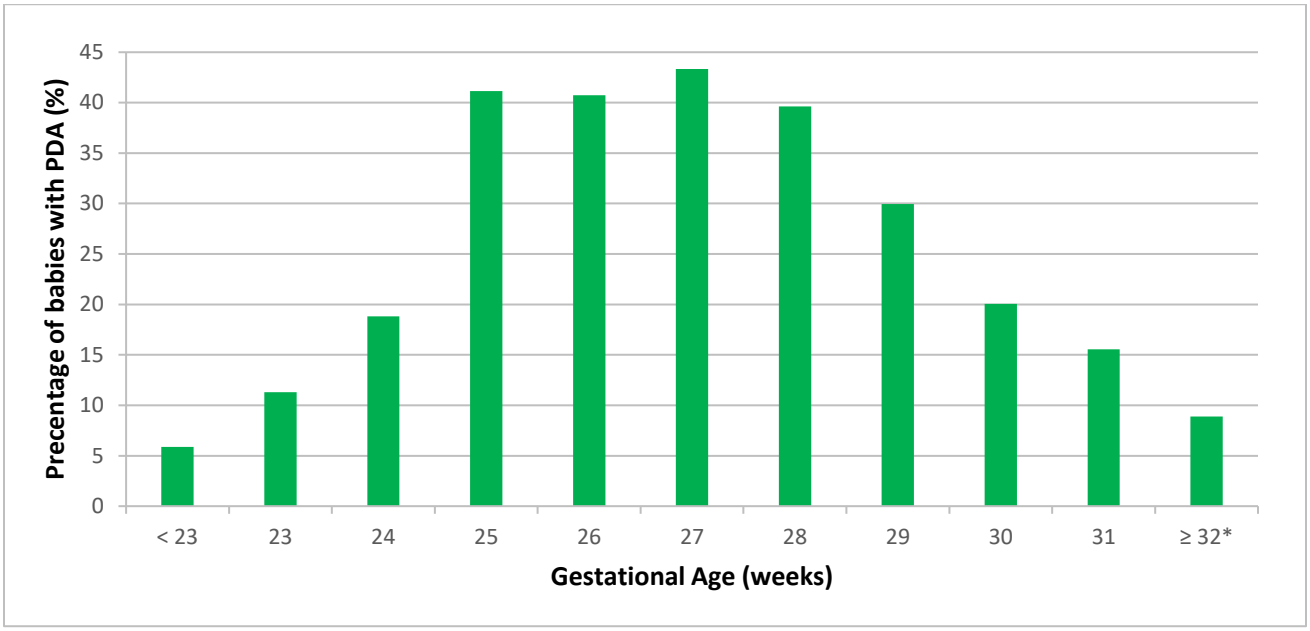


Table 10 :
Treatment of patent ductus arteriosus (PDA) in admitted inborn babies in the MNNR by gestational age

Gestational age (completed weeks)	Total number of admitted inborn babies		PDA		Confirmed by ECHO		Indomethacin/ Ibuprofen		Ligation	
	n	%	*n*	%	*n*	%	*n*	%	*n*	%
<23	17	0.2	1	5.9	0	0.0	0	0.0	0	0.0
23	62	0.6	7	11.3	7	100.0	5	71.4	1	14.3
24	101	0.9	19	18.8	19	100.0	10	52.6	0	0.0
25	141	1.3	58	41.1	48	82.8	32	55.2	1	1.7
26	194	1.8	79	40.7	73	92.4	37	46.8	6	7.6
27	270	2.4	117	43.3	108	92.3	48	41.0	2	1.7
28	391	3.5	155	39.6	140	90.3	51	32.9	2	1.3
29	444	4.0	133	30.0	121	91.0	51	38.3	1	0.8
30	633	5.7	127	20.1	111	87.4	44	34.6	1	0.8
31	739	6.7	115	15.6	104	90.4	28	24.3	2	1.7
≥32*	8054	72.9	715	8.9	672	94.0	60	8.4	8	1.1
Total included	11046	100	1526	13.8	1403	91.9	366	24.0	24	1.6
Total no. of missing (GA)	0									
Overall Total babies	11046									

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

Figure 11

Prevelance of patent ductus arteriosus (PDA) in admitted inborn babies in the MNNR by birth weight categories

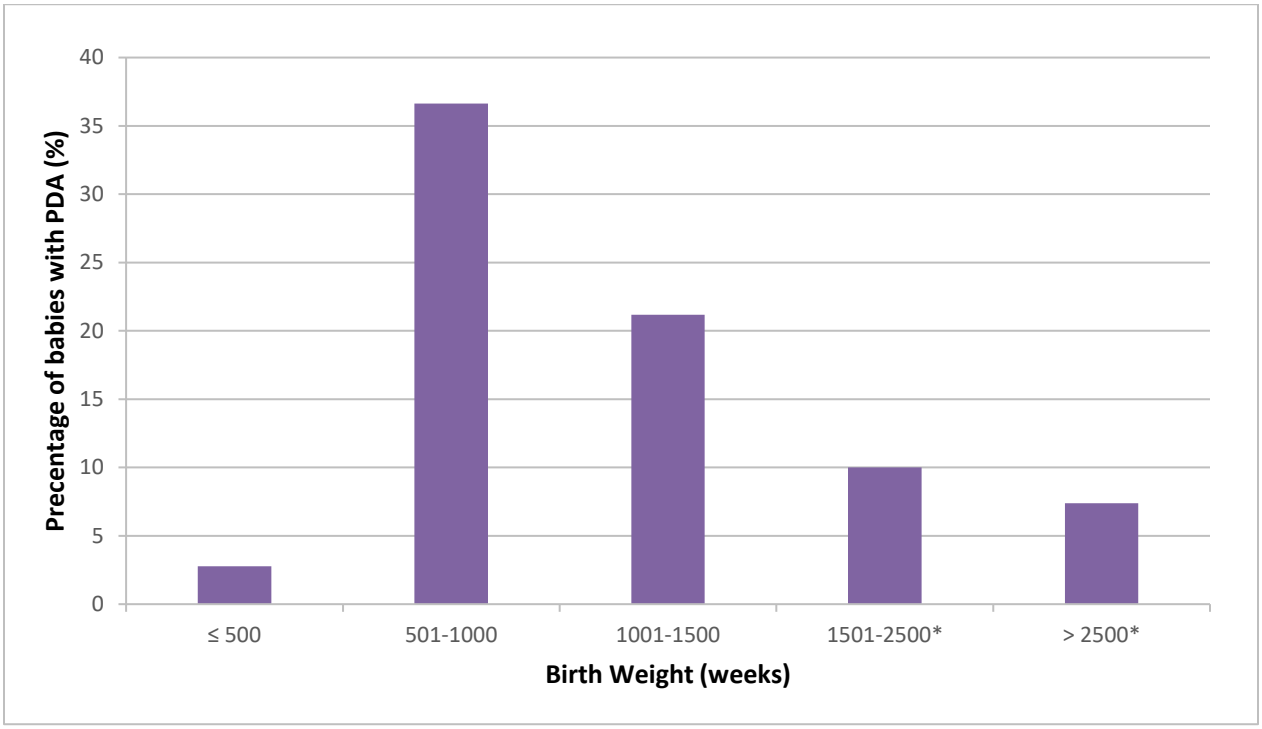


Table 11 :
Treatment of patent ductus arteriosus (PDA) in admitted inborn babies in the MNNR by birth weight categories

Birth weight (grams)	Total number of admitted inborn babies		PDA		Confirmed by ECHO		Indomethacin/ Ibuprofen		Ligation	
	n	%	*n*	%	*n*	%	*n*	%	*n*	%
≤500	36	0.3	1	2.8	1	0.0	0	0.0	0	0.0
501-1000	1032	9.3	378	36.6	345	91.3	162	42.9	10	2.6
1001-1500	2267	20.5	480	21.2	424	88.3	138	28.8	7	1.5
1501-2500*	3719	33.7	372	10.0	345	92.7	55	14.8	4	1.1
≥2500*	3992	36.1	295	7.4	288	97.6	11	3.7	3	1.0
Total included	11046	100	1526	13.8	1403	91.9	366	24.0	24	1.6
Total no. of missing (BW)	0									
Total babies	11046									

Table 12
Treatment of patent ductus arteriosus (PDA) in admitted inborn babies in the MNNR 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	177	5.9	177	100.0	27	15.3	26	96.3	15	55.6	1	3.7
25-27	605	20.2	605	100.0	254	42.0	229	90.2	117	46.1	9	3.5
28-31	2207	73.8	2207	100.0	530	24.0	476	89.8	174	32.8	6	1.1
Total included	2989	100.0	2989	100.0	811	27.1	731	90.1	306	37.7	16	2.0

Table 13
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	372	11.2	372	100.0	81	21.8	73	90.1	35	43.2	1	1.2
751-1000	696	20.9	696	100.0	298	42.8	273	91.6	127	42.6	9	3.0
1001-1250	938	28.1	938	100.0	263	28.0	234	89.0	90	34.2	4	1.5
1251-1500	1329	39.9	1329	100.0	217	16.3	190	87.6	48	22.1	3	1.4
Total included	3335	100	3335	100.0	859	25.8	770	89.6	300	34.9	17	2.0

