

# A STUDY OF CRITICALLY ILL BABIES IN NEONATAL INTENSIVE CARE UNITS

Editor: Irene Cheah Guat Sim

With contributions from:

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Report of the

Malaysian National Neonatal Registry 2006

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## FOREWORD

The Malaysian National Neonatal Registry (MNNR) study centres comprise 29 out of 40 Neonatal Intensive Care Units (NICU)'s in government hospitals and one NICU was from a university hospital. Nearly fifty per cent of deliveries in Malaysia are conducted in the MNNR hospitals. From this, 61,758 are admitted for neonatal care and 10,387 babies in 2006 fulfilled the MNNR study criteria. Without the immense effort and team work of the doctors and nurse coordinators from each NICU and the registry staff to collect and coordinate the data, this study would not have been feasible. Their hard work is much appreciated. It is hoped that all NICU's in the study will benchmark their performance accordingly and continue to strive to provide better care through audit and quality improvement.

The steering committee thank Tan Sri Datuk Dr Ismail Merican, Dato Dr Zaki Morad, Dr Lim Teck Onn, Dr Hussain Imam and Dr Goh Pik Pin for their constant support. We extend our gratitude to the late Dato' Dr Lim Nyok Ling, the previous Chairman, for having persevered in the setting up the foundation of this registry.

This annual report has been delayed due to unforeseen circumstances but I am glad to report that the study on the 'Outcome of Critically III Babies in the Neonatal Intensive Care Units (NICUs) in Malaysia' in its third year has gathered sufficient data to permit some level of analysis of NICU care and the various outcomes, such as survival rates and rates of screening for retinopathy of prematurity over the three years; and to compare outcomes such as survival rates, use of antenatal steroids, the rate of complications such as pneumothorax, chronic lung disease, retinopathy of prematurity across centres, as well as the use of treatment such as parenteral nutrition and surfactant in the care of preterm babies by the various centres. Variations in outcome arise from various reasons pertaining to the data itself as well as variation of referral pattern and resources available. Risk adjustment would be one of the things to look at for future analysis.

Several papers arising from this data have been presented at national conferences and several forums. It is also hoped to stimulate further research, including auditing of NICU care in Malaysia, which will lead to continuous quality improvement in NICU care. The findings from this database can also be used to produce papers for publication in journals.

We look forward to private and more university-based institutions to join the Malaysian National Neonatal Registry (MNNR) in order to capture a more comprehensive picture of the care of critically ill babies in the country.

Dr. Irene Cheah Guat Sim Chairman Malaysian National Neonatal Registry

## SUMMARY

The study started its recruitment in 2004 and the inclusion criteria involve all preterm babies below 32 weeks gestational age, those with birth weight below or equal to 1500 grams, all significant congenital anomalies admitted to the NICU, all babies who were ventilated and all live-born babies who died in the hospital.

In 2006, there were a total of 239,750 births in the 30 participating centres, of which 2,226 were stillbirths and 237,514 were live-births. More than ten thousand (n=10,387) babies in the level III NICU centres met the study criteria. From this, 3,153 were preterm babies below 32 weeks gestational age (GA) and 3,586 babies had birth weights of below 1501 grams.

**Results:** 

- Twenty-five percent (25%) of the study population were small-for-gestational-age (SGA) and there is an increasing trend in the percentage of SGA babies from 2004-2006.
- Babies born to *Orang Asli* mothers had the highest risk of fulfilling the study criteria, followed by *Bumiputra Sarawak* and *Bumiputra Sabah* mothers.
- Only 60% of mothers of 25-33 weeks gestation received antenatal steroids in 2006. There were marked variations (12-90% of preterm babies below 32 weeks GA) in the use of antenatal steroids across centres.
- Seven-thousand three-hundred and six (81.0%) out of 9,023 babies were inborn. For babies less than 32 weeks gestational age, 2,426 (83.6%) out of 2,902 were inborn. The overall maternal steroids used were only 55.2% with 60.3% used in inborn babies and 23.3% in outborn. Inborn babies had a better survival rate particularly those in the 701-900 birthweight category
- The Caesarean section rate for very low birthweight (VLBW) babies in the MNNR was 44%, and this was low compared to that of other neonatal networks such as the Vermont Oxford Network which had a VLBW Caesarean section rate of 69%.
- The 'clinical risk index for babies' (CRIB), revealed a strong correlation of CRIB score with mortality rates in all three years. Although there was variation in outcomes between centres for the same mean CRIB score, for each centre, there was an increase in survival for the same mean CRIB score over the three years.
- Eighty-two percent of the overall cohort required ventilator support. Seventy percent of ventilated babies were more than 32 weeks gestation and more than 1500 gram birth weight. The duration of ventilatory support for survivors between 501-1000 grams birthweight (BW) was 20+19 days, for those between 1001-1500 grams, BW was 10+8 days and those of more than 2500 grams had BW of 4+6 days.
- Other than in the birthweight group 501-1000 grams, less than 50% of the babies with respiratory distress syndrome (RDS) received surfactant within two hours of life. There is, however, increasing percentage of babies receiving early surfactant over the years.
- The rates of chronic lung disease defined as the requirement for oxygen supplementation at Day 28 and 36 weeks GA were 18.9% and 5.5% respectively for the survivors of between 501-1000 grams BW, a drop from 46.2% and 18.3% respectively in 2004. The rates among babies with birthweights 1001-1500 grams were 7.0% and 2.3% at Day 28 and 36 weeks respectively.

- Postnatal steroid for chronic lung disease was given to 10.6% of those with birth weights <a href="https://www.eights/1000">weights/1000</a> grams and 4.0% of those with birthweights 1001 -1500 grams.
- Five-hundred and five (4.9%) of the entire cohort developed pneumothorax with high mortality rates in preterm infants.
- Nine percent (9.3%) of babies above 2000 grams birthweight were reported to have hypoxic ischaemic encephalopathy (HIE) 69.4% had mild or moderate HIE and 30.6% had severe HIE. Severe HIE was more common among the outborn babies (44.6%) than the in-born babies (27.5%) with HIE, and mortality rates was 70.2% in those with severe HIE as compared to 10.7% HIE.
- Twelve percent (12.1%) of babies, between 501-1000 grams BW with ultrasound screening, had grade 3 or grade 4 intraventricular haemorrhage which had a high mortality rate of 55%. There is a decreased rate of grade 2 IVH but no change in grades 3 and 4 IVH.
- Sixty-three (5%) babies with BW 501-1000 grams and 34 (1.4%) of those between 1000-1500 grams BW had developed Grade 3, 4 or 5 retinopathy of prematurity (ROP). The rate of babies who had not been screened prior to discharge seems to be increasing but screening could have been done as an outpatient.
- Nineteen percent (18.5%) (1922/10387) of infants had congenital anomalies. The incidence of congenital anomaly was 185 per 1000 births. Amongst infants with congenital anomalies, the mortality rate was 57.8%.
- Eleven percent of all babies had one or more episodes of confirmed bacterial sepsis. In this group, mortality rate was 26.9% in contrast to a mortality rate of 19.6% in babies without confirmed bacterial sepsis. The infection rate is highest (21%) in the birthweight group 501-1000 grams followed by 14% in the group of 1001-1500 grams BW.
- The overall survival to discharge has increased from 77% in year 2004 to 80% in year 2006. Survival of babies up to 31 weeks and up to 1500 grams improved progressively with increasing gestation and birthweight. Over the last two years, there is a 10% increase in survival rate for the 701-800 gram birthweight group. There was marked difference in survival between babies below and above 700 grams birthweight i.e. from 22% survival rate at 601-700 grams birth weight group to 43% survival at 701-800 grams birthweight.
- The survival rate of babies between 1001-1500 grams birthweight, which is the key performance index for government NICU's, varied from 74-92% according to centres.

• The survival rate of babies between 501-1000 grams birthweight varied from 31-65% Study recommendations include collaboration with Obstetrics and Public Health staff to

- closely monitor the antenatal care of mothers of *Orang Asli* and *Bumiputra Sabah* and *Sarawak* ethnic groups to reduce the risk of hypoxic ischaemic encephalopathy
- enhance the use of antenatal steroids and continue with in-utero transfer of high risk pregnancies

and for the NICU it is to:

- increase the use of early rather than late surfactant administration in respiratory distress syndrome
- review ventilation strategies to reduce the risk of pneumothorax and use of continuous positive airway pressure
- enhance infection control in the NICU.

# Report of the Malaysian National Neonatal Registry (MNNR) 2006

# 1. Organisation of the MNNR

## 1.1 History

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

Since then a pilot study in collaboration with the Clinical Research Centre (CRC) and the Ministry of Health of Malaysia, from 1<sup>st</sup> October to 31<sup>st</sup> December in which 14 centres participated was done. Two reports were published for the years 2004 and 2005.

#### The Malaysian NNR aims to:

- 1. Determine the frequency and distribution of critically ill neonates in Malaysia. These are useful measures of the health burden arising from neonatal critical illness and its care in the country.
- 2. To study the mortality and some morbidity outcomes of babies admitted to NICU in participating hospitals.
- 3. To calculate the perinatal, neonatal, and stillbirth mortality rates of inborn babies.
- 4. To compare 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. Stimulate and facilitate research on neonatal critical illness and its management.

#### 1.2 Structure

The MNNR consists of an Advisory Committee, Steering Committee and administrative staff. The Advisory Committee consists of heads of department (or their nominee) of each participating hospital, a few academic neonatologists from the Universities and a clinical biostatistician and epidemiologist. This committee monitors and directs the functions of MNNR and it meets at least once a year during a National Neonatal Registry Forum.

The Steering committee consists of nine members, eight of whom were elected. The 9<sup>th</sup> was appointed for his expertise and involvement in the development of the 'congenital anomalies' section of the registry. This committee is concerned with the general running and decision making of the Registry and to approve use of its data.

The administrative staff at the Neonatal Registry Unit (NRU) is headed by a Clinical Nurse Manager. She is assisted by a clinical research officer and three other clinical research assistants. Statistical support is provided by the CRC.

#### 1.3 Funding

The Ministry of Health of Malaysia provided a research grant to 'Study the outcome of critically ill babies in NICUs'. Considerable funding was also obtained from the Perinatal Society of Malaysia. In 2006, some funds were also raised from the organisation of two MNNR Forums. We thank all involved for their very generous and encouraging support.

# 2. Data Set

#### Participating centres in 2006, in alphabetical order:

- 1. Hospital Alor Setar
- 2. Hospital Batu Pahat
- 3. Hospital Universiti Sains Malaysia (HUSM)
- 4. Hospital Ipoh
- 5. Hospital Kangar
- 6. Hospital Kajang
- 7. Hospital Keningau
- 8. Hospital Kota Bahru
- 9. Hospital Kuala Lumpur
- 10. Hospital Kuala Terengganu
- 11. Hospital Likas, Kota Kinabalu
- 12. Hospital Manjung
- 13. Hospital Melaka
- 14. Hospital Miri
- 15. Hospital Muar
- 16. Hospital Pulau Pinang
- 17. Hospital Putrajaya
- 18. Hospital Selayang
- 19. Hospital Seremban
- 20. Hospital Seberang Jaya
- 21. Hospital Sg. Buloh
- 22. Hospital Sibu
- 23. Hospital Sg. Petani
- 24. Hospital Sultanah Aminah, Johor Bharu
- 25. Hospital Taiping
- 26. Hospital Tengku Ampuan Rahimah, Klang
- 27. Hospital Tengku Ampuan Afzan, Kuantan
- 28. Hospital Teluk Intan
- 29. Hospital Temerloh
- 30. Hospital Umum Kuching

Hospitals Sg. Buloh and Batu Pahat joined the MNNR in 2006. Centre numbers are allocated to these centres and are different from the numbers above.

## 2.1 Registration criteria

The MNNR audit of critically ill babies admitted to a Neonatal Unit (NNU) included

A. All babies admitted to a Neonatal Unit who

- 1. had a gestation of <32 weeks i.e. up to 31 weeks + 6 days.
- 2. had birthweight of 1500 grams and below
- 3. were ventilated
- 4. had significant congenital anomalies

B. All neonatal deaths (i.e. newborn babies (<28 days) who die in the NNU, delivery room i.e. Operating Theatre and labour room, and other wards)

Both inborn and outborn babies will be included but outborn babies who expire before arrival will be excluded. Babies who are admitted to the NNU at a corrected gestation of > 44/52 will not be considered a neonatal case and hence will be omitted from the study.

#### 2.2 Data set variables

The variables and their definitions are listed in Appendix 1.

In 2006 the format of Case Report Forms (CRFs) was changed slightly to include name of hospitals for ex-utero transfer and place of death. Data on all inborn births was also collected to facilitate calculation on perinatal and neonatal mortality rates of each hospital. (Appendix 2 Birth Census)

#### 2.3 Data collection

The CRF consisted of four sheets of forms. (Appendix 3: CRF)

Babies discharged /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 CRFs completed and readmission of the same babies into the NNU will require a new set of CRFs.

A baby who was transferred between neonatal and paediatric wards under the same department will be considered to be the same admission and the discharge CRF is to be completed after complete discharge from the hospital.

Hard copies of CRFs were used and completed CRFs were sent to the Neonatal Registry Unit (NRU) after a defined period.

#### 2.4 Data verification

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

## 3. Results

#### 3.1 Results in general

In 2006, total births in the 30 participating centres were 239,750 of which 2,226 were stillbirths and 237,514 were livebirths.

A total of 10,387 babies who were admitted (admissions also included outborns who were not delivered in respective hospitals of the participating centres) met the criteria to be included in the MNNR (Table 1). Of these 3,153(30.3%) were less than 32 completed weeks (Table 2) and 3,586 (34.5%) had birthweights of 1500 grams and below. A total of 1,187 babies (11.4%) had birthweight of 1000 grams or less (Fig. 3, Table 3). There were more babies in the 2006 cohort compared to 2004 and 2005 especially in the higher gestation and birthweight groups (Figs 1a, 1b and 2). This is largely due to the addition of three additional NICU's participating in the MNNR.

While the babies who met the criteria for the study (n=10,387) were generally babies requiring the most care, they do not include many other babies admitted to the NICUs for other treatment and observation. The total number of admissions to the 30 centres totaled 61,758 based on census collected concurrently by the NICU's. *About 5% of total livebirths in the MNNR hospitals are of birthweight below or equal to 1500 grams. Twenty-eight per cent (28%) of total livebirths between 1501-2500 grams birthweight and 1.6% of livebirths with birthweight above 2500 grams met the MNNR criteria.* 

In this report, babies are referred to as 'very preterm' if they are less than 32 completed weeks gestation; 'preterm' if they are less than 37 completed weeks' gestation, and 'term' if born at 37 weeks gestation or more. Very low birth weight (VLBW) babies are babies with birthweight (BW 501-1500g) and extremely low birthweight (ELBW) babies have birthweight of less than 1000 grams.





Gestational age (weeks)



Fig. 1b Percentage of babies according to gestational age by year



Fig. 2 Number of babies according to birthweight



Fig. 3 Number of babies (<1500g) in 100gm birthweight category by year

#### 3.1.1 Growth status

In terms of growth status, 2,600 (25%) of the whole study population was small for gestational age (SGA <  $10^{th}$  centile for gestation according to Lubchenko chart). The SGA rate for very preterm infants (gestation < 32 weeks) was 18% and VLBW infants (BW 501-1500g) was 36% (Tables 7 and 7a).

In 2006, 68% of babies of birth weight 500 grams or below were SGA. There appears to be a trend towards an increase in the percentage of SGA babies amongst the VLBW babies over the three years. There is a significant increase in the percentage of SGA babies in the 1501-2500 grams birthweight group meeting the MNNR criteria in 2006, this may be due to the selection criteria of the study.



#### 3.1.2 Registrants per unit

The number of admissions and number of babies included in the study from each Neonatal Unit are as shown in Table 1. The number of babies who met the criteria and was included in the study ranged from 84 in one centre to 862 in another. These numbers reflected the size of the centre, the case mix of their patients and the geography and population distribution of each area.

The relative proportion of babies below 32 weeks' gestation at birth in the study per center is shown in Fig. 5.



# 3.1.3 Levels of Neonatal Care

Care for the newborn is provided at three levels. (See Appendix 4)

Hospitals with a level III NICU provide all three levels of care and are referred to in this report as tertiary hospitals. Most Level III NICUs are in Ministry of Health hospitals and a few are in university hospitals. A total of about 40 government and three university hospital centres in the country provided neonatal intensive care to sick babies in 2006, and 30 of these NICUs are source data producers (SDPs) of the MNNR- 29 NICU's in government hospitals and one NICU attached to an university.

The majority of the state hospitals or larger NICU's in Selangor offered Level IIIB care in all aspects except for the availability of High Frequency Oscillatory Ventilation (HFOV) and nitric oxide and subspecialties in some hospitals. These hospitals would accept the sicker and smaller babies from the smaller NICU's in the study although the latter hospitals do manage the ELBW (extremely low birth weight infants) in smaller numbers. There are neonatologists in 12 out of 17 of the state hospitals/larger NICU's.

Many more hospitals in the country provide only Level I and II neonatal care and refer sicker babies to Level III NICUs when the need arises.

#### 3.2 The Mother

Ethnicity as identified by the mother was reported as 63.4% Malays, 10.7% Chinese, 7.3 % Indians, 1.4 % Orang Asli, 5.1% Bumiputra Sabah, 5.6% Bumiputra Sarawak, 0.8% other Malaysians and 5.8% foreigners (Table 4). Similar case distribution was seen in 2004 and 2005 except for an increased proportion of Bumiputra Sabah (4.2% to 5.1%)

Table 4a shows that a much higher percentage of babies born in the SDP hospitals to Orang Asli (8.8%) meet the MNNR criteria, i.e. are more ill or of very low birth weight, preterm or having a significant congenital abnormality; followed by Bumiputra Sarawak, Indian and Bumiputra Sabah. Although Malay mothers have the largest number of their babies in the study, it is not an over-representation of the mothers delivering in SDP hospitals (Table 4a, Fig.6).

Ethnicity	No. livebirths in SDP hospitals	No. in MNNR	%MNNR
Malays	159,071	6,579	4.1
Chinese	24,551	1,108	4.5
Indian	14,629	761	5.2
Orang asli	1,632	143	8.8
Bumiputra Sabah	10,543	527	5.0
Bumiputra			
Sarawak	10,340	577	5.6
Others	4,011	83	2.1
Foreigners	12,737	605	4.7
Total	237,514	10,383	4.4

#### Table 4a. Ethnic distribution of livebirths in SDP hospitals





The mean maternal age in the study group was 29 +/- 7 years(Tables 6 and 6a) and there was little variation in the maternal age between the gestational and birthweight groups. (Tables 4 and 4a)

#### **3.3 Use of Antenatal steroids**

Corticosteroids are administered to the mother to enhance the maturation of her baby's lungs when it is thought she will deliver before 34 weeks' gestation. The first randomized controlled trail of steroid use was in New Zealand in 1970 (Liggins & Howie, 1972). A systematic review reported antenatal steroids to be efficacious in helping to promote maturation of the lungs and preventing death (Crowley, 2003). This therapy also has other beneficial effects such as reduction of the incidence of necrotizing enterocolitis, without harmful effects for mother and baby. The Perinatal Society of Malaysia in collaboration with the Ministry of Health of Malaysia has recommended that maternal corticosteroids should be considered before all births at less than 34 weeks in order to improve neonatal outcomes. (PSM Clinical Practice Guidelines, 1995 updated 2001)

This therapy was given to mothers of 1,833 (58%) out of 3,153 babies below 32 weeks (note babies of 32-33 weeks gestation who are not VLBW, and did not require ventilatory support or not died were not included in the study ). There was a considerable variation in the use of antenatal centres across SDP centres (Figs. 8 & 9, Table 40). The use of antenatal steroids for outborn babies was not unexpectedly lower than in inborn babies (Table 41). *The increased usage of antenatal steroids for inborn deliveries should be encouraged, in view of its beneficial effects to the outcome of the preterm infant.* 





Fig. 8 Percentage of inborn babies < 32 weeks gestation who received antenatal steroids (other NICU's)



From Fig. 9, it can be seen that only about 60% of babies between 25-33 weeks GA receive antenatal steroids.

#### 3.4 The baby

#### 3.4.1 Gender

The proportion of males in the study was 5970/10387 i.e. 57% and females 4370/10387 i.e. 42%. Sex was indeterminate in 47 babies (0.5%) (Table 8). Relatively more males admitted into the study implying that babies of the male sex were at higher risk of being critically ill at birth. Tables 8 and 8a show the gender distribution according to gestational age and birthweight group. Significantly more male babies than female babies  $\geq$ 2500 grams. birthweight met the MNNR criteria, as with more male babies of term gestation.

#### 3.4.2 Multiple births

There were 9,520 (92%) singletons, 795 (8%) twins, 64 (1%) triplets in the study. (Tables 11 and 11a)A total of 867 (8.4%) babies in the study were from a multiple birth. Twelve per cent of preterm infants were from a multiple birth.

#### 3.5 Birth

#### 3.5.1 Inborn vs Outborn Babies

Babies are usually cared for in the hospital of their births. However some high-risk babies may need to be transferred to a hospital with a level III NICU, if care is being received at a hospital without NICU facilities. When this risk is anticipated both mother and baby may be transferred before birth (in-utero), or if risk is not anticipated baby is transferred only after being born (ex-utero). Transfer is usually made to the nearest NICU with an available bed, and in most places an escort transport system is practised. Sometimes this transfer may have to be made to an NICU which is quite far away from the referring unit. It is generally recommended that all babies <33 weeks should be delivered in an obstetric unit in a hospital with an NICU.

In this cohort 7,306 (81.0%) out of 9,023 babies were inborn. For babies of <32 weeks gestation 2,426 out of 2,902 (83.6%) were inborn (Table 10a). Fig 10 shows the inborn-outborn status according to birth-weight groups. Proportionately babies in the lower birthweight groups were more likely to be inborn.

The number of babies  $\leq$ 1500g was 3,586 babies with 3,088 (86%) inborn (IB) and 498 (14%) outborn babies (OB). There were 3,153 babies born with gestational age <32 weeks with 2,719 (86%) inborn and 434 (14%) outborn babies (Table 10). The overall maternal steroids used was only 55.2% with inborn 60.3% versus outborn 23.3% (p value = 0.000). More inborn babies were delivered by Lower Segment Caesarean Section (LSCS)(49.3%) with p value = 0.000.



The overall surfactant usage was only 43.7% with IB 42.3% compared with OB 52.2% (p value 0.004). Ventilation support (CPAP and ventilation) in IB 72% was lower than OB 82% (p-value 0.000). Continuous Positive Airway Pressure (CPAP) usage for IB (17%) was higher than OB (10%). For babies ventilated, the median duration of ventilation was similar between the two groups; IB:5 days (IQR 2-12) and OB:6 days (IQR 3-15). Antibiotic usage was high (85.6%) with IB 84% versus OB 93% (p = 0.000).

The overall survival for the year 2006 for extremely low birth weight (ELBW) was 46.5% and VLBW 73.1%. Figure 11 shows the survival in birthweight categories in VLBW babies with IB versus OB babies for the year 2006. The OB had better apparent survival than IB babies in birthweight categories 501-600, 601-700, 901-1000, 1001-1100 and 1201 to 1300 grams, a pattern similar to that in MNNR 2005 data. It could be explained by selection bias as MNNR is a hospital and not community based registry. Babies who would otherwise been transferred out but died before transfer would have been included in the inborn group whilst the more stable baby transferred would be an outborn. Hence, the survival for OB babies especially those less than 800 grams or 25 weeks appears to be falsely higher. Table 10b summarises the survival of IB versus OB babies in which the IB did better for 1001-1500 grams and VLBW but not for the ELBW. However, once the birthweight <700g has been excluded from the calculation, the IB babies had better survival in all birthweight categories particularly in the 701-900 grams birthweight group.