Figure 14

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

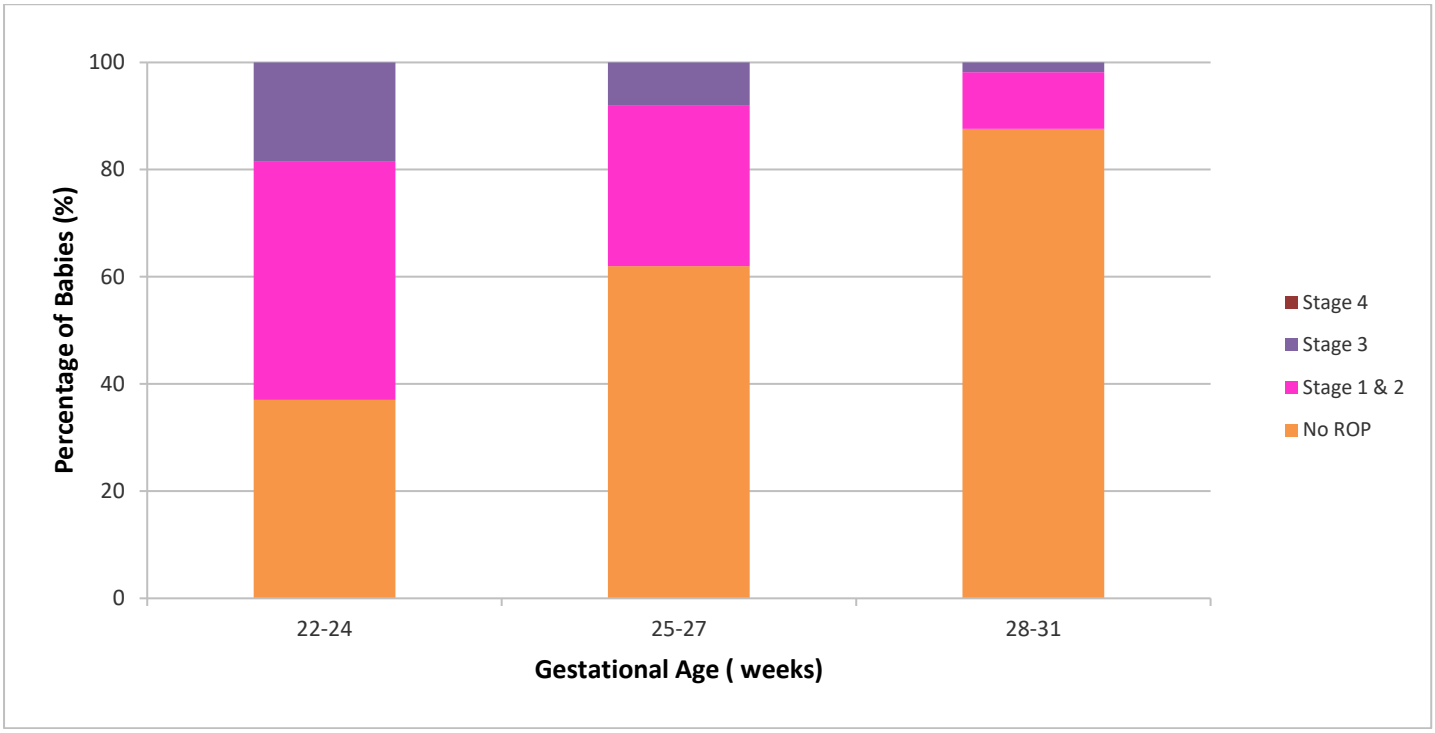


Table 14 :
Incidence of retinopathy of prematurity (ROP) in admitted inborn babies in the MNNR by gestational age categories

Gestational age at birth (weeks)	Total number of admitted inborn babies	No. of babies alive at 6 weeks	No. of babies with eye examination		Retinopathy of prematurity								Therapy	
					No ROP		ROP Stage 1 & 2		ROP Stage 3		ROP Stage 4 & 5		Cryo	Laser
	n	*n*	*n*	%	*n*	%	*n*	%	*n*	%	*n*	%		
22-24	177	33	27	81.8	10	37.0	12	44.4	5	18.5	0	0.0	0	5
25-27	605	398	371	93.2	230	62.0	111	29.9	30	8.1	0	0.0	1	27
28-31	2207	1975	1423	72.1	1247	87.6	150	10.5	26	1.8	0	0.0	0	18
Total Included	2989	2406	1821	75.7	1487	81.7	273	15.0	61	3.3	0	0.0	1	50

Comment: Screening refers to those screened during the ward admission

Figure 15

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

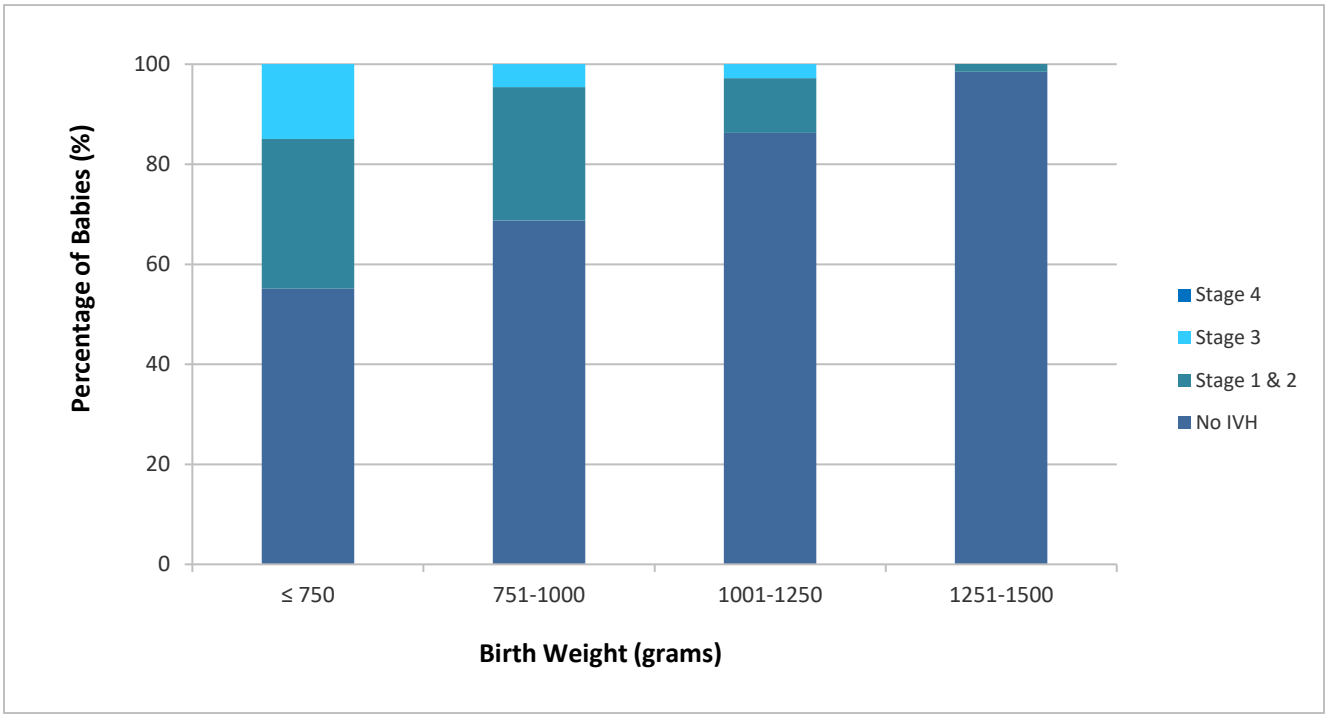


Table 15 :
Incidence of retinopathy of prematurity (ROP) in admitted inborn babies in the MNNR by birth weight categories

Birth weight (grams)	Total no of admitted inborn babies	No. of babies alive at 6 weeks	No. of babies with eye examination		Retinopathy of prematurity								Therapy	
					No ROP		ROP Stage 1 & 2		ROP Stage 3		ROP Stage 4 & 5		Cryo	Laser
	n	*n*	*n*	%	*n*	%	*n*	%	*n*	%	*n*	%		
≤ 750	372	116	107	92.2	59	55.1	32	29.9	16	15.0	0	0.0	0	12
751-1000	696	533	502	94.2	345	68.7	134	26.7	23	4.6	0	0.0	0	21
1001-1250	938	818	676	82.6	583	86.2	74	10.9	19	2.8	0	0.0	1	13
1251-1500	1329	1231	733	59.5	722	98.5	44	6.0	7	1.0	0	0.0	0	4
Total included	3335	2698	2018	74.8	1709	84.7	284	14.1	65	3.2	0	0.0	1	50

Comment: Screening refers to those screened during the ward admission

Figure 16

Incidence of intraventricular haemorrhage (IVH) in admitted inborn babies < 32 weeks gestational age

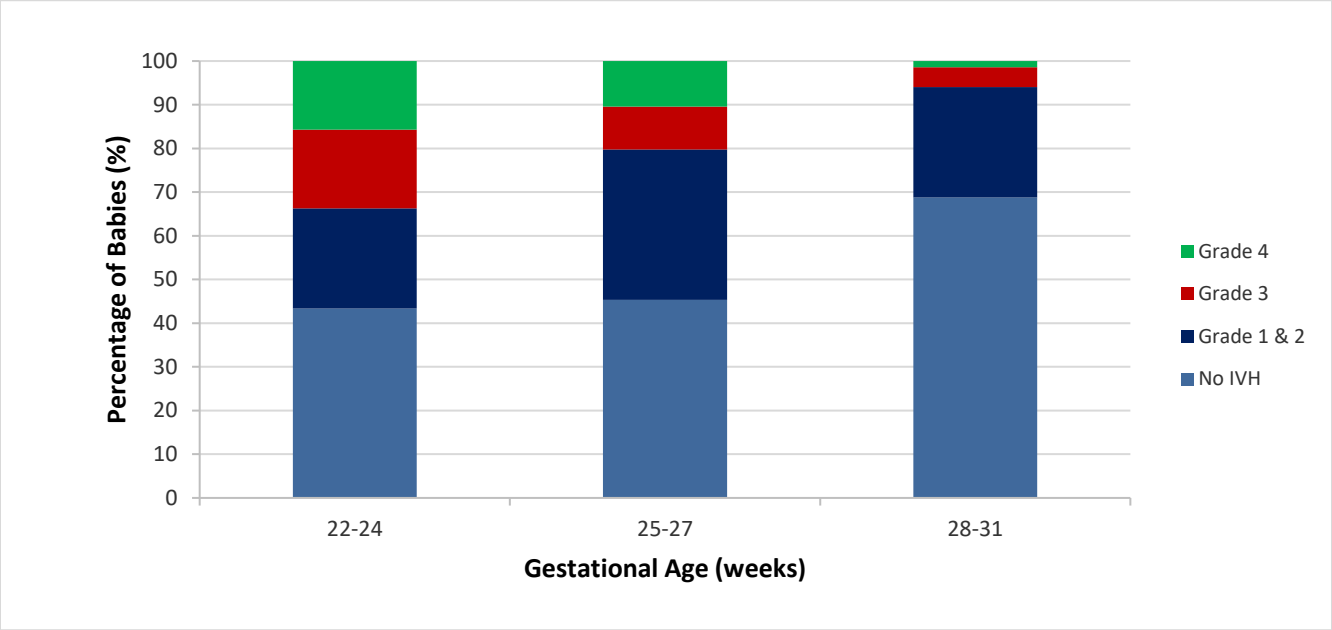


Table 16 :
Incidence of intraventricular haemorrhage (IVH) in admitted inborn babies < 32 weeks gestational age

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	177	83	36	19	15	13	26	57
	%	5.9	46.9	43.4	22.9	18.1	15.7		
25-27	n	605	538	244	185	53	56	370	168
	%	20.2	88.9	45.4	34.4	9.9	10.4		
28-31	n	2207	1975	1358	500	89	28	1791	184
	%	73.8	89.5	68.8	25.3	4.5	1.4		
Total included	n	2989	2596	1638	704	157	97	2187	409
	%	100.0	86.9	63.1	27.1	6.0	3.7		
Total no. of missing (GA)	0								
Total babies	2989								

CUS – cranial untrasound

Figure 17

Incidence of intraventricular haemorrhage (IVH) in admitted inborn babies ≤ 1500 grams birth weight

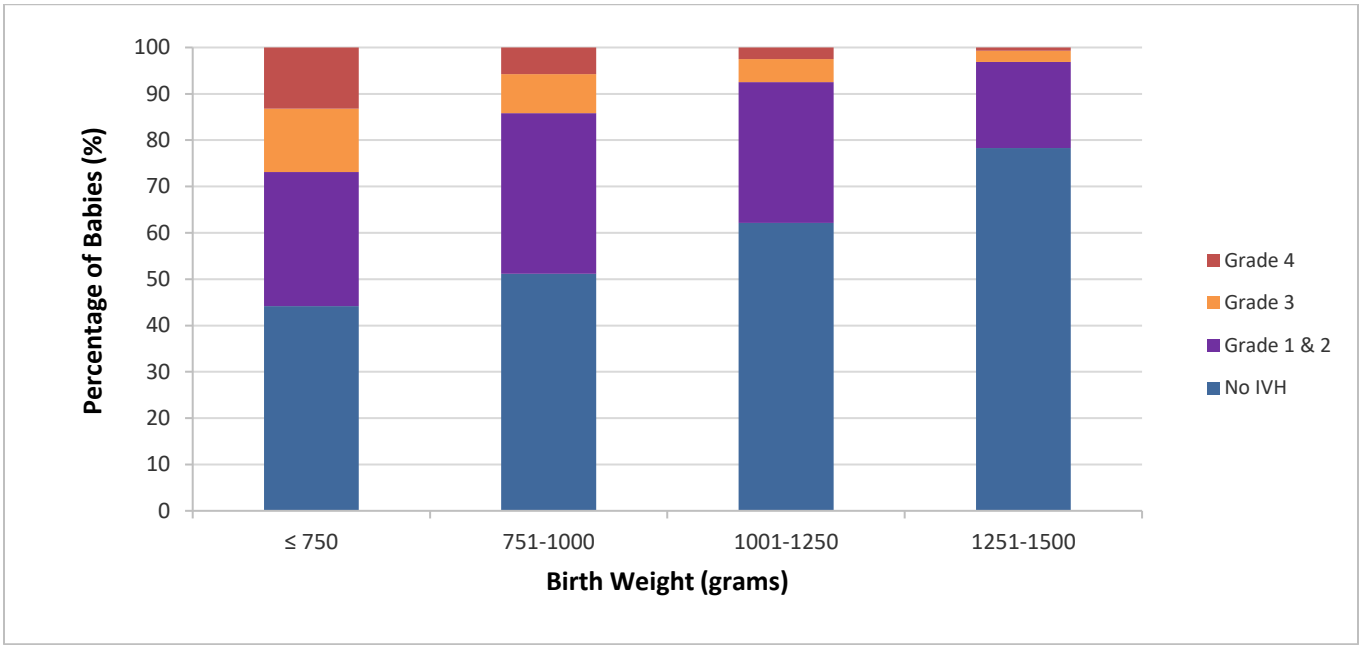


Table 17 :
Incidence of intraventricular haemorrhage (IVH) in admitted inborn babies ≤ 1500 grams birth weight

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	372	242	107	70	33	32	102	140
	%	11.2	65.1	44.2	28.9	13.6	13.2		
751-1000	n	696	641	328	222	54	37	499	142
	%	20.9	92.1	51.2	34.6	8.4	5.8		
1001-1250	n	938	845	525	257	42	21	753	92
	%	28.1	90.1	62.1	30.4	5.0	2.5		
1251-1500	n	1329	1141	893	212	28	8	1073	68
	%	39.9	85.9	78.3	18.6	2.5	0.7		
Total included	n	3335	2869	1853	761	157	98	2427	442
	%	100	86.0	64.6	26.5	5.5	3.4		
Total no. of missing (GA)	0								
Total babies	3159								

Figure 18

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

Table 18 :
Incidence and treatment of necrotizing enterocolitis (NEC) in admitted inborn babies according to gestational age categories

Gestational age (weeks)	Total number of admitted inborn babies	Babies with NEC		With Surgical treatment	
	n	*n*	*%*	*n*	*%*
22-24	177	7	4.0	3	42.9
25-27	605	40	6.6	12	30.0
28-31	2207	95	4.3	29	30.5
Total included	2989	142	4.8	44	31.0
Total no. of missing (GA)	0				
Overall Total babies	2989				

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

Figure 19

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

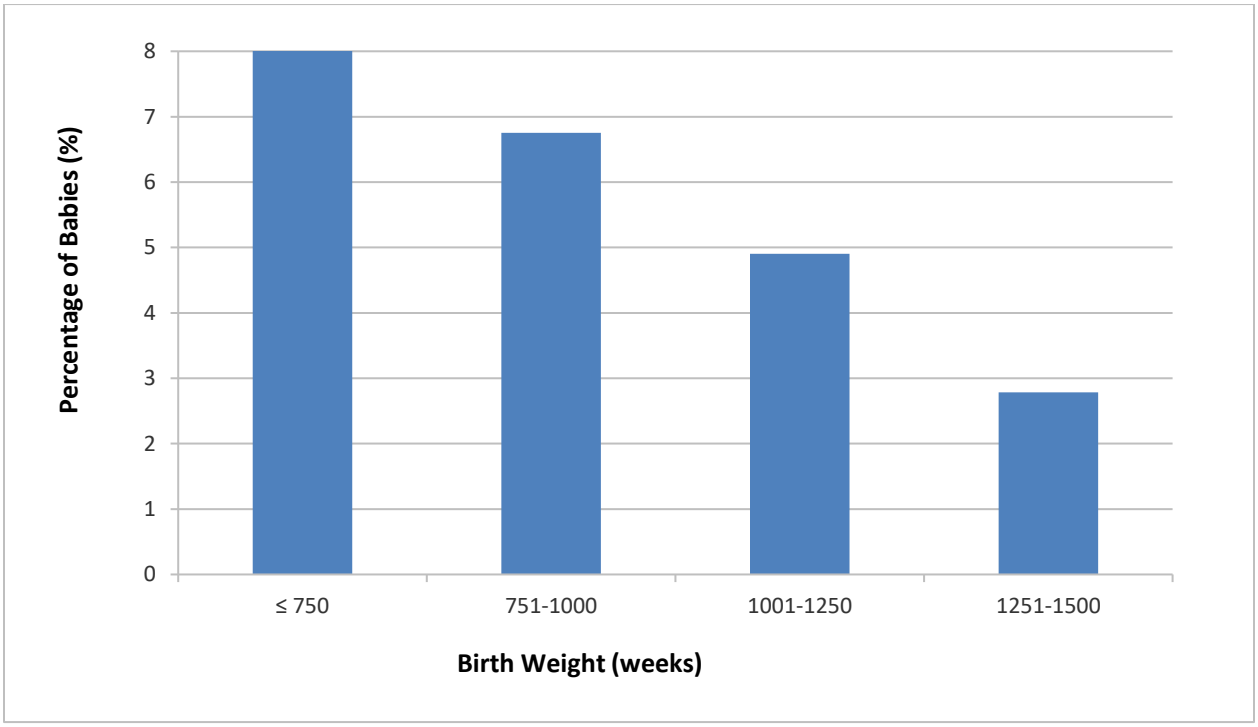


Table 19 :
Incidence and treatment of necrotizing enterocolitis (NEC) in admitted inborn babies according to birth weight categories