For the survivors, the median age of discharge for IB was 42 days compared to 48 days for OB babies (p value = 0.0001). There was no difference in the incidence and grade of retinopathy of prematurity (ROP) between inborn and outborn babies. Intraventricular haemorrhage (IVH) occurred more often in OB 29% compared with IB 21% (p=0.094). There was no difference in pneumothorax, pulmonary haemorrhage, necrotising enterocolitis (NEC) between the two groups of babies. OB babies had a higher incidence of sepsis of 93% compared to IB of 84% (p = 0.000).



#### Fig. 11 Survival in birthweight categories in VLBW babies – IB versus OB, 2006

Table 10b - Survival (%) according to Inborn or Outborn status, 2004-2006

Year	ELBW			1001-1500g			VLBW		
	IB(%)	OB(%)	IB&OB	IB(%)	OB(%)	IB&OB(%)	IB(%)	OB(%)	IB&OB(%)
2004	39.6	50.9	41.5	85.1	84.0	84.9	69.4	73.6	70.2
2005	44.6	49.4	45.2	86.3	82.3	85.6	71.9	72.6	72.0
2006	46.1	50.0	46.5	86.7	82.9	86.2	73.2	72.5	73.1
2006*	59.0	54.5	58.3	86.7	82.9	86.2	79.6	74.9	78.9

\*Survival % for 2006 EXCLUDING birthweight categories <500g, 501-600, 601 to 700g

#### 3.5.2 Place of birth

NICUs are generally placed in general hospitals, university hospitals and some district hospitals with specialist. Some private hospitals also provided neonatal intensive care to sick babies either in a separate NICU or as part of a general ICU. In both the 2004 and 2005 studies however none of the private hospitals or university hospitals participated, but in 2006 Hospital Universiti Sains Malaysia joined the MNNR. Some babies who had been delivered in private hospitals however had been transferred to NICUs in the participating hospitals. Place of birth according to gestation and birthweight groups are as shown in Tables 9 and 9a. As most babies were inborn, the place of birth reflected the nature of NICUs participating in the study. Hence 60% were delivered in general hospitals and 24% in district hospitals with specialists.



Fig. 12. Mode of delivery vs. gestational age

The overall spontaneous vertex delivery rate was 52.0% (5398/10387) and Caesarean section rate 41.9% (4400/10387). For very preterm (<32 weeks) babies the Caesarean section rate was 38.8% (1225/3153) (Table 12). The Caesarean section rate for VLBW babies in the MNNR is 44%, low compared to that of other neonatal networks such as the Vermont Oxford Network which has a VLBW Caesarean section rate of 69%. The Caesarean section rate is the lowest in babies below 27 weeks gestation which may be a reflection of the less aggressive intrapartum management of the extremely preterm babies (Fig. 12). One other possible reason is the late arrival of mothers with poor or no antenatal care to the hospital.

#### 3.6 Condition of VLBW babies (BW <1500gm)

A 'clinical risk index for babies' (CRIB) score was performed based on six variables, derived from routine data recorded within 12 hours of birth. These variables have been found to be independently associated with hospital deaths. (Appendix 3 CRF) and the score may be used as a tool for assessing initial risk and comparing performance of neonatal intensive care units.

The mean CRIB score of babies with BW < 1500gm in 2004-2006 cohorts was 4 +/- 4 and of overall survival was 72% in 2004, 74% in 2005 and 77% in 2006.

There was a strong correlation of CRIB score with mortality rates in all three years. (Fig 13). However centre comparison in CRIB score and performance shows some variation in outcomes among centres with similar scores (Table 13a). Overall, for each centre, there is an increase in survival for the same mean CRIB score over the three years.



#### 3.7 Need for Ventilatory Support (VS)

All newborn babies admitted to NICUs with a gestation of < 32 weeks at birth were included in this study. Of these 2,553/3,153 (81%) received ventilatory support which included Continuous Positive Airway Pressure (CPAP), Intermittent Mandatory Ventilation (IMV), IMV + Patient-Trigger Ventilation (PTV), High Frequency Positive Pressure Ventilation (HPPV), High Frequency Oscillatory Ventilation (HFOV) and Nitric Oxide (NO) as a single modality or in combination. More mature babies were included only if they needed VS or they had died. For these babies (32 weeks and above) the VS rate was 6,011/7,234 (83.1%) (Table 14).

The overall VS support rate was 82.4% (8564/10387).

CPAP alone as a mode of ventilatory support was given to 1,675 (16.1%) of the babies, highest rate of use (about 23%) being among babies in gestational age group of 32-36 weeks and BW group of 1501-2500 grams (Tables 15 and 15a). Another 2,433 of the total 10,387 (23.4%) babies was supported with CPAP in combination of other VS modes, most commonly IMV.

HFOV is a specialized form of mechanical ventilation given at 8-15 hertz per second, in contrast to conventional IPPV which is given at about one breath or less per second.

Figure 14 shows the usage of IMV, CPAP, HFOV, NO and PTV in all babies for the year 2006. Figure 15 shows the proportions in percentage of the same over the years 2004, 2005 and 2006. Usage according to gestational age and BW groups are as shown in Tables 15,15a, 16, 16a, 17, 17a, 18 and 18a.


Fig. 15 Modes of ventilatory support 2004-2006



Ventilatory support including CPAP only, was given to about 80% of babies between 501-1000 grams over the three years and only offered to 14% of babies of or below 500 grams birthweight. In 2006, only 72% of larger babies (1001-1500 grams birthweight) required some form of ventilatory support (Fig. 16). The total percentage of babies on CPAP alone increased marginally from 18-20% of total babies on respiratory support, with the largest increase in the 32-36 weeks gestational age group and 1001-2500 grams birth weight groups (Tables 15 and 15a).



In all three years, 70% of ventilated babies were more than 32 weeks gestation and birth weight of more than 1500 grams (Tables 14 & 14a, Fig 17).



Fig. 17. Ventilatory support according to gestational age

## 3.8 Morbidity

There is a high rate of morbidity amongst babies admitted to a level III NICU. These are principally associated with preterm births and complications arising in term babies necessitating ventilatory support.

The criteria for entry into study have selected those babies most at-risk of morbidity and mortality. The outcomes reported are those identifiable while the baby is in hospital, and many of these outcomes have also been shown to be predictors of later morbidity.

## 3.8.1 Specific conditions in relation to respiratory morbidity

#### **3.8.1.1 Respiratory distress**

The adaptation to life outside the uterus can cause problems for both preterm and term babies. Respiratory distress is a major cause of morbidity and accounts for a large proportion of the use of resources in these sick babies.

For preterm babies who survived, the duration of ventilatory support increased with decreasing gestational age. Duration of VS for term survivors however was slightly longer on average (Mean of 5+/- 9 days) compared to borderline preterm babies of 32-36 weeks gestation. (Mean of 4+/- 6 days) who survived (Table 19).

For very low birth weight babies who survived, the duration of ventilator support was highest in the birth weight group of 501-1000 grams. The duration was surprisingly low in the survivors below 500 grams birth weight and this might have been due to their being small of gestational age (Fig. 18).



# Fig. 18 Mean duration of ventilatory support for survivors according to birth weight

# 3.8.1.2 Respiratory distress syndrome & exogenous surfactant

Respiratory distress syndrome (RDS) was the predominant respiratory diagnosis for babies in this study, being present in 4,567 out 10,387 (44%), out of whom 4,226/4,567 (92.5%) in the year 2006 needed ventilatory support (Table 41, Figs. 19,20). Ventilatory support includes the use of continuous positive pressure ventilation (CPAP) only as well as CPAP with other modes of ventilation.

71.8% of babies of birth weight  $\leq$  1500 grams had RDS, out of which 88.8% (2280/2565) and 12.4% (317/2565) of these babies with RDS received ventilatory support and CPAP only respectively. (Tables 59a and 59b)

Seventy-nine percent of babies with gestation < 32 weeks had RDS, of which 91.1% (2,269/2,492) and 11.6% (288/2,492) of these babies with RDS received ventilatory support and CPAP only respectively. (Table 60a and 60b)



Fig.19 Respiratory distress syndrome 2004-2006



Exogenous surfactant is a treatment primarily for RDS and is given soon after birth via the endotracheal tube. Its efficacy was confirmed by a systematic review (Soll, 2003) and this treatment in the Malaysian Clinical Practice Guideline (CPG) is recommended for babies who are ventilated for RDS. In this study, of the 4,226 babies in 2006 who had RDS and required ventilatory support, 2,386 (56.5%) were treated with surfactant (Table 41, Figs. 19, 20).

Other than in the birthweight group 501-1000 grams, less than 50% of the babies with RDS received surfactant within 2 hours of life. There was, however, an increasing trend in the percentage of babies who received surfactant early comparing 2005 and 2006 results (Figs.21 & 22). Exogenous surfactant has been shown to be more efficacious the earlier the delivery after birth<sup>1</sup>. This is one area which can be reviewed to reduce respiratory morbidity.





# 3.8.1.3 Chronic lung disease

Chronic lung disease in this study was captured as supplemental oxygen at Day 28 and also again at 36 weeks corrected age. Among ELBWs, the rates of supplemental oxygen use at Day 28 and 36 weeks corrected gestation were 18.9% and 5.5% respectively, a drop from 46.2% and 18.3% respectively in 2004. The rates among babies with birthweights 1001-1500 grams were 7.0% and 2.3% at Day 28 and 36 weeks respectively. (Table 39 and 39a)

Postnatal steroid for chronic lung disease was given to 10.6% of those with birthweights  $\leq$ 1000g and 4.0% of those with birthweights 1001 -1500g. There is a trend towards administering postnatal steroid for chronic lung disease (CLD) based on supplemental use of oxygen at Day 28 of life. (Table 22)

The effect of postnatal corticosteroids on the combined outcome of death or CP varies with the level of risk for CLD. With risks for CLD below 35%, corticosteroid treatment significantly increased the chance of death or CP, whereas with risks for CLD exceeding 65%, it reduced this chance<sup>2</sup>. On the basis of limited short term benefits, the absence of long term benefits, and the number of serious short and long term complications, The American Academy of Paediatrics and the Canadian Pediatric Society published a joint statement in 2002 and updated in February 2008, that the routine use of systemic dexamethasone for the prevention or treatment of CLD in infants with VLBW is not recommended. Outside the context of a randomized controlled trial, the use of corticosteroids should be limited to exceptional clinical circumstances (e.g., an infant on maximal ventilatory and oxygen support)<sup>3</sup>.

The use of postnatal steroids at the lowest possible dose, if at all, is recommended only for ventilator dependent babies on high settings where its benefit outweighs the risk of poorer central nervous system (CNS) outcome and other adverse effects of dexamethasone.

## 3.8.1.4 Congenital pneumonia (C Pneu)

There were 2,038 babies with congenital pneumonia of which 246 (12.1%) died (Figure 23). Twenty-six percent of babies with birthweight of more than 2500 grams were ventilated for congenital pneumonia. (Table 33a)

#### 3.8.1.5 Meconium aspiration syndrome (MAS)

There were 786 babies with MAS, 139 (17.7%) died (figure 23). Twenty percent of babies >2500 gm birth weight were ventilated for MAS.