Birth weight (grams)	Total number admitted of inborn babies	Babies with NEC		With Surgical treatment	
	n	*n*	*%*	*n*	*%*
≤ 750	372	36	9.7	11	30.6
751-1000	696	47	6.8	14	29.8
1001-1250	938	46	4.9	15	32.6
1251 - 1500	1329	37	2.8	13	35.1
Total included	3335	166	5.0	53	31.9
Total no. of missing (BW)	0				
Overall total babies	3335				

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

Figure 20
Incidence of blood culture positive early onset sepsis in admitted inborn babies by gestational age categories

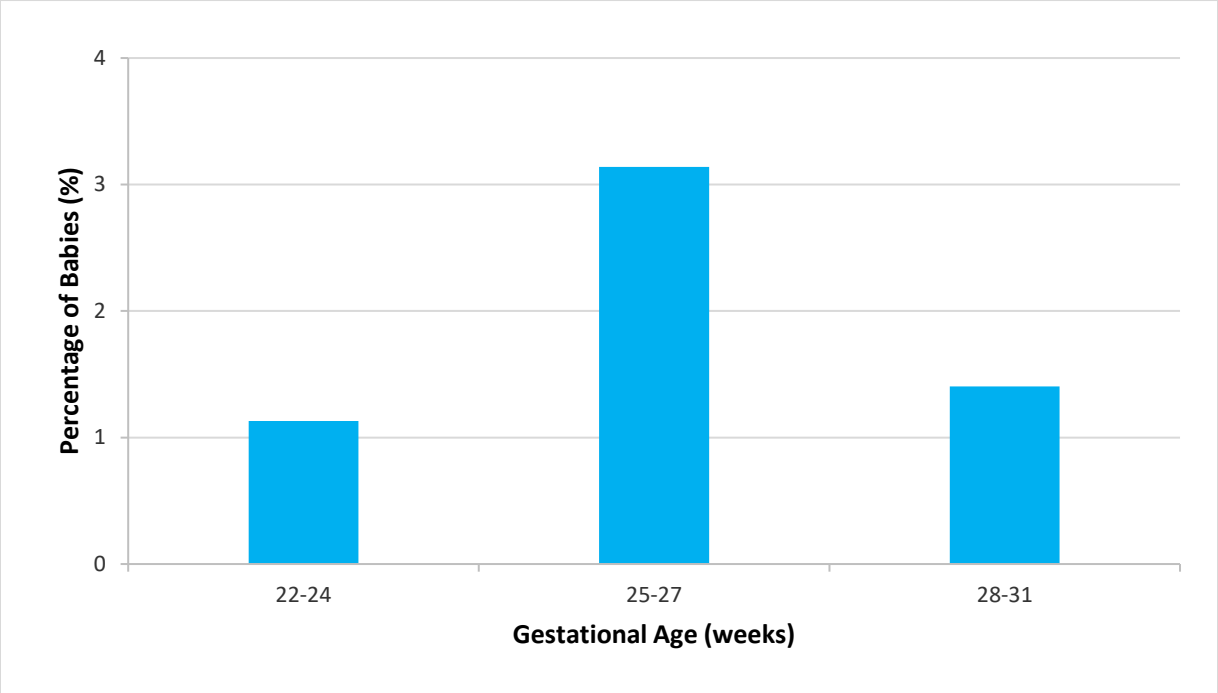


Table 20 :
Incidence of blood culture positive early onset sepsis in admitted inborn babies by gestational age categories

Gestational age at birth (completed weeks)	Total number of admitted inborn babies	No. of babies with early infection	
	n	*n*	%
22-24	177	2	1.1
25-27	605	19	3.1
28-31	2207	31	1.4
Total included	2989	52	1.7
Total no. of missing (GA)	0		
Total babies	2989		

Figure 21

Incidence of blood culture positive late onset sepsis in admitted inborn babies by gestational age categories

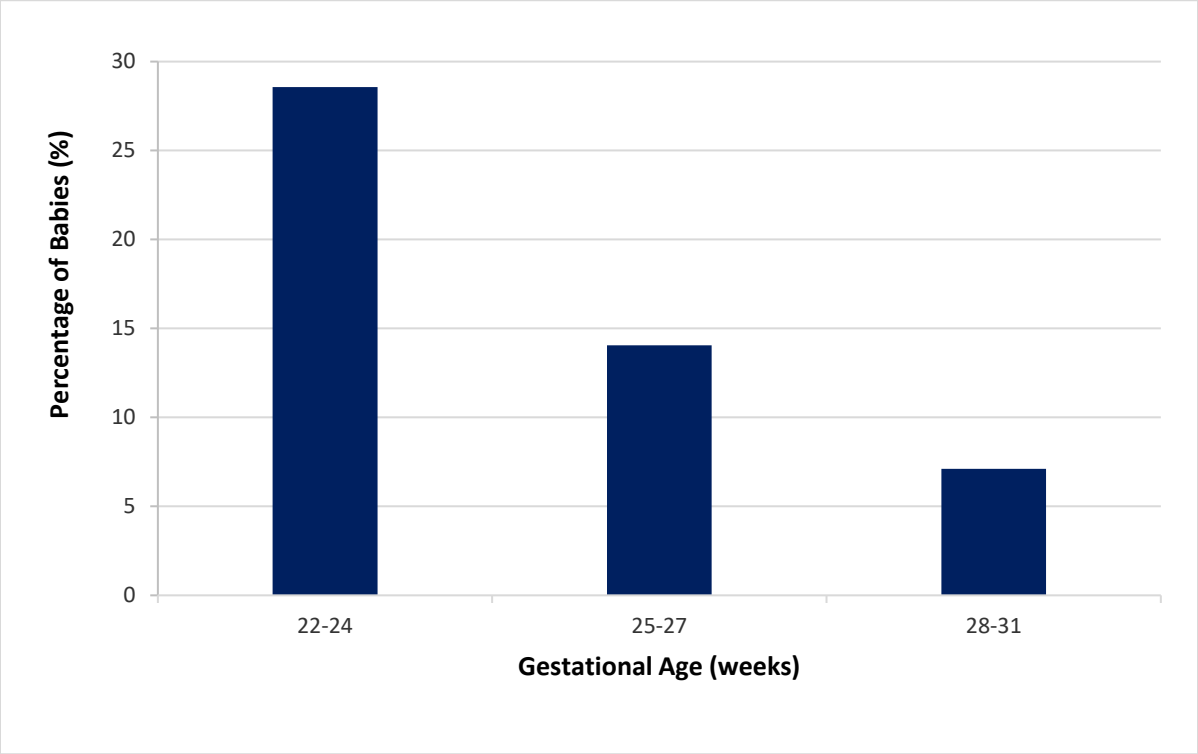


Table 21 :
Incidence of blood culture positive late onset sepsis in admitted inborn babies by gestational age categories

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	177	28	8	28.6
25 – 27	605	377	53	14.1
28 – 31	2207	1940	138	7.1
Total included	2989	2345	199	8.5
Total no. of missing (GA)	0			
Total babies	2989			

Figure 22

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

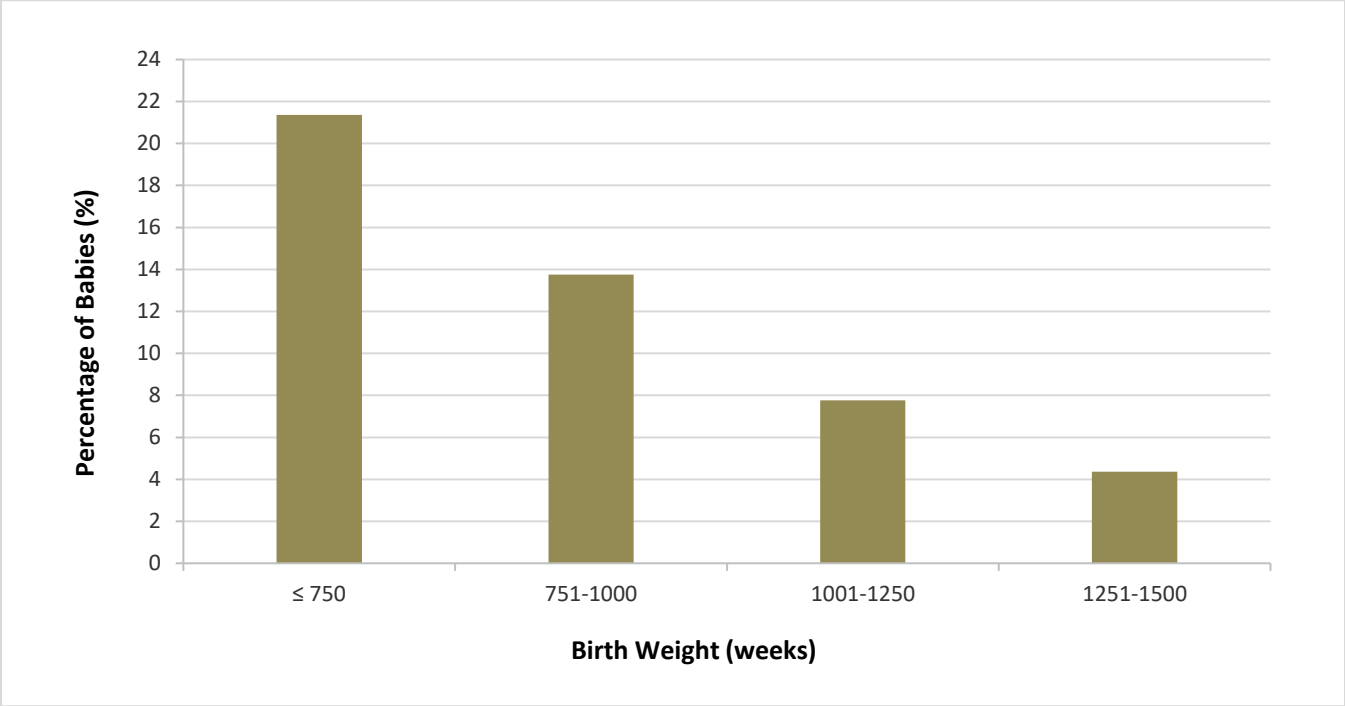


Table 22 :
Incidence of blood culture positive late onset sepsis in admitted inborn babies by birth weight categories

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	372	103	22	21.4
751-1000	696	516	71	13.8
1001-1250	938	798	62	7.8
1251-1500	1329	1213	53	4.4
Total included	3335	2630	208	7.9
Total no. of missing (BW)	0			
Overall total babies	3335			

Table 23a

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	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. with any five morbidities prior to discharge among survivors	No. without any five morbidities prior to discharge among survivors
22-24	n	177	29	9	3	1	1	0	15
	%	5.9	16.4	31.0	10.3	3.4	3.4	0.0	51.7
25-27	n	605	379	123	44	6	3	0	203
	%	20.2	62.6	32.5	11.6	1.6	0.8	0.0	53.6
28-31	n	2207	1963	283	60	5	0	0	1615
	%	73.8	88.9	14.4	3.1	0.3	0.0	0.0	82.3
Total Included	n	2989	2371	415	107	12	4	0	1833
	%	100	79.3	17.5	4.5	0.5	0.2	0.0	77.3
Total no. of missing (GA)	-								
Total babies	2989								

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 23b

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

Gestational age at birth (weeks)		Total no. of admitt-ed inborn babies	Numb er 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
≤ 750	n	372	103	44	19	2	1	0	37
	%	11.2	27.7	42.7	18.4	1.9	1.0	0.0	35.9
751- 1000	n	696	517	155	51	5	3	0	303
	%	20.9	74.3	30.0	9.9	1.0	0.6	0.0	58.6
1001 - 1250	n	938	811	137	22	6	0	0	646
	%	28.1	86.5	16.9	2.7	0.7	0.0	0.0	79.7
1251 - 1500	n	1329	1226	99	11	1	0	0	1115
	%	39.9	92.2	8.1	0.9	0.1	0.0	0.0	90.9
Total Included	n	3335	2657	435	103	14	4	0	2101
	%	100	79.7	16.4	3.9	0.5	0.2	0.0	79.1
Total no. of missing (GA)	-								
Total babies	3335								

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 as in home delivery
6. ***Ethnic group***: Malay / Chinese / Indian / Orang Asli / Bumiputra Sabah / Bumiputra Sarawak / Other Malaysian/ Non-citizen (specific country). 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). Multiple pregnancy considered as ONE para (e.g twins)
9. ***Maternal Diabetes:*** State 'yes' or 'no' if mother had 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.

12. ***Maternal Eclampsia:*** State 'yes' or 'no'. State 'unknown' if so.
13. ***Maternal Anaemia:*** State 'yes', 'no' or 'unknown'. Mother's Hb level < 11 g/dL or noted to have anaemia of pregnancy by O&G.
14. ***Maternal abruptio placenta:*** State 'yes' or 'no'.
15. ***Maternal bleeding placenta praevia:*** State 'yes' or 'no'.
16. ***Cord prolapse:*** State 'yes' or 'no'.

SECTION 2: Birth History

17. ***Antenatal steroids****:* State 'yes' if this has been given (regardless of number of doses or when it was given) or 'no' if this has not been given. If yes, state whether ONE or TWO doses given. State 'unknown' if so
18. ***Intrapartum antibiotics****:* State 'Yes' if systematic antibiotics (enteral or parenteral) were given to mothers in the 24 hours prior to delivery. State 'unknown' if so
19. ***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 only listed as an estimate, record the estimate, but make a note on the CRF that this is an approximate birth weight.
20. **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. (Ultrasound date selected if done earlier than 25 weeks and there is a discrepancy with the Last Menstrual Period (LMP) dates. Otherwise, use LMP dates. 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.
21. ***Growth status****:* based on Intrauterine Growth Curves (Composite Male / Female) chart. SGA <10th centile; AGA 10-90th centile; LGA >90th centile.
22. ***Gender***: Indicate Male, Female or Ambiguous/Indeterminate.
23. ***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. (unless in ambulance – born before arrival BBA as outborn)

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

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

25. ***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, not whether it is listed as 'semi emergency' or 'emergency' in the OT list.

26. ***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. Tick 'unknown' if so, not because it was not scored once baby intubated. Apgar score can be '0' at 1 minute & 5 minutes.

27. ***Initial Resuscitation (for inborn babies only):*** Tick 'Yes' for all intervention that apply at birth for inborn cases only
    a) Oxygen
    b) Bag-mask vent
    c) Endotracheal Tube Ventilation
    d) Cardiac Compression
    e) Adrenaline

28. ***Admission Temperature:*** Temperature on admission to one decimal point in degree Celsius. Mandatory field for admission to Neonatal Ward. Does not include babies who die in delivery room.

SECTION 3: Neonatal Events

29. Respiratory 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 e.g. by Neopuff

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) HFJ/ HFOV – High frequency ventilation

d) Nitric oxide – gas delivered via a ventilator at any time after leaving the delivery room.

30. Total number of days on ventilation support at your centre: Total number of days on conventional ventilation and high frequency ventilation. Do not include days on CPAP.

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

32. 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

48a. Date of discharge/transfer/death*:* Enter the exact date

48b. Time of death: State as 24-hour format – used to auto calculate age at discharge. Mandatory for death cases – give best-estimated time if of death if exact time not known.

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

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

b) Indicate growth status as per Intrauterine Growth Curves (Composite Male / Female)

50. Feeding at discharge/death: Refers to feeding received at the time of discharge

'Never Fed' – if infants did not received any enteral feeding at discharge either formula milk or human milk.
'Human milk only' – if infants was discharge receiving human milk either by breast-fed and/or expressed breast milk.
'Formula only' – if infants was discharge receiving formula milk at discharge
'Human milk with formula' –if infants was discharge receiving 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 'Still hospitalised as of 1st birthday' or 'Transferred to other hospitals'. If transferred to other hospitals, specify the name of hospital transferred to.

If a case is transferred to another hospital in the MNNR network, complete the CRF up to current status and send photocopy of the form with the baby to assist the referral hospital in obtaining the patient particulars and birth history. The referring hospital still need to key in the original form into the system. The referral centre will open and complete a new CRF and this will be analysed together with the CRF of the referring hospital.

Post- transfer disposition: **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.

SUPPLEMENTARY FORM

Filled whenever there is neonatal death in accordance to the Modified Wigglesworth Classification of Perinatal Mortality:

An additional data to that collected in the main CRF for neonatal deaths.

1. ***Centre' Name:*** State name of reporting hospitals
2. ***Name:*** State mother's name
3. ***RN of baby:*** RN at participating hospital. If the baby dies in Labour Room and has no RN, use mother's RN.
4. ***Mother's new IC number or passport:*** whichever applicable

Immediate Cause of Death (Modified Wigglesworth):

(Adapted from Garis panduan Penggunaan Format PNM 1/97 (Pindaan 2000) bagi Melapor Kematian Perinatal, Jun 2000, Bahagian Pembangunan Kesihatan Keluarga, Kementarian Kesihatan Malaysia)

*a. **Lethal Congenital Malformation (LCM)/defect***
Severe or lethal malformation that contribute to death. If 'Yes', tick specifically the cause of death.

*b. **Gestation***
< 37 or ≥ 37 weeks

*c. **Immaturity***
This includes only livebirths < 37 weeks gestation after excluding LCM. Tick immediate secondary cause of death e.g. severe IVH, pulmonary haemorrhage

*d. **Asphyxial conditions***
All term babies who died from birth asphyxia or meconium aspiration syndrome or PPHN

*e. **Infection***
This refers to term babies (. 37 weeks gestation) whose primary cause of death is an infection. Some examples includes meningitis, group B streptococcal infection, intrauterine infections, etc.

*f. **Other specific causes***
Specify any course of death not included in the above classification. This includes kernicterus, haemorrhagic shock/inborn error of metabolism/pneumothorax/pulmonary haemorrhage.

*g. **Unknown***
Where cause of death is not known.

Readmission CRF

To be used for babies discharged well from any MNNR SDP hospital and then readmitted to same or another MNNR SDP hospital cohort within 44 weeks of corrected age. The aim is to audit reasons for readmission when bay was supposedly well enough to be discharged.