## 3.8.1.6 Pneumothorax (PTX)

Of the 10,387 infants admitted to the NICUs in the network, 505 (4.9%) of them developed pneumothorax. All birthweight groups were affected with 42% of the affected infants being big infants of birthweight >2500g. More than 55% of infants affected were preterm. Mortality was high as 45.1% of the infants died (Fig. 18). In fact, the more preterm the infants, the higher the mortality. When compared with infants without pneumothorax, significantly higher proportions of infants with pneumothorax had meconium aspiration and were on ventilatory support. *The large number of infants with this preventable condition in the network warrants further attention to find ways to minimize this problem. Ventilatory strategies should be reviewed to look into ways to reduce this problem. Prevention strategies towards meconium aspiration syndrome should also be looked into.* 

## 3.8.2 Hypoxic ischaemic encephalopathy (HIE)

Nine-hundred and sixty-four (9.3%) babies were reported to have HIE, compared with 5% of infants in the Vermont Oxford Network 2004. Majority (81.8%) of them were inborns. The proportion of babies with HIE was less than 10% in all ethnic groups, ranging from 9.9% among the Malays, 8.2% among the Chinese, 7.2% among the Indians, 4.9% among the Orang Asli, 7.8% among the Bumiputra Sabah and 8.2% among the Bumiputra Sarawak.

Majority (80.4%) of babies admitted with HIE weighed more than 2500g. In heavier babies weighing more than 4500 grams, more than 25% were admitted because of HIE.

Of the 964 babies with HIE, 69.4% had mild or moderate HIE and 30.6% had severe HIE (Fig. 23). Severe HIE was more common among the outborns (44.6%) than the in-born infants (27.5%) with HIE. Mortality was highest among babies with severe HIE, as 70.2% of them died when compared with 10.7% of babies with mild to moderate HIE. When compared with inborns with HIE, the mortality rate of outborn was higher (inborn 23.2 % versus outborn 40%).

# 3.8.3 Neonatal encephalopathy (NE)

A smaller number of babies (147) had NE of 'non-HIE aetiology' and mortalilty in this group was 38.8% (Figure 23).



# 3.8.4 Intraventricular haemorrhage

Ultrasound imaging of the head of very preterm babies is performed to detect both intraventricular haemorrhage (IVH) and the formation of cysts and ventricular dilatation (hydrocephalus). An initial ultrasound is generally performed during the first week of life to detect signs of IVH. These IVHs are graded according to an internationally recognized method<sup>4</sup>. Grade 1 and 2 are milder grades and generally do not affect outcome adversely while Grade 3 and 4 are not only associated with early morbidity and mortality but are also markers of possible later disability.

Of the 3,536 babies with BW 501-1500 grams, 2,410 (68.2 %) had CUS. This means a slight increase from the two previous years (60% and 67.4% for 2004 and 2005 respectively), but it is still quite far from the targeted CUS for all babies in this weight category (Vermont Oxford network achieved 91%). The rates of cerebral ultrasound scanning for various birthweight groups in the MNNR in 2006 are shown in Table 26.

Among the babies in this birth weight group who underwent cerebral ultrasound scanning (CUS), 292 (12.1% versus 9% in the Vermont Oxford network) had Grade 3 or 4 IVH. The combined mortality rate from Grade 3 and 4 IVH was 54.8% (Table 33). In 2005, IVH grade 3 and 4 were equally common (12.1 %) but the mortality rate for this group of babies was higher (60.3%). In figure 24, the numbers of babies with grade 1 to grade 4 IVH are compared between 2006 and the two previous years.





Of all babies receiving ultrasound examination, grade 4 was found in 5.2% in 2006 (compared to 4.1% in 2004 and 4.0% in 2005). This slightly higher percentage of grade 4 IVH may reflect a higher proportion of the small ELBW receiving active intervention.

Figures 25 and 26 show the higher incidence of IVH in babies less than or equal to 1000gm birth weight. There is a downward trend in the percentage of babies screened with grade II IVH, over the three years. There is not much change in the percentage of higher grades of IVH amongst the babies who had ultrasound screening for IVH. In 2006, 10% of the ELBW babies and 3% of the babies of birthweight of between 1001-1500 grams had grade IV IVH.

Further reduction of Grade III and Grade IV IVH is still possible with enhanced neonatal services.





# 3.8.5 Eye examinations for retinopathy of prematurity

Eyes of very preterm babies are examined to monitor vascularisation which, if disrupted, can result in retinopathy of prematurity (ROP). The staging criteria for ROP were set by the International Committee for the classification of ROP (1984). Threshold disease i.e. Stage III plus or Stage IV usually necessitates laser or cryotherapy to preserve vision. Criteria that are being used for ROP screening in Malaysia are that babies with gestation < 32 weeks or birth weights of <1500 g should be screened. Other babies out of these BW and gestation criteria are also screened if a significant risk is perceived by the doctors taking care of these babies. The first screening is generally recommended at 4-6 weeks of life.

This audit did not study the exact time of the screening for the survivors who satisfy the criteria for screening. However, among the babies who survived, 1,716 out of 2,280 (75.3%) very preterm infants < 32 weeks, and 1,961 out of 2,621 (74.8%) babies of BW < 1501 grams had ROP screening. The rate of ROP screening for various gestation and BW groups are as shown in Tables 25 and 25a.

Some very preterm or VLBW babies have been discharged early without an ROP screening. *The percentage of babies <32 weeks gestational age, who were not screened before discharge has been increasing over the past years (Figure 27).* These babies were likely to be screened on an out-patient basis but this information was not captured in this study.

Sixty-three infants (5%) of babies with BW 501-1000 grams and 34 (1.4%) of those with birthweight between 1000-1500 grams developed Grade 3, 4 or 5 ROP (Table 33a).



# Fig. 27 Percentage of survivors less than 32 weeks GA screened for ROP (2004-2006)

# 3.8.6 Necrotising enterocolitis

Necrotising enterocolitis (NEC) is a disease, usually of the preterm baby which affects the intestines. It is associated with high morbidity and mortality in preterm babies and occasionally in term babies. It is generally associated with factors such as low gestational age, hypoxic events and infections.

An overall NEC rate of 4.1 + 0.8 % was recorded. Extremely low birthweight (ELBW) infants had the highest incidence (8.5+1.2% i.e. 9.8%) of NEC (Table 33). Necrotising enterocolitis requiring surgical intervention occurred in 1% in each birthweight category with an incidence of 0.01% in VLBW babies. With a mortality rate of 45% in babies with NEC, this is one area for improvement which can be further looked at.

## 3.9 Congenital anomalies

All infants with significant congenital anomalies were included in the study. For the 2006 cohort, 18.5% (1922/10387) of infants had congenital anomalies. The incidence of congenital anomaly is 185/1,000 births. Of this, 28.1% (540/1922) was syndromic diagnoses. There was a total of 1,382 patients with non-syndromic anomalies (isolated or multiple congenital anomalies). Some babies may have more than one congenital anomaly (Table 33a).

The number of babies with syndrome as diagnosis were as follows: 210 (10.9%) Down syndrome, 120 (6.2%) Edward syndrome, 54 (2.8%) Patau syndrome and 156 (8.1%) other syndromes. Based on this figures, the incidence of Down syndrome was 0.9/1,000 livebirths, Edward syndrome was 0.5/1000 livebirths and Patau syndrome was 0.23/1,000 livebirths.

The most common organ system affected was cardiovascular system (547 cases), followed by cleft lip and palate (276 cases), GIT anomalies (228), CNS anomalies (non-neural tube defects) (187) and neural tube defects (176). Amongst the congenital heart disease, 247 (45%) and 320 (55%) were cyanotic and acyanotic lesions, respectively. The incidence of CVS anomaly is 2.3/1,000 livebirths. Amongst the clefts, there were cleft lip (39), cleft palate

(67) and cleft lip and palate (170). The incidence of cleft anomaly is 1.2/1,000 livebirths. For neural tube defects, there were 36 patients with spina bifida, 83 with anencephaly and 57 with other NTDs. The incidence of NTDs is 0.74/1,000 livebirths. See Table 33b.

Amongst infants with congenital anomalies, the mortality rate was 57.8% (190/329). Data from bigger infants are not available. For infants between 501-1000 grams, the mortality rate was 74% (60/81) while for infants from 1001-1500 grams, it was 52.4% (130/248).

The total number of infants with inborn errors of metabolism was 105, giving an incidence of 1 per 1,000 births. Of this 105, 81 (76%) were clinical diagnosis while the remaining 24% were confirmed diagnosis (Table 33c).

# 3.10 Neonatal infections

## 3.10.1 Classification:

Neonatal infections are classified into the following categories:

- 1. Presumed sepsis antibiotics given in the presence of obstetric risk factors but no clinical signs of infection and investigations subsequently ruled out infection,
- 2. Clinical sepsis clinical signs of infection present but no organism identified,
- 3. Confirmed sepsis clinical evidence of sepsis plus culture-proven infection (including positive bacterial antigen test).



#### Fig. 28 Categories of Infection

Fifty-eight percent (58.2%) of the babies had presumed infection, 16.3% had clinical sepsis and only 10.4% had confirmed sepsis (Fig. 28). The presumed sepsis group is high because it includes situations where there are maternal risk factors like pyrexia and prolonged rupture of membranes. This reflects an important workload on the nurseries, and different centres have different criteria and guidelines for dealing with this situation.

Overall, 11% of all babies have one or more episodes of confirmed bacterial sepsis.

Among babies who had one or more episode of confirmed bacterial sepsis, the mortality was 26.9% in contrast to a mortality rate of 19.6% in babies who did not have confirmed bacterial sepsis(p<0.001).

# 3.10.2. Infection Rates

Each infant might have more than 1 type of infection and also >1 episode of a specific infection i.e. infections in various categories are not mutually exclusive. The number of episodes of each specific infection was not captured in this study, e.g. if a baby had two episodes of infections due to *coagulase negative staphylococcus* (CoNs) it will be recorded as one infection while an episode of infection caused by *Klebsiella* sp and an episode caused by CONS will be recorded as two infections.



Fig. 29 Infection Rate according to Gestation

The overall infection rate is 11%, with the highest of 21% being in the gestation group of 25-27 weeks, followed by 15% in the 28-31 weeks group.



Fig. 30 Infection Rate according to Birthweight

The infection rate is highest (21%) in the 501-1000 grams weight group followed by 14% in the 1001-1500 grams group, similar with the findings in the gestation grouping.

## 3.10.3 Types of infecting organism



Fig. 31 Types of Infecting Organisms

A total of 1,189 babies had at least one episode of confirmed sepsis. This is in comparison with 1,024 in 2005 (the total cohort in the MNNR increased proportionately from 9,023 in 2005 to 10,387 in 2006).

The commonest infection organism is staphylococcus, with 16.1% being MRSA (methicillin resistant staph aureus) and 17.5% being CONS (coagulase negative staph).

These percentages were 12.6% and 17.7% respectively in 2005, showing an increase in the percentage of MRSA infections.

Group B Streptococcal infections increased in percentage from 6.5% in 2005 to 9.8% in 2006. However extended spectrum beta-lactamase (ESBL) organisms decreased from 14.0% in 2005 to 6.6% in 2006. This may be due to the impact of systematic prescribing policies.

Fungal sepsis increased slightly from 5.3% in 2005 and 6.6% in 2006. This could be due to an increased placement of central IV lines.

## 3.11 Outcome

## 3.11.1 Survival according to birthweight and gestational age

The overall survival at discharge of this high risk group of babies was 8,271 survivors out of 10,387 i.e. 80% compared to a survival rate of 78% and 77% in 2005 and 2004 respectively (Table 29 and 29a). Survival is dependent on many factors including gestational age and birthweight. Three babies of BW < 500 grams survived. Two-hundred and thirty-two out of 1,137 (20%) babies of birthweight below 1000 grams and 3% (43 out of 2399) of babies between 1001-1500 grams died within 48 hours of life. For outborn babies, mortality was attributed to the referring unit if the baby died within the first 24 hours of life.

There was marked difference in survival for babies with birthweight below or above 700 grams i.e. from 22% survival rate at 610-700 grams birthweight group to 43% survival at 701-800 grams birthweight (Fig. 32). This may be a reflection of the NICU policies in terms of conservative management in the lower birthweight group. Over the last two years, there is a 10% increase in survival rate for the 701-800 grams birthweight group.



Fig. 32 Survival according to birthweight category and year

Less than half (45%) of babies of 26 weeks' gestation survived whilst survival was better at 61% for 27 weeks gestation (Fig. 33). Survival of babies up to 31 weeks and up to 1500 grams improved progressively with increasing gestation and birthweight. The survival rates of babies in the Australian New Zealand Network were about 75-85% for babies of 26 weeks gestational age and over 95% for babies above 29 weeks gestation. Thus, better survival rates are possible as neonatal care services advance.

Babies who were 32 weeks and above and babies of BW > 1500 grams were entered into the study only if they had required ventilatory support or had died, hence the survival appeared lower in these more mature and bigger babies (Fig. 33).



Fig. 33 Survival according to gestational age and year

#### 3.11.2 Survival rate according to centres

#### 3.11.2.1 Survival rate of babies of birth weight between 1001-1500 grams

The survival rate of babies with birthweight of between 1001-1500 grams in 19 out of 30 centres was above 85%, the key performance index for level III NICU's. The variation in survival rate varies across centres, varying from 74-92% (Fig. 34 – the spokes of the 'wheel' refer to the centre number). The survival rate figure may be affected by:

- variation in antenatal factors, higher risk babies, human resources, facilities and workload
- referral patterns as the death is attributed to the referral hospital if the baby dies after 24 hours of life
- the total number of babies admitted to the SDP centres e.g. Centre 31 which joined the study towards the end of the year with only two patients with 100% survival rate (Fig. 35)
- the number of lethal congenital anomalies. Fig 36 shows the shift in the survival rate amongst referral/state hospital NICU's when babies who died in the first 24 hours of life with congenital anomalies were excluded.

Some of these factors may explain the lack of difference in survival rate between the referral hospitals and the smaller hospitals.



# Fig. 34 Survival rate of preterm babies BWt 1001-1500 gm









#### 3.11.2.2 Survival of babies of birthweight 501-1000 grams

The survival rate of babies with birthweight of between 501-1000 grams varied from 31-65% (Fig. 37). The study group includes the group of preterm infants who died shortly after delivery and were never admitted into the NICU and this should be taken into account. Reasons given earlier for the larger VLBW infants may apply for the variation in survival rate in this group of babies. In addition, the individual NICU policy regarding aggressive or conservative management in these babies may have affected the final outcome. Fig. 38 shows the relative distribution of babies in this birthweight category and the number of survivors.









# 3.12 Perinatal and neonatal mortality rates

These are important indicators of both obstetric and neonatal outcomes. The births are obtained by records of all births in the hospitals of each neonatal unit and the mortality rates are calculated pertaining to that for inborn babies only.

Perinatal mortality rate =	
No stillbirths + neonatal deaths < 7 days (BW 500 grams an	d above
or gestation 22 weeks and above	x 1000 TBs
No total births (TBs)	
Early Neonatal mortality rate	
No neonatal deaths < 7 days (BW 500gm and above	
or gestation 22 weeks and above	x 1000 LBs
No live births (LBs)	
Neonatal mortality rate	
No neonatal deaths < 28 days (BW 500gm and above	
or gestation 22 weeks and above	x 1000 LBs
No live births (LBs)	

The birth census in Appendix 2 shows the number of total births and stillbirths, and the number of neonatal deaths in all the centres can be obtained from the study. The 2006 perinatal, early neonatal and neonatal mortality rates were calculated to be 14.1 per 1000 TBs, 5.2 and 6.6 per 1000 LBs respectively for our SDP group.

## Total births and neonatal deaths and mortality rates, 2006

Total Births	239,740
No Stillbirths	2,226
No Livebirths	237,514
Inborn deaths <7 days (early neonatal deaths)	1,236
Inborn deaths < 28 days (neonatal deaths)	1,557
Stillbirth rate	9.2 per 1,000 TBs
Perinatal mortality rate (PMR)	14.4 per 1,000 TBs
Early neonatal mortality rate (Early NMR)	5.2 per 1,000LBs
Neonatal mortality rate (NMR)	6.6 per 1,000 LBs

These rates are high when compared to the overall national figures which were 10.0 for PMR, 3.9 for Early NMR and 4.9 for NMR. (Health Management and Information System (HMIS) Ministry of Health 2002 data). This was expected as these NICUs are tertiary centres handling high risk pregnancies and sick babies.

#### 3.13 Discharge

Babies are usually discharged straight home from the participating NICUs in the hospital. Some may have been discharged from a paediatric ward following extended care after NICU stay (e.g. babies with prolonged oxygen requirement) or rarely transferred elsewhere.

The duration of hospital stay is dependent on many factors especially gestational age and birthweight and whether babies survived.

For survivors the mean duration of hospital stay according to gestation and birthweight groups are as shown in Tables 57 and 57a-e. The overall duration of stay was 26 +/- 27 days and stay was progressively shorter with higher birthweight and gestational age groups. (Figs. 16 & 17). The shorter stay of babies 500 grams birthweight or below is related to their lower survival rate.



# Fig. 16 Duration of hospital stay for survivors according to gestational age





## 4.0 Study Recommendations

- 1. Antenatal care (to work with Public health and Obstetrics staff)
  - a. Review measures to enhance antenatal care of mothers of Orang Asli, Bumiputra Sarawak and Bumiputra Sabah ethnicities
  - b. Close monitoring of foetal growth
- 2. Perinatal care (to work with Obstetrics staff)
  - a. Enhance the use of antenatal steroids for mothers at risk of preterm birth in centres with present low rates
  - b. Continue the in-utero transfer for deliveries at risk of preterm birth and HIE as well as babies with poor intrauterine growth to referral centres
- 3. Postnatal care
  - a. Aim for earlier surfactant administration for preterm babies with respiratory distress syndrome
  - b. Review ventilator strategies to reduce the incidence of pneumothorax
  - c. Enhance the use of CPAP as immediate respiratory support option or earlier extubation to CPAP
  - d. Review the use of postnatal steroid use such as to limit its use to those with high ventilator settings
  - e. Monitor the ROP screening of babies in each centre who fulfil the criteria. For subsequent years, the ROP screening as outpatient will also be monitored by the MNNR
  - f. Continuously improve infection control measures

# 5.0 Tables

Centres	No of babies	s admitted to t unit	he Neonatal	No of babi	es included ir	in the study		
	2004	2005	2006	2004	2005	2006		
1	45557	54671	61758	7350	9023	10387		
2	2923	3069	3151	452	509	566		
3	941	1620	2788	369	446	494		
4	1020	1539	1357	252	248	265		
5	1251	1463	1505	402	481	633		
6	2135	2553	2674	343	349	438		
7	5074	4657	4488	674	671	862		
8	3566	4373	4458	403	463	548		
9	3486	3862	3962	350	390	380		
10	1131	1913	2911	146	213	329		
11	2182	2327	2421	82	114	104		
12	2023	2402	2269	251	211	199		
13	1602	1572	1513	262	276	280		
14	887	841	852	163	157	106		
15	1187	1369	1232	208	183	241		
16	1266	1492	1727	384	368	413		
17	1469	1759	2199	312	433	368		
18	565	643	553	71	72	108		
19	812	827	851	270	295	364		
20	1993	1993	2370	228	218	309		
21	1535	1558	1351	139	162	119		
22	2477	3316	2705	372	428	437		
23	2597	2351	2509	714	665	627		
24	2543	2483	2240	312	386	456		
25	892	1408	1791	191	309	293		
26	NA	2638	2930	NA	784	779		
27	NA	468	571	NA	156	179		
28	NA	175	625	NA	36	84		
29	NA	NA	3187	NA	NA	266		
30	NA	NA	517	NA	NA	113		
31	NA	NA	51	NA	NA	27		

#### Table 1. Admissions to each NICU unit by year

Gestational age	All babies in	2004		2005		2006		
group (weeks)	study	No of cases	%	No of cases	%	No of cases	%	
<22	34	9	0	5	0	20	0	
22-24	531	168	2	173	2	190	2	
25-27	1818	601	8	607	7	610	6	
28-31	6193	1744	24	2116	23	2333	22	
32-36	8612	2328	32	2956	33	3328	32	
>=37	9572	2500	34	3166	35	3906	38	
Total	26760	7350	100	9023	100	10387	100	

Table 2. Case distribution according to gestational age group by year

Table 3. Case distribution according to birthweight group by year

Birthweight group	All babies	2004		2005		2006		
(Grams)	in study	No of cases	%	No of cases	%	No of cases	%	
<=500	120	38	1	32	0	50	0	
501-1000	3142	907	12	1098	12	1137	11	
1001-1500	6469	1846	25	2224	25	2399	23	
1501-2500	8604	2315	31	2899	32	3390	33	
>2500	8425	2244	31	2770	31	3411	33	
Total	26760	7350	100	9023	100	10387	100	

	All babies					<22					22-24							25-2	27		
Ethnic group	2004	2005	2006	20	04	20	05	20	06	200	)4	20	05	200	)6	200	04	200	)5	200	6
	No	No	No	No	%	No	%	No	%	No	%	No	%	No	%	No	%	No	%	No	%
Malay	4731	5850	6579	4	0	2	0	14	0	104	2	103	2	104	2	347	7	377	6	349	5
Chinese	778	1057	1108	2	0	0	0	0	0	22	3	28	3	31	3	77	10	92	9	86	8
Indian	643	683	761	0	0	1	0	1	0	16	2	16	2	13	2	66	10	44	6	51	7
Orang Asli	101	130	143	0	0	0	0	0	0	1	1	2	2	2	1	5	5	11	8	8	6
Bumiputra Sabah	296	385	527	2	1	1	0	2	0	8	3	6	2	12	2	26	9	27	7	38	7
Bumiputra Sarawak	327	463	577	1	0	0	0	0	0	8	2	9	2	11	2	31	9	37	8	39	7
Other	35	47	83	0	0	0	0	0	0	3	9	2	4	2	2	5	14	2	4	6	7
Foreigner	439	407	605	0	0	1	0	3	0	6	1	7	2	15	2	44	10	17	4	33	5
Total	7350	9022	10383	9	0	5	0	20	0	168	2	173	2	190	2	601	8	607	7	610	6

Table 4. Ethnicity according to gestational age group (weeks) by year

		28-31				32-26						37 and above						
Ethnic group	2004 20		200	2005 2006		06	2004		200	5	200	6	2004		2005		2006	
	No	%	No	%	No	%	No	%	No	%	No	%	No	%	No	%	No	%
Malay	1093	23	1320	23	1463	22	1471	31	1914	33	2101	32	1712	36	2134	36	2548	39
Chinese	215	28	265	25	253	23	252	32	334	32	353	32	210	27	338	32	385	35
Indian	155	24	147	22	145	19	223	35	246	36	270	35	183	28	229	34	281	37
Orang Asli	20	20	29	22	33	23	45	45	49	38	53	37	30	30	39	30	47	33
Bumiputra Sabah	78	26	92	24	128	24	95	32	114	30	163	31	87	29	145	38	184	35
Bumiputra Sarawak	88	27	152	33	169	29	111	34	155	33	182	32	88	27	110	24	176	31
Other	4	11	11	23	15	18	8	23	13	28	27	33	15	43	19	40	33	40
Foreigner	91	21	100	25	126	21	123	28	130	32	177	29	175	40	152	37	251	41
Total	1744	24	2116	23	2332	22	2328	32	2955	33	3326	32	2500	34	3166	35	3905	38

	All b	abies in s		E	3W 501-1	.000gn	า		BW 1001-1500gm						
Ethnic group	2004	2005	2006	200	4	200	5	200	6	200	4	200	5	200	6
	No	No	No	No	%	No	%	No	%	No	%	No	%	No	%
Malay	4731	5850	6579	561	12	677	12	688	10	1082	23	1373	23	1467	22
Chinese	778	1057	1108	99	13	155	15	147	13	217	28	265	25	253	23
Indian	643	683	761	112	17	101	15	89	12	180	28	168	25	176	23
Orang Asli	101	130	143	7	7	13	10	17	12	29	29	42	32	41	29
Bumiputra Sabah	296	385	527	39	13	42	11	63	12	102	34	107	28	140	27
Bumiputra Sarawak	327	463	577	41	13	62	13	59	10	117	36	153	33	171	30
Other	35	47	83	7	20	7	15	6	7	6	17	13	28	21	25
Foreigner	439	407	605	41	9	41	10	67	11	113	26	102	25	129	21
Total	7350	9022	10383	907	12	1098	12	1136	11	1846	25	2223	25	2398	23