Discharge from: specify name of hospital

Centre Name: hospital name as in MNNR

Date of admission: of this admission (dd/mm/yy)

Section 1: Patient particulars

1. ***Name of mother***: Name as in hospital record
2. ***Name of baby (optional)***: Name as in hospital record.
3. ***RN of baby****:* RN at participating hospital of last discharge.
4. ***a) Mother's I/C Number****:* MyKad number or Other ID document no. If "Other" please specify type of document.
   b) Baby's MyKid number: add if available
5. ***Date of Birth****:* dd/mm/yy
6. ***Birth weight:*** (grams)
7. ***Gestation at birth*****:** best estimate of gestational age given at full weeks
8. ***Date of first discharge:*** discharge date at the first admission after birth

Section 2: Particulars of this admission

9. ***Age at this readmission:*** auto-calculate from date of readmission & date of birth
10. ***Weight at this readmission:*** (grams)
11. ***Reason(s) for readmission:*** apnoea/fever/URTI/LRTI/confirmed sepsis/poor weight gain/cyanosis due to sucking/ swallowing coordination/jaundice/others; specify
12. ***Ventilated*** – Yes/No

Section 3: outcome

13. Date of this discharge: enter exact date
14. Total duration of hospital stay during this admission (in completed days): e.g. 10 days 6 hours = 11 days (autocalculate)
15. Outcome at readmission: Alive / Dead

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 retraction. 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 may include 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 may also 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). For infants who had thoracic surgery and a chest tube placed at the time of surgery OR if free air was only present on a CXR taken immediately afther thoracic surgery and wat not treated with a chest tube, tick **'No'**. For infants who had thoracic surgery and then later developed extra pleural air diagnosed by CXR or needle thoracocentesis, tick **'Yes'**. **Indicate whether pneumothorax developed during CPAP, Conventional ventilation or HFV.**
Supplemental oxygen & BPD For babies < 32 weeks – state if O_2 / any form of CPAP or ventilatory support required at Day 28 and 36 weeks corrected gestation For babies ≥ 32 weeks - state if O_2 / any form of CPAP or ventilatory support required at Day 28 and ≥ 56 postnatal days	Receipt of continuous enriched oxygen concentration > 21% by oxyhood, nasal cannula, nasal catheter, facemask or still requiring nCPAP or other forms of respiratory support by Day 28 and 36 weeks or day 56. '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 or ECHO evidence of PDA with documentation of left to right ductal shunting. If ticked 'Yes', indicate whether ECHO was done and whether treatment (indomethacine/ibuprofen for > 24 hours or ligation) was given or not.
Necrotising enterocolitis (NEC) (Stage 2 and above) If 'yes' and managed surgically, tick 'Surgical Treatment' NEC present before admission to your centre? (applies to outborn babies)	NEC according to Bell's criteria stage 2 or higher **Stage 1:** Suspect (History of perinatal stress, systemic signs of ill health i.e. temperature instability, lethargy, apnoea, 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 shows 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).	If an indirect ophthalmologic examination was performed at any time, enter the worst stage documented:

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. Tick 'Yes' if a retinal exam was done. State exact date of first screening and post conceptional age at screening. Specify only the worst stage**. Include if PLUS disease present** 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. ROP present prior to admission? (applies to outborn babies)	**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) Tick 'Yes' if IVH is seen and enter the worst grade before or on 28 days of life. State if VP shunt/reservoir was inserted Tick 'No; if no IVH before or day 28 Tick 'Not Applicable' for term infant	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
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:

	NA – not applicable: no CVC line ○ Aorta ○ Superior vena kava ○ Brachiocephalic veins ○ Internal jugular veins ○ Subclavian veins ○ Inferior vena kava ○ External iliac veins ○ Common femoral veins
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.
Confirmed sepsis Tick 'Yes'if there is evidence of confirmed sepsis. Do not include presumed or clinical sepsis. State whether the onset of first confirmed sepsis was On or before 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. NOTE: The date of birth as day 1 regardless of the time of birth. For an infant born at 11.59 PM on September 1, day 3 will be September 3. <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 /or recovered from infants CSF 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 were to treat for 5 or more days.

	Do not place a tick if any or all of the above are not true. <u>For FUNGAL infection</u>: Place a tick only if a fungus 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 findings).
Hypoxic ischaemic encephalopathy (HIE) **Applied to <u>any gestation</u> so long the criteria fulfilled.**	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 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 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	*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

Major Congenital Abnormalities Tick 'Yes ' if major congenital anomaly is present even if it is an isolated one (i.e. only one abnormality) If Yes, state: 1. 'Known Syndrome', 2. 'Not a Recognised Syndrome' 3. 'Isolated major abnormality' If the syndrome is known, tick the specify syndromes or specify it. Types of Abnormalities: **Tick all major abnormalities found for recognisable syndrome, non-recognisable ones or isolated major congenital abnormality** Tick all the congenital anomalies found in patient. 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".

Malaysian National Neonatal Registry

2-7, Medical Academies of Malaysia
210 Jln Tun Razak
50400 Kuala Lumpur

Telephone: 016– 270 4505
03- 4023 4505
Fax 03- 4023 4505

i. Hospital:					
ii. Month:		iii. Year:			
iv. Total Births:		v. Live Births:		vi. Still Births:	

SECTION 1: DELIVERIES VERSUS BIRTH WEIGHT

Birth Weight (grams)	No. of Still Births	No. of Live Births	No. Admitted to Neonatal Unit	No. who died in delivery room
< 500				
500				
501 - 600				
601 - 700				
701 - 800				
801 - 900				
901 - 999				
1000				
1001 - 1250				
1251 - 1499				
1500				
1501 - 2000				
2001 - 2500				
> 2500				
TOTAL				

SECTION 2: BIRTH VERSUS GESTATION WEEKS

Gestation (weeks)	No. of Still Births	No. of Live Births	No. Admitted to Neonatal Unit	No. who died in delivery room
<22				
22-24				
25				
26				
27				
28				
29				
30				
31				
32				
33				
34				
35				
36				
37-40				
> 40				
TOTAL				

SECTION 3: BIRTH VERSUS MODE OF DELIVERY

Mode of Delivery	No. of Still Births	No. of Live Births	No. Admitted to Neonatal Unit	No. who died in delivery room
SVD				
Breech				
Forceps				
Ventouse				
LSCS Elective				
LSCS Emergency				
TOTAL :				

SECTION 4: BIRTHS VERSUS ETHNIC GROUP

Ethnic Group	No. of Still Births	No. of Live Births	No. Admitted to Neonatal Unit	No. who died in delivery room
Malay				
Chinese				
Indian				
Orang Asli				
Bumiputera Sabah specify ethnic group: _____				
Bumiputera Sarawak specify ethnic group: _____				
Foreigner				
Other Malaysian _____				
TOTAL :				

1. Remarks:	
2. Name of Site Coordinator:	
3. Chop:	
4. Date:	☐☐ / ☐☐ / ☐☐

i Birth census should be sent together with the tracking forms and the completed CRFs of discharges for the month by the end of the following month

ii Sample of tracking form are as follows

MALAYSIAN NATIONAL NEONATAL REGISTRY (CRF 2013)

Centre Name:	○ New Case ○ Readmission ○ Previously admitted to other SDP hospital:	**MNNR No. (Office use):** ☐☐☐☐ **Centre:** ☐☐☐
Date of Admission: ☐☐☐ (dd/mm/yy)		

Admitted to neonatal ward: ○ Yes → (Proceed to complete all sections in this CRF) ○ No → (Proceed to complete [Sections 1,2,4(No.47) and 5])

☐ Abandoned baby → (if box is ticked, item # 1,4a, 6-16 not mandatory)

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

SECTION 1 : PATIENT PARTICULARS & MATERNAL HISTORY

***1. Name of mother:**	
***2. Name of baby** (Optional):	
***3. RN of baby:**	
***4a. 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 ○ Other, specify:.....
***4b. Baby's MyKid number:**	☐☐☐☐☐☐ - ☐☐ - ☐☐☐☐
***5a. Date of birth of baby:** (dd/mm/yy)	☐☐/☐☐/☐☐☐☐ **5b. Time of birth**: (24– hour format) (enter the best estimated time of birth if the exact time unknown) ☐☐☐☐
***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:**	☐☐
***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 included:**	○ Yes ○ No ○ Unknown
***11. Maternal Eclampsia:**	○ Yes ○ No ○ Unknown
***12. Maternal Chorioamnionitis:**	○ Yes ○ No ○ Unknown
***13. Maternal Anaemia:**	○ Yes ○ No ○ Unknown
***14. Maternal abruption placenta:**	○ Yes ○ No ○ Unknown
***15. Maternal Bleeding placenta praevia:**	○ Yes ○ No ○ Unknown
***16. Cord prolapse:**	○ Yes ○ No ○ Unknown

SECTION 2 : BIRTH HISTORY

***17. Antenatal steroid:**	○ Yes → ○ 1 dose ○ 2 doses ○ No ○ Unknown
***18. Intrapartum antibiotic:**	○ Yes ○ No ○ Unknown
***19. Birth weight:**	☐☐☐☐ (grams)
***20a.Gestation:**	☐☐ (weeks) ***20b.Gestational age based on: (if patient died)** ○ LMP ○ Ultrasound ○ Neonatal assessment ○ Unknown
***21. Growth status:**	○ SGA ○ AGA ○ LGA
***22. Gender:**	○ Male ○ Female ○ Ambiguous/ Indeterminate
***23. Place of birth:**	○ Inborn ○ Outborn → ○ Home ○ Health Clinic ○ Private Hospital ○ Government hospital with specialist ○ District ○ General ○ Government hospital without specialist ○ University hospital ○ Unknown ○ Maternity home with specialist ○ Maternity home without specialist ○ Alternative Birthing centre (ABC) ○ Urban ○ Rural ○ Enroute / During transport ○ Others, specify .....
***24. Multiplicity:**	○ Singleton ○ Twin ○ Triplet ○ Other, specify: ..... Specify birth order if not a singleton ☐☐
***25. Final Mode of delivery:**	○ Vaginal delivery → ○ SVD ○ Breech ○ Instrumental → ☐ Vacuum ☐ Forceps ○ Caesarean section → ○ Elective ○ Emergency ○ Others, specify:..... ○ Unknown

SECTION 2 : BIRTH HISTORY (continue)

*26. 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
27. Initial resuscitation: (applicable for inborn only)	a) Oxygen:	○ Yes ○ No	d) Endotracheal tube vent:	○ Yes ○ No
	b) CPAP :	○ Yes ○ No	e) Cardiac compression:	○ Yes ○ No
	c) PPV:	○ Yes ○ No	f) Adrenaline:	○ Yes ○ No
*28. Admission temperature: (mandatory if admitted to Neonatal ward)	☐☐ . ☐ (°C)			

SECTION 3: NEONATAL EVENT

*29. Respiratory support: ○ Yes → ○ No

a) CPAP done?	○ Yes ○ No	
	i) Early CPAP within 1 hour from birth:	○ Yes ○ No
	ii) Total duration of CPAP at your centre:	☐☐ . ☐ day(s)
b) Conventional ventilation:	○ Yes ○ No	
	i) Total duration of Conventional ventilation at your centre:	☐☐ . ☐ day(s)
c) HFJV/HFOV:	○ Yes ○ No	
	i) Total duration of HFJV//HFOV at your centre:	☐☐ . ☐ day(s)
d) Nitric Oxide:	○ Yes ○ No	
	i) Total duration of Nitric Oxide at your centre:	☐☐ . ☐ day(s)

*30. Total number of days on ventilation support at your centre: ☐☐☐ . ☐ (autocalculate)

*31. Surfactant: ○ Yes → ○ < 1 hr ○ 1-2 hrs ○ > 2 hrs ; ○ No

*32. Parenteral nutrition: ○ Yes ○ No

SECTION 4: PROBLEMS/ DIAGNOSES

33. Respiratory: ☐ Meconium aspiration syndrome ☐ Pulmonary haemorrhage ☐ Pneumonia ☐ Transient tachypnoea of newborn ☐ Pulmonary interstitial emphysema

*34. RDS: ○ Yes ○ No

*35. Pneumothorax: ○ Yes → Pneumothorax developed during: ○ Spontaneous ○ CPAP ○ CMV ○ HFV ; ○ No

*36. Supplemental oxygen and BPD:
a) Is baby on > 21% oxygen continuously for 28 days or more? ○ Yes ○ No
b) If Yes
- (i) for < 32 weeks GA, baby still on oxygen / CPAP / ventilator support at 36 weeks corrected age? ○ Yes ○ No
- (ii) for >= 32 weeks GA, baby still on oxygen / CPAP / ventilator support at day 56 of life? ○ Yes ○ No

*37. Cardiovascular PPHN: ○ Yes ○ No ○ Unknown

*38. PDA: ○ Yes → ; ○ No

a) ECHO done:	○ Yes	○ No
b) Indomethacin/Ibuprofen:	○ Yes	○ No
c) Ligation:	○ Yes	○ No

*39. NEC (stage 2 and above): ○ Yes → ; ○ No

a) surgical treatment:	○ Yes	○ No
b) NEC present before admission to your centre: (for outborn baby only)	○ Yes	○ No

*40. ROP Retinal Exam Done: ○ Yes (If yes, worst stage of ROP): →

a) Date of first screening:	☐☐ / ☐☐ / ☐☐
b) Post conceptional age at 1st screening:	☐☐ (autocalculate)
c) ○ No ROP ○ Stage 1 ○ Stage 2 ○ Stage 3 ○ Stage 4 ○ Stage 5 ☐ PLUS disease	
d) Laser Therapy:	○ Yes ○ No
e) Cryotherapy:	○ Yes ○ No
f) Vitrectomy:	○ Yes ○ No
g) ROP present prior to admission? (for outborn baby only)	○ Yes ○ No

○ No → Appointment given: ○ Yes ○ No ; Date of appointment ☐☐ / ☐☐ / ☐☐

○ Not Applicable

SECTION 4: PROBLEMS/ DIAGNOSES (continue)

***41. 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

***42. Seizures :** ○ Yes ○ No

***43. Central venous line:** ○ Yes ○ No

***44. Confirmed sepsis:** ○ Yes → ○ No

I) For first episode:
○ ≤ 72 hours of life ○ > 72 hours of life

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

45. Neonatal meningitis: ○ Yes ○ No

***46. Hypoxic ischaemic encephalopathy (HIE):** ○ None ○ Mild ○ Moderate ○ Severe

***47. Congenital anomalies:**

***47a. Major congenital anomalies:** ○ Yes → ○ No

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

○ Not a recognized syndrome
○ Isolated major abnormality

***47b. Types of abnormalities (check all that are present. Applies to all including 'known syndromes', 'not a recognized syndrome' or 'isolated major abnormality')**

- ☐ CVS → ○ Cyanotic ○ Acyanotic; ☐ ECHO done
- ☐ CNS → ○ Hydrocephalus ○ Hydrancephaly ○ Holoprosencephaly ○ Others (Refer to ICD 10):_____
- ☐ Neural Tube Defect → ☐ Spina bifina ☐ Anencephaly ☐ Encephalocoele ☐ Others (Refer to ICD 10):_____

- ☐ Skeletal dysplasia
- ☐ Respiratory
- ☐ GIT
- ☐ Hydrops
- ☐ Renal
- ☐ Cleft → ○ Lip ○ Palate ○ Lip and Palate
- ☐ Others, specify (Refer to ICD10):
- ☐ None of the above

SECTION 5: OUTCOME

***48a. Date of discharge / transfer/ death:** (dd/mm/yy) ☐☐ / ☐☐ / ☐☐

48b. Time of Death: (24 hour format) (mandatory for death cases) ☐☐☐☐ (enter the best estimated time of death if the exact time is unknown)

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

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

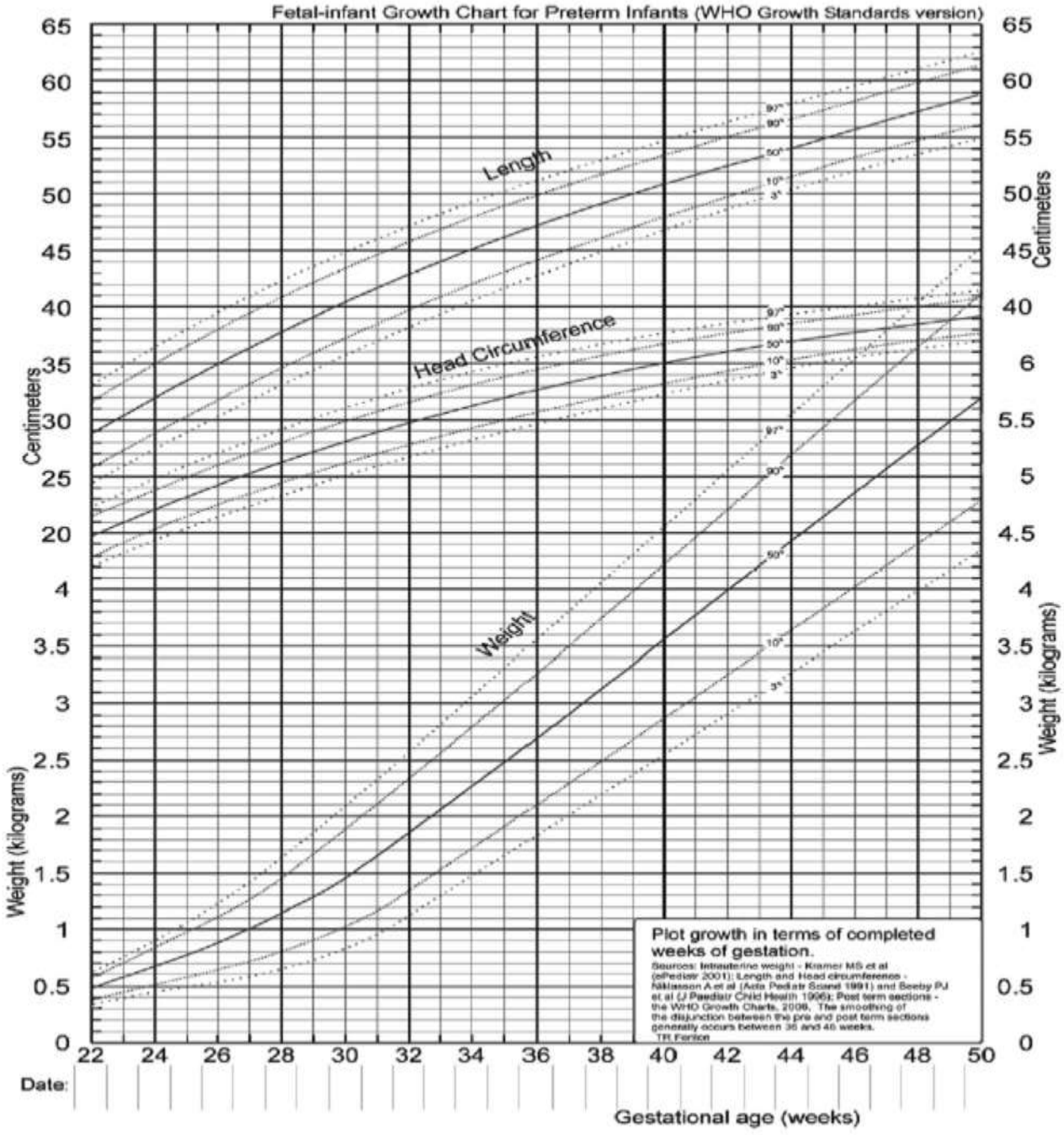
***51. Total duration of hospital stay (neonatal/ peads care):** ☐☐☐ (in completed days) (autocalculate)