Table 4a. Ethnicity according to birthweight group, by year

		B\	N 1501-2	500gm		BW > 2500gm							
Ethnic group	2004		2005		2006		200	4	200	5	2006		
	No	%	No	%	No	%	No	%	No	%	No	%	
Malay	1528	32	1877	32	2153	33	1538	33	1899	32	2244	34	
Chinese	253	33	340	32	336	30	206	26	295	28	362	33	
Indian	190	30	219	32	255	34	154	24	191	28	235	31	
Orang Asli	45	45	50	38	51	36	19	19	25	19	34	24	
Bumiputra Sabah	80	27	117	30	160	30	74	25	118	31	158	30	
Bumiputra Sarawak	87	27	161	35	210	36	80	24	86	19	137	24	
Other	10	29	11	23	28	34	12	34	16	34	27	33	
Foreigner	122	28	124	30	195	32	161	37	140	34	214	35	
Total	2315	31	2899	32	3388	33	2244	31	2770	31	3411	33	

Costational aga	۵	hahies in st	udv	Antenatal steroid given								
group (weeks)		babies in se	uuy	2004	4	200	5	200	6			
8, (,	2004	2005	2006	No	%	No	%	No	%			
<22	9	5	20	0	0	0	0	1	5			
22-24	168	173	190	48	29	52	30	61	32			
25-27	601	607	610	354	59	320	53	337	55			
28-31	1744	2116	2333	1117	64	1273	60	1434	61			
<32	2522	2901	3153	1519	60	1645	57	1833	58			
32-33	1107	1376	1527	700	63	765	56	888	58			
<34	3629	4277	4680	2219	61	2410	56	2721	58			
>=34	3721	4746	5707	462	12	599	13	648	11			
Total	7350	9023	10387	2681	36	3009	33	3369	32			

Table 5. Use of antenatal steroid according to gestational age group, by year

#### Table 6. Mean maternal age according to gestational age group, by year

Gestational		2004			2005		2006				
age group (weeks)	No of cases	Mean maternal age	SD	No of cases	Mean maternal age	SD	No of cases	Mean maternal age	SD		
<22	9	28	5	5	27	8	20	30	6		
22-24	168	30	7	173	29	6	190	29	6		
25-27	601	29	6	606	29	7	610	29	7		
28-31	1744	29	7	2113	30	7	2333	29	7		
32-36	2328	30	7	2946	30	7	3328	29	7		
>=37	2500	31	6	3155	31	6	3906	30	6		
Total	7350	30	7	8998	30	7	10387	29	7		

#### Table 6a. Mean maternal age according to birthweight group, by year

Birthweight		2004			2005		2006				
group (grams)	No of cases	Mean maternal age	SD	No of cases	Mean maternal age	SD	No of cases	Mean maternal age	SD		
<=500	38	30	6	32	29	6	50	30	6		
501-1000	907	29	6	1098	30	7	1137	29	7		
1001-1500	1846	29	7	2214	30	7	2399	29	7		
1501-2500	2315	30	7	2893	30	7	3390	29	7		
>2500	2244	31	6	2761	31	6	3411	30	6		
Total	7350	30	7	8998	30	7	10387	29	7		

Gestational	All babies in study		study			SG	A					AG	4					LG	iΑ		
age group (weeks)				200	)4	200	)5	200	06	200	)4	200	5	200	6	200	)4	20	05	200	J6
(,	2004	2005	2006	No	%	No	%	No	%	No	%										
<22	9	5	20	2	22	1	20	4	20	7	78	3	60	14	70	0	0	1	20	2	10
22-24	168	173	190	40	24	31	18	53	28	126	75	141	82	130	68	2	1	1	1	7	4
25-27	601	607	610	95	16	104	17	107	18	501	83	493	81	470	77	5	1	10	2	33	5
28-31	1744	2116	2333	239	14	373	18	412	18	1456	83	1681	79	1803	77	49	3	61	3	118	5
32-36	2328	2956	3328	539	23	744	25	1062	32	1740	75	2153	73	2140	64	49	2	59	2	126	4
>=37	2500	3166	3906	362	14	494	16	962	25	1989	80	2461	78	2746	70	149	6	210	7	198	5
Total	7350	9023	10387	1277	17	1747	19	2600	25	5819	79	6932	77	7303	70	254	3	342	4	484	5

Table 7. Growth status according to gestational age group, by year

SGA: Small for gestational age

AGA: Appropriate for gestational age

LGA: Large for gestational age

	Birthweight All Babies in study					SG	Δ					AG	Δ					IG	Δ		
Birthweight group	All B	abies in	study	200	4	200	5	200	6	200	4	200	5	200	06	200	)4	200	)5	200	)6
(grams)	2004	2005	2006	No	%	No	%	No	%	No	%										
<=500	38	32	50	25	66	19	59	34	68	12	32	12	38	16	32	1	3	1	3	0	0
501-1000	907	1098	1137	283	31	370	34	405	36	622	69	723	66	723	64	2	0	5	0	9	1
1001-1500	1846	2224	2399	479	26	709	32	866	36	1361	74	1500	67	1492	62	6	0	14	1	41	2
1501-2500	2315	2899	3390	461	20	597	21	1037	31	1800	78	2239	77	2221	66	54	2	63	2	132	4
>2500	2244	2770	3411	29	1	52	2	258	8	2024	90	2458	89	2851	84	191	9	259	9	302	9
Total	7350	9023	10387	1277	17	1747	19	2600	25	5819	79	6932	77	7303	70	254	3	342	4	484	5

Table 7a. Growth status according to birthweight group, by year

Gestational	All babies in study					Ма	le					Fem	nale				In	deter	mina	ıte	
age group	All	bables in	i study	200	)4	200	)5	200	)6	200	)4	200	)5	200	6	200	)4	200	)5	200	)6
(weeks)	2004	2005	2006	No	%	No	%	No	%	No	%	No	%								
<22	9	5	20	4	44	4	80	12	60	5	56	1	20	8	40	0	0	0	0	0	0
22-24	168	173	190	91	54	109	63	113	59	77	46	63	36	77	41	0	0	1	1	0	0
25-27	601	607	610	327	54	331	55	345	57	271	45	275	45	261	43	3	0	1	0	4	1
28-31	1744	2116	2333	985	56	1183	56	1292	55	754	43	926	44	1035	44	5	0	6	0	6	0
32-36	2328	2956	3328	1345	58	1666	56	1859	56	973	42	1277	43	1453	44	10	0	13	0	16	0
>=37	2500	3166	3906	1507	60	1948	62	2349	60	984	39	1206	38	1536	39	9	0	12	0	21	1
Total	7350	9023	10387	4259	58	5241	58	5970	57	3064	42	3748	42	4370	42	27	0	33	0	47	0

Table 8. Gender according to gestational age group, by year

Table 8a. Gender according to birthweight group, by year

Birthweight	All babies in study					Mal	е					Fem	ale				h	ndeter	mina	te	
group		ables in s	τυαγ	200	4	200	5	200	6	200	4	200	5	200	6	200	)4	200	)5	200	<b>J</b> 6
(grams)	2004	2005	2006	No	%	No	%	No	%	No	%	No	%								
<=500	38	32	50	11	29	14	44	22	44	26	68	18	56	27	54	1	3	0	0	1	2
501-1000	907	1098	1137	470	52	560	51	611	54	434	48	533	49	521	46	3	0	4	0	5	0
1001-1500	1846	2224	2399	1010	55	1144	51	1247	52	829	45	1072	48	1144	48	7	0	8	0	8	0
1501-2500	2315	2899	3390	1375	59	1737	60	1960	58	930	40	1146	40	1408	42	10	0	16	1	22	1
>2500	2244	2770	3411	1393	62	1786	64	2130	62	845	38	979	35	1270	37	6	0	5	0	11	0
Total	7350	9023	10387	4259	58	5241	58	5970	57	3064	42	3748	42	4370	42	27	0	33	0	47	0

Gestational		ahiaa in a			Un	iversity	Hosp	ital				General	Hospita	I	
age group		ables in s	ludy	200	4	200	)5	200	)6	200	)4	200	)5	200	6
(weeks)	2004	2005	2006	No	%	No	%	No	%	No	%	No	%	No	%
<22	9	5	20	0	0	0	0	0	0	7	78	2	40	16	80
22-24	168         173         190           601         602         612			5	3	6	3	2	1	108	64	110	64	125	66
25-27	601	607	610	12	2	7	1	26	4	370	62	387	64	362	59
28-31	1744	2116	2333	24	1	51	2	45	2	1103	63	1334	63	1483	64
32-36	2328	2956	3328	41	2	57	2	62	2	1436	62	1900	64	2013	60
>=37	2500	3166	3906	55	2	97	3	106	3	1459	58	1885	60	2275	58
Total	7350         9023         10387			137	2	218	2	241	2	4483	61	5618	62	6274	60

Table 9. Place of birth according to gestational age group, by year

Gestational		P	rivate H	lospit	tal		Dis	strict H	lospital v	with s	pecialist		Distri	ct Ho	spital w	/ithou	t specia	alist
age group	200	)4	200	)5	200	6	200	4	200	5	200	6	200	4	200	)5	200	6
(weeks)	No	%	No	%	No	%	No	%	No	%	No	%	No	%	No	%	No	%
<22	0	0	0	0	0	0	2	22	3	60	4	20	0	0	0	0	0	0
22-24	2	1	4	2	5	3	38	23	49	28	42	22	7	4	2	1	8	4
25-27	19	3	16	3	23	4	117	19	129	21	136	22	39	6	30	5	26	4
28-31	49	3	65	3	37	2	345	20	448	21	541	23	117	7	112	5	127	5
32-36	64	3	71	2	104	3	525	23	630	21	869	26	119	5	154	5	146	4
>=37	89	4	110	3	131	3	516	21	627	20	883	23	217	9	264	8	287	7
Total	223	3	266	3	300	3	1543	21	1886	21	2475	24	499	7	562	6	594	6

Gestational	Private Maternity Home								Hor	ne					Oth	ers		
age group	200	)4	200	)5	200	06	20	04	200	)5	20	06	20	04	20	05	20	06
(weeks)	No	%	No	%	No	%	No	%	No	%	No	%	No	%	No	%	No	%
<22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
22-24	0	0	1	1	1	1	6	4	0	0	3	2	2	1	1	1	4	2
25-27	9	1	2	0	4	1	17	3	22	4	24	4	18	3	14	2	9	1
28-31	15	1	16	1	9	0	47	3	52	2	48	2	44	3	38	2	42	2
32-36	55	2	54	2	37	1	57	2	41	1	51	2	31	1	48	2	45	1
>=37	91	4	114	4	122	3	46	2	40	1	54	1	27	1	29	1	48	1
Total	170	2	187	2	173	2	173	2	155	2	180	2	122	2	130	1	148	1