***52. Outcome:**

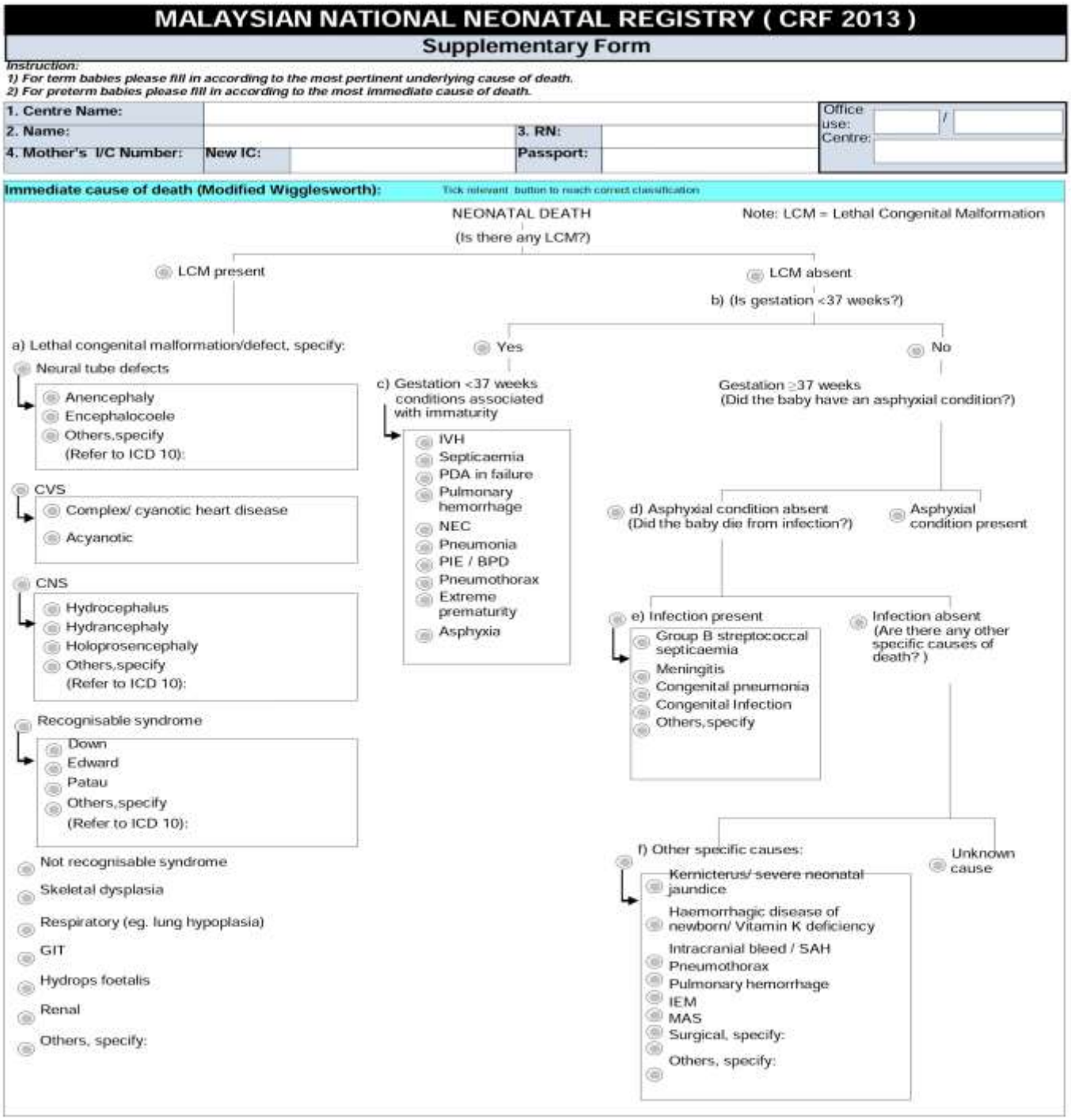
○ Alive → **Place discharged to:**
- ○ Home
- ○ Social welfare home
- ○ Other non Paeds ward
- ○ Still hospitalized as of 1st birthday
- ○ Transfer to other hospitals →
  - **a) Name of hospital:**
  - **b) Reason for transfer:** ○ Growth/ stepdown care ○ Acute medical/ diagnostic services ○ Social/ Logistic reason ○ Lack of NICU bed ○ Chronic/ Palliative care ○ Surgery ○ Other, specify: .....
  - **c) Post transfer disposition:** (Please fill this section if place transferred is not part of the NNR Network) ○ Home ○ Death ○ Transferred again to another hospital ○ Readmitted to your hospital ○ Still in ward

○ Dead → **Place of death:** ○ Labour room/OT ○ In transit ○ Neonatal unit ○ Others, specify: .....

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


Fetal-infant Growth Chart for Preterm Infants (WHO Growth Standards version)
Length
Head Circumference
Weight
97°
90°
50°
10°
3°
Centimeters
Weight (kilograms)
Plot growth in terms of completed weeks of gestation.
Sources: Intrauterine weight - Kramer MS et al (ePediatr 2001); Length and Head circumference - Niklasson A et al (Acta Pediatr Scand 1991) and Scelby PJ et al (J Paediatr Child Health 1996); Post term sections - the WHO Growth Charts, 2006. The smoothing of the disjunction between the pre and post term sections generally occurs between 36 and 46 weeks.
TR Fenton
Date:
Gestational age (weeks)

Appendix 4a Supplementary Form (Death cases)



MALAYSIAN NATIONAL NEONATAL REGISTRY (CRF 2013)

Supplementary Form

Instruction:
1) For term babies please fill in according to the most pertinent underlying cause of death.
2) For preterm babies please fill in according to the most immediate cause of death.

1. Centre Name:			Office use: / Centre:
2. Name:		3. RN:	
4. Mother's I/C Number:	New IC:	Passport:	

Immediate cause of death (Modified Wigglesworth): Tick relevant button to reach correct classification

NEONATAL DEATH
(Is there any LCM?)

Note: LCM = Lethal Congenital Malformation

- LCM present
  - a) Lethal congenital malformation/defect, specify:
    - Neural tube defects
      - Anencephaly
      - Encephalocoele
      - Others,specify (Refer to ICD 10):
    - CVS
      - Complex/ cyanotic heart disease
      - Acyanotic
    - CNS
      - Hydrocephalus
      - Hydrancephaly
      - Holoprosencephaly
      - Others,specify (Refer to ICD 10):
    - Recognisable syndrome
      - Down
      - Edward
      - Patau
      - Others,specify (Refer to ICD 10):
    - Not recognisable syndrome
    - Skeletal dysplasia
    - Respiratory (eg. lung hypoplasia)
    - GIT
    - Hydrops foetalis
    - Renal
    - Others, specify:
- LCM absent
  - b) (Is gestation <37 weeks?)
    - Yes
      - c) Gestation <37 weeks conditions associated with immaturity
        - IVH
        - Septicaemia
        - PDA in failure
        - Pulmonary hemorrhage
        - NEC
        - Pneumonia
        - PIE / BPD
        - Pneumothorax
        - Extreme prematurity
        - Asphyxia
    - No
      - Gestation ≥37 weeks (Did the baby have an asphyxial condition?)
        - d) Asphyxial condition absent (Did the baby die from infection?)
          - e) Infection present
            - Group B streptococcal septicaemia
            - Meningitis
            - Congenital pneumonia
            - Congenital Infection
            - Others,specify
          - Infection absent (Are there any other specific causes of death?)
            - f) Other specific causes:
              - Kernicterus/ severe neonatal jaundice
              - Haemorrhagic disease of newborn/ Vitamin K deficiency
              - Intracranial bleed / SAH
              - Pneumothorax
              - Pulmonary hemorrhage
              - IEM
              - MAS
              - Surgical, specify:
              - Others, specify:
            - Unknown cause
        - Asphyxial condition present

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

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Appendix 5 Presentations

POSTER, ABSTRACT AND PAPER PRESENTIONS

1. Neoh SH. *Survival of VLBW 2013.* Presented at the MNNR SDP Meeting, Selayang Hospital, Selangor, Malaysia, 2014

2. Neoh SH. *Hypothermic theraphy for HIE.* Presented at the MNNR SDP Meeting, Selayang Hospital, Selangor, Malaysia, 2014

3. Boo NY. *HIE 2013.* Presented at the MNNR SDP Meeting, Selayang Hospital, Selangor, Malaysia, 2014

4. Chee SC. *IVH 2013.*Presented at the MNNR SDP Meeting, Selayang Hospital, Selangor, Malaysia, 2014

5. Lee JKF. *MAS and pneumothorax 2013.* Presented at the MNNR SDP Meeting, Selayang Hospital, Selangor, Malaysia, 2014

6. Teh SH. *Hypothermia 2013.* Presented at the MNNR SDP Meeting, Selayang Hospital, Selangor, Malaysia, 2013

7. Cheah IGS. *Congenital anomalies 2013.* Presented at the MNNR SDP Meeting, Selayang Hospital, Selangor, Malaysia, 2014

8. Soo TL. *Confirmed sepsis 2013.* Presented at the MNNR SDP Meeting, Selayang Hospital, Selangor, Malaysia, 2014

9. Chin CY. *NEC 2013.* Presented at the MNNR SDP Meeting, Selayang Hospital, Selangor, Malaysia, 2014