Birthweight	الم	hahid	as in ct	udv				Unive	ersity	Hos	spital					Gener	al Hos	oital		
group	AII	Dabit	5 111 51	uuy		20	04		200	)5		200	06	20	04		2005		200	6
(grams)	2004	2	005	200	6	No	%	6	No	%	6	No	%	No	%	No	<b>)</b>	6	No	%
<=500	38		32	50		0	0	)	1	(1)	3	0	0	29	76	25	5 7	8	35	70
501-1000	907	1	098	113	7	22	2	2	23	2	2	37	3	579	64	72	66	6	723	64
1001-1500	1846	2	224	239	9	28	2	2	43	2	2	53	2	1153	62	142	28 6	4	1506	63
1501-2500	2315	2	899	339	C	34	1	L	72	2	2	61	2	1426	62	178	89 6	2	2028	60
>2500	2244	2	770	341	1	53	2	2	79	(1)	3	90	3	1296	58	165	50 E	0	1982	58
Total	7350	9	023	1038	57	137	2	2 2	218	2	2 2	241	2	4483	61	561	.8 6	2	6274	60
Birthweight		Pr	ivate l	Hospi	tal			Di	strict	Hos	spital v	with s	specialis	st	Distri	ct Ho	spital v	vitho	ut speci	alist
group	200	4	20	05		2006		200	4		2005		200	06	200	4	20	05	20	006
(grams)	No	%	No	%	Ν	lo 9	6	No	%		No	%	No	%	No	%	No	%	No	%
<=500	1	3	0	0	C	) (	)	6	16		6	19	12	24	0	0	0	0	1	2
501-1000	23	3	31	3	3	2 3	3	190	21	2	231	21	257	23	42	5	30	3	49	4
1001-1500	42	2	60	3	4	1	2	366	20	4	151	20	549	23	122	7	135	6	117	5
1501-2500	62	3	68	2	8	7 3	3	522	23	6	534	22	868	26	134	6	179	6	188	6
>2500	95	4	107	4	14	40 4	1	459	20	5	564	20	789	23	201	9	218	8	239	7
Total	223	3	266	3	30	00 3	3	1543	21	1	886	21	2475	24	499	7	562	6	594	6
				•		•			•							•	•		•	•
Birthweight		Priv	ate Ma	atern	ity H	ome					Но	me					Oth	ers		
group	20	04		2005		20	06		2004		20	05	2	006	200	4	200	)5	20	06
(grams)	No	%	N	0	%	No	%	N	0	%	No	%	No	%	No	%	No	%	No	%
< F00	0	0	0		~ T	0	0	1		ſ	0	0	1	2	1	2	0	0	4	2

Table 9a. Place of birth according to birthweight group, by	v vear
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Birthweight		Privat	e Mate	rnity l	Home				Hor	ne					Oth	ers		
group	200	4	200	)5	20	06	200	4	200	5	200	)6	200	4	200	5	200	)6
(grams)	No	%	No	%	No	%	No	%	No	%	No	%	No	%	No	%	No	%
<=500	0	0	0	0	0	0	1	3	0	0	1	2	1	3	0	0	1	2
501-1000	11	1	5	0	4	0	18	2	32	3	24	2	22	2	20	2	11	1
1001-1500	19	1	14	1	11	0	71	4	50	2	71	3	45	2	42	2	50	2
1501-2500	51	2	60	2	58	2	54	2	53	2	50	1	32	1	44	2	49	1
>2500	89	4	108	4	100	3	29	1	20	1	34	1	22	1	24	1	37	1
Total	170	2	187	2	173	2	173	2	155	2	180	2	122	2	130	1	148	1

Gestational		abies in	ctudy			Inbo	rn					Outbo	orn		
age group		ables in	study	200	)4	20	05	200	6	200	4	200	5	200	6
(weeks)	2004	2005	2006	No	%	No	%	No	%	No	%	No	%	No	%
<22	9	5	20	9	100	5	100	19	95	0	0	0	0	1	5
22-24	168	173	190	151	90	161	93	170	89	17	10	12	7	20	11
25-27	601	607	610	473	79	495	82	517	85	128	21	112	18	93	15
28-31	1744	2116	2333	1424	82	1765	83	2013	86	320	18	351	17	320	14
32-36	2328	2956	3328	1883	81	2488	84	2835	85	445	19	468	16	493	15
>=37	2500	3166	3906	1879	75	2392	76	3029	78	621	25	774	24	877	22
Total	7350	9023	10387	5819	79	7306	81	8583	83	1531	21	1717	19	1804	17

 Table 10. Inborn-Outborn status according to gestational age group, by year

Table 10a. Inborn-Outborn status according to birthweight group, by year

Birthweight		ahies in	study			Inb	orn					Outbo	orn		
group			Study	200	)4	20	05	20	06	200	4	200	5	200	6
(grams)	2004	2005	2006	No	%	No	%	No	%	No	%	No	%	No	%
<=500	38	32	50	36	95	32	100	46	92	2	5	0	0	4	8
501-1000	907	1098	1137	750	83	942	86	983	86	157	17	156	14	154	14
1001-1500	1846	2224	2399	1502	81	1851	83	2059	86	344	19	373	17	340	14
1501-2500	2315	2899	3390	1856	80	2365	82	2829	83	459	20	534	18	561	17
>2500	2244	2770	3411	1675	75	2116	76	2666	78	569	25	654	24	745	22
Total	7350	9023	10387	5819	79	7306	81	8583	83	1531	21	1717	19	1804	17

Gestational	A11 H	ahias in	ctudy			Singlet	ons					Twi	ins		
age group		ables III	study	200	)4	20	05	200	6	20	04	200	)5	200	06
(weeks)	2004	2005	2006	No	%	No	%	No	%	No	%	No	%	No	%
<22	9	5	20	9	100	5	100	16	80	0	0	0	0	4	20
22-24	168	173	190	144	86	151	87	170	89	19	11	22	13	20	11
25-27	601	607	610	504	84	489	81	533	87	90	15	111	18	65	11
28-31	1744	2116	2333	1488	85	1829	86	2028	87	234	13	266	13	287	12
32-36	2328	2956	3328	2096	90	2667	90	2956	89	212	9	275	9	332	10
>=37	2500	3166	3906	2455	98	3102	98	3817	98	44	2	63	2	87	2
Total	7350	9023	10387	6696	91	8243	91	9520	92	599	8	737	8	795	8

Table II. Multiplicity of births according to gestational age group, by yea	Table 11. Multipli	city of births accordin	ng to gestationa	l age group,	by year
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			Trip	lets					Oth	ers		
Gestational age	20	04	20	05	20	D6	20	04	200	)5	200	06
group (weeks)	No	%	No	%	No	%	No	%	No	%	No	%
<22	0	0	0	0	0	0	0	0	0	0	0	0
22-24	5	3	0	0	0	0	0	0	0	0	0	0
25-27	7	1	7	1	7	1	0	0	0	0	5	1
28-31	22	1	20	1	18	1	0	0	1	0	0	0
32-36	19	1	12	0	39	1	1	0	1	0	0	0
>=37	1	0	0	0	0	0	0	0	1	0	1	0
Total	54	1	39	0	64	1	1	0	3	0	6	0

	A 11 H	ahias in i	ctudu.			Single	tons					Τv	vins		
Birthweight group (grams)			study	200	4	200	5	200	6	200	)4	200	)5	2	006
0 1 10 7	2004	2005	2006	No	%	No	%	No	%	No	%	No	%	No	%
<=500	38	32	50	28	74	24	75	42	84	10	26	7	22	7	38
501-1000	907	1098	1137	754	83	911	83	977	86	137	15	178	16	148	907
1001-1500	1846	2224	2399	1583	86	1901	85	2039	85	237	13	299	13	328	1846
1501-2500	2315	2899	3390	2104	91	2661	92	3087	91	198	9	230	8	276	2315
>2500	2244	2770	3411	2227	99	2746	99	3375	99	17	1	23	1	36	2244
Total	7350	9023	10387	6696	91	8243	91	9520	92	599	8	737	8	795	7350

# Table 11a Multiplicity of births according to birthweight group, by year

			Trip	lets					Oth	ers		
Birthweight group (grams)	20	04	200	05	20	06	20	04	20	05	20	06
	No	%	No	%	No	%	No	%	No	%	No	%
<=500	0	0	1	3	1	2	0	0	0	0	0	0
501-1000	16	2	8	1	7	1	0	0	1	0	5	0
1001-1500	25	1	22	1	31	1	1	0	1	0	1	0
1501-2500	13	1	8	0	25	1	0	0	0	0	0	0
>2500	0	0	0	0	0	0	0	0	1	0	0	0
Total	54	1	39	0	64	1	1	0	3	0	6	0

Gestational		ahiaa in	atu du			SVI	כ					Bre	ech					Ford	eps		
age group		ables in	study	200	04	200	)5	200	)6	20	04	20	05	20	06	20	04	20	05	20	06
(weeks)	2004	2005	2006	No	%	No	%	No	%	No	%	No	%	No	%	No	%	No	%	No	%
<22	9	5	20	8	89	4	80	15	75	1	11	0	0	1	5	0	0	0	0	0	0
22-24	168	173	190	136	81	129	75	154	81	20	12	23	13	25	13	0	0	0	0	0	0
25-27	601	607	610	406	68	396	65	403	66	57	9	64	11	44	7	1	0	0	0	0	0
28-31	1744	2116	2333	934	54	1099	52	1192	51	88	5	95	4	86	4	2	0	3	0	4	0
32-36	2328	2956	3328	1086	47	1355	46	1494	45	67	3	76	3	80	2	9	0	11	0	16	0
>=37	2500	3166	3906	1391	56	1705	54	2140	55	52	2	45	1	59	2	35	1	54	2	26	1
Total	7350	9023	10387	3961	54	4688	52	5398	52	285	4	303	3	295	3	47	1	68	1	46	0

	Table 12. Mode of delivery	y according to g	estational age	group, by year
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Gestational			Vento	ouse					Caesarea	n Sectio	on				Unkn	own		
age group	200	4	20	05	20	06	20	04	200	)5	200	)6	200	04	200	)5	20	06
(weeks)	No	%	No	%	No	%	No	%	No	%	No	%	No	%	No	%	No	%
<22	0	0	0	0	0	0	0	0	1	20	4	20	0	0	0	0	0	0
22-24	0	0	0	0	0	0	12	7	21	12	11	6	0	0	0	0	0	0
25-27	0	0	3	0	0	0	137	23	143	24	163	27	0	0	1	0	0	0
28-31	0	0	4	0	3	0	720	41	915	43	1047	45	0	0	0	0	1	0
32-36	17	1	18	1	20	1	1149	49	1495	51	1717	52	0	0	1	0	1	0
>=37	101	4	158	5	221	6	921	37	1202	38	1458	37	0	0	2	0	2	0
Total	118	2	183	2	244	2	2939	40	3777	42	4400	42	0	0	4	0	4	0

Birthweight		ahiaa in	ماسية م			SV	D					Bre	ech					Forc	eps		
group		ables in	study	200	4	200	5	200	6	200	)4	200	)5	200	06	200	)4	20	05	20	06
(grams)	2004	2005	2006	No	%	No	%	No	%	No	%	No	%	No	%	No	%	No	%	No	%
<=500	38	32	50	27	71	21	66	35	70	2	5	3	9	6	12	0	0	0	0	0	0
501-1500	907	1098	1137	555	61	593	54	656	58	84	9	102	9	74	7	1	0	1	0	0	0
1001-1500	1846	2224	2399	918	50	1086	49	1137	47	89	5	90	4	87	4	2	0	2	0	4	0
1501-2500	2315	2899	3390	1212	52	1518	52	1711	50	73	3	78	3	81	2	10	0	14	0	14	0
>2500	2244	2770	3411	1249	56	1470	53	1859	55	37	2	30	1	47	1	34	2	51	2	28	1
Total	7350	9023	10387	3961	54	4688	52	5398	52	285	4	303	3	295	3	47	1	68	1	46	0

Table 12a. Mode of delivery according to birthweight group, by year

Birthweight			Vent	ouse				С	aesarean	Sectio	n				Unkr	nown		
group	200	)4	20	05	200	)6	200	)4	200	5	200	6	20	04	20	05	20	006
(grams)	No	%	No	%	No	%	No	%	No	%	No	%	No	%	No	%	No	%
<=500	0	0	1	3	0	0	9	24	7	22	9	18	0	0	0	0	0	0
501-1500	0	0	4	0	0	0	267	29	397	36	406	36	0	0	1	0	1	0
1001-1500	0	0	2	0	1	0	837	45	1043	47	1169	49	0	0	1	0	1	0
1501-2500	20	1	23	1	30	1	1000	43	1266	44	1552	46	0	0	0	0	2	0
>2500	98	4	153	6	213	6	826	37	1064	38	1264	37	0	0	2	0	0	0
Total	118	2	183	2	244	2	2939	40	3777	42	4400	42	0	0	4	0	4	0

	No c	of babies v	with			Surv	/ival		
CRIB score	corres	sponding	score	20	04	20	05	20	06
	2004	2005	2006	No	%	No	%	No	%
0	194	220	268	184	95	212	96	259	97
1	430	572	613	399	93	531	93	582	95
2	283	282	398	238	84	243	86	354	89
3	185	194	255	141	76	171	88	213	84
4	200	262	265	138	69	207	79	214	81
5	129	163	151	90	70	120	74	111	74
6	95	105	112	60	63	65	62	73	65
7	95	107	132	52	55	53	50	74	56
8	72	90	108	35	49	46	51	53	49
9	66	86	81	36	55	45	52	42	52
10	43	84	81	18	42	29	35	31	38
11	67	66	56	24	36	21	32	25	45
12	37	42	47	8	22	9	21	12	26
13	28	33	38	5	18	2	6	8	21
14	14	19	26	2	14	3	16	2	8
15	14	11	18	0	0	0	0	3	17
16	13	19	18	0	0	1	5	1	6
17	5	13	11	0	0	2	15	0	0
18	3	5	4	0	0	0	0	0	0
19	6	6	3	0	0	0	0	0	0
20	2	2	1	0	0	0	0	0	0
Total	1981	2381	2686	1430	72	1760	74	2057	77

Table 13. Survival rate according to CRIB score for babies <1500 grams, by year

	Bab	ies with	BW			CRIB sc	ore					Surv	vival		
Centres		<1500 gn	n	200	4	200	5	200	6	200	)4	200	)5	20	06
	2004	2005	2006	Mean	SD	Mean	SD	Mean	SD	No	%	No	%	No	%
All centres	1981	2381	2686	4	4	4	4	4	4	1430	72	1760	74	2057	77
2	143	153	177	5	4	4	4	4	4	106	74	110	72	131	74
3	73	79	124	2	2	4	3	3	3	50	68	62	78	102	82
4	41	47	62	5	5	6	5	5	4	30	73	35	74	47	76
5	90	136	177	4	3	4	4	4	3	73	81	106	78	143	81
6	85	77	56	5	4	4	3	5	4	51	60	52	68	40	71
7	179	152	176	4	4	5	4	4	4	140	78	117	77	144	82
8	88	113	118	4	3	4	3	3	3	52	59	64	57	84	71
9	98	86	96	5	4	5	4	5	5	68	69	61	71	79	82
10	54	49	90	5	4	6	5	4	4	32	59	30	61	66	73
11	25	32	23	6	4	6	5	7	6	19	76	25	78	18	78
12	72	69	62	4	4	4	4	5	4	51	71	53	77	41	66
13	44	65	65	5	4	5	4	4	4	31	70	47	72	51	78
14	56	56	29	5	4	5	5	4	4	40	71	40	71	21	72
15	70	44	63	5	4	4	4	4	4	45	64	30	68	45	71
16	111	98	112	4	3	5	4	3	4	91	82	82	84	90	80
17	103	119	107	5	5	6	5	6	5	77	75	80	67	76	71
18	25	25	31	2	2	4	3	4	3	21	84	18	72	28	90
19	85	98	106	3	4	2	3	3	3	66	78	88	90	87	82
20	56	57	70	4	4	4	4	2	2	39	70	38	67	60	86
21	41	60	30	1	2	3	3	3	4	29	71	35	58	21	70
22	80	94	100	3	3	4	3	4	4	66	83	78	83	82	82
23	197	170	211	4	4	4	4	4	4	139	71	139	82	173	82
24	133	177	160	4	4	3	4	3	4	99	74	139	79	121	76
25	32	45	64	6	5	5	5	4	4	15	47	31	69	38	59
26	NA	213	176	NA	NA	4	4	5	4	NA	NA	145	68	119	68
27	NA	57	73	NA	NA	3	3	5	4	NA	NA	47	82	50	68
28	NA	10	34	NA	NA	3	4	4	4	NA	NA	8	80	23	68
29	NA	NA	67	NA	NA	NA	NA	4	4	NA	NA	NA	NA	56	84
30	NA	NA	21	NA	NA	NA	NA	5	5	NA	NA	NA	NA	17	81
31	NA	NA	6	NA	NA	NA	NA	4	3	NA	NA	NA	NA	4	67

Table 13a. Mean CRIB score and survival rate according to centre, by year
Gestational		ahias in d	tud.		Babie	s with Ven	tilatory	support	
age group		ables in s	study	20	04	200	)5	20	06
(weeks)	2004	2005	2006	No	%	No	%	No	%
<22	9	5	20	1	11	0	0	7	35
22-24	168	173	190	74	44	72	42	81	43
25-27	601	607	610	493	82	506	83	504	83
28-31	1744	2116	2333	1416	81	1720	81	1961	84
32-36	2328	2956	3328	1967	84	2489	84	2704	81
>=37	2500	3166	3906	2359	94	2985	94	3307	85
Total	7350	9023	10387	6310	86	7772	86	8564	82

Table 14. Ventilatory support according to gestational age group, by year

Table 14a. Ventilatory support according to birthweight group, by year

		hios in si	tu alu		Babies	s with Ver	tilatory	support	
Birthweight group (grams)	All Da	DIES IN S	ludy	20	04	20	05	200	06
0 - 1 (0 )	2004	2005	2006	No	%	No	%	No	%
<=500	38	32	50	10	26	8	25	7	14
501-1000	907	1098	1137	686	76	857	78	894	79
1001-1500	1846	2224	2399	1315	71	1553	70	1730	72
1501-2500	2315	2899	3390	2121	92	2653	92	2973	88
>2500	2244	2770 3411		2178	97	2701	98	2960	87
Total	7350	9023	10387	6310	86	7772	86	8564	82

Gestational	All	babies or	n VS		Bab	ies with (	CPAP a	lone		Babies	with C of	PAP in co ther mod	ombina es of \	ation with /S	any
age group				200	4	200	5	200	6	200	4	200	5	200	6
(Weeks)	2004	2005	2006	No	%	No	%	No	%	No	%	No	%	No	%
<22	1	0	7	0	0	0	0	1	14	0	0	0	0	3	43
22-24	74	72	81	10	14	9	13	3	4	10	14	15	21	16	20
25-27	493	506	504	56	11	31	6	33	7	169	34	187	37	223	44
28-31	1416	1720	1961	232	16	301	18	329	17	507	36	637	37	886	45
32-36	1967	2489	2704	508	26	693	28	782	29	451	23	576	23	775	29
>=37	2359	2985	3307	341	14	466	16	527	16	341	14	466	16	527	16
Total	6310	7772	8564	1147	18	1500	19	1675	20	1147	18	1500	19	1675	20

#### Table 15. Use of CPAP according to gestational age group, by year

Table 15a. Use of CPAP according to birthweight group, by year

Birthweight group (grams)	All Babi	es on VS i	n study		Babi	es with C	PAP al	one		Babies	with C	CPAP in co others mo	ombin de of	ation wit VS	h any
(grams)				2004	1	200	5	200	6	200	4	200	5	200	)6
	2004	2005	2006	No	%	No	%	No	%	No	%	No	%	No	%
<=500	10	8	7	3	30	2	25	0	0	1	10	1	13	3	43
501-1000	686	857	894	90	13	88	10	74	8	215	31	317	37	406	45
1001-1500	1315	1553	1730	230	17	318	20	339	20	478	36	542	35	732	42
1501-2500	2121	2653	2973	493	23	653	25	767	26	462	22	600	23	815	27
>2500	2178	2770	3411	331	15	439	16	495	17	234	11	369	14	477	16
Total	6310	7772	8564	1147	18	1500	19	1675	20	1390	22	1829	24	2433	28

Gestational	All b	abies in	study	Ва	abies	with	HFO	V alon	e	cor	Bak nbin	oies wit ation v mode	th HFO vith a of VS	OV in ny othe S	ers
(weeks)				20	04	20	05	20	06	200	)4	200	)5	200	06
	<b>2004 20</b>		2006	No	%	No	%	No	%	No	%	No	%	No	%
<22	9	5	20	0	0	0	0	0	0	0	0	0	0	0	0
22-24	168	173	190	3	2	2	1	2	1	3	2	5	3	4	2
25-27	601	607	610	7	1	9	1	9	1	21	3	20	3	48	8
28-31	1744	2116	2333	4	0	13	1	14	1	28	2	40	2	74	3
32-36	2328	2956	3328	5	0	11	0	11	0	20	1	35	1	41	1
>=37	2500	3166	3906	25	1	34	1	33	1	30	1	81	3	138	4
Total	7350	9023	10387	44	1	69	1	69	1	102	1	181	2	305	3

Table 16. Use of HFOV according to gestational age group, by year

Birthweight	All b	abies in	study	B	abies	with I	HFO\	/ alon	e	cor	Bab nbina	ies wit ation w mode	h HF vith a of V	OV in ny othe S	ers
(grams)				20	04	20	05	20	06	200	4	200	)5	200	06
	2004	<b>2004 2005 2006</b> 38 32 50	No	%	No	%	No	%	No	%	No	%	No	%	
<=500	38	32	50	0	0	1	3	0	0	0	0	1	3	0	0
501-1000	907	1098	1137	9	1	12	1	14	1	32	4	33	3	67	6
1001-1500	1846	2224	2399	4	0	10	0	9	0	17	1	30	1	59	2
1501-2500	2315	2899	3390	4	0	15	1	18	1	23	1	42	1	54	2
>2500	2244	2770	3411	27	1	31	1	28	1	30	1	75	3	125	4
Total	7350	9023	10387	44	1	69	1	69	1	102	1	181	2	305	3

Table 16a. Use of HFOV according to birthweight group, by year

Contrational and		habiaa in a	hu alu		E	Babies wi	th Nitric O	xide	
Gestational age	All	bables in si	ludy	2	004	20	005	20	006
group (weeks)	2004	2005	2006	No	%	No	%	No	%
<22	9	5	20	0	0	0	0	0	0
22-24	168	173	190	0	0	0	0	0	0
25-27	601	607	610	1	0	1	0	2	0
28-31	1744	2116	2333	2	0	5	0	6	0
32-36	2328	2956	3328	5	0	8	0	7	0
>=37	2500	3166	3906	17	1	32	1	60	2
Total	7350	9023	10387	25	0	46	1	75	1

#### Table 17. Use of Nitric Oxide according to gestational age group, by year

#### Table 17a. Use of Nitric Oxide according to birthweight group, by year

Distance in the survey		Pahias in s			E	abies wi	th Nitric O	kide	
	All	Dables In s	study	2	004	2	005	2	006
(grains)	2004	2005	2006	No	%	No	%	No	%
<=500	38	32	50	0	0	0	0	0	0
501-1000	907	1098	1137	1	0	1	0	1	0
1001-1500	1846	2224	2399	2	0	3	0	4	0
1501-2500	2315	2899	3390	3	0	10	0	19	1
>2500	2244	2770	3411	19	1	32	1	51	1
Total	7350	9023	10387	25	0	46	1	75	1

#### Table 18. Use of patient-trigger ventilation according to gestational age group, by year

Gestational	A11	habias in st	udv		Ba	bies with	IMV +PTV		
age group	All	Dables III St	uuy	20	004	20	005	20	06
(weeks)	2004	2005	2006	No	%	No	%	No	%
<22	9	5	20	0	0	0	0	1	5
22-24	168	173	190	13	8	10	6	18	9
25-27	601	607	610	62	10	62	10	54	9
28-31	1744	2116	2333	151	9	200	9	207	9
32-36	2328	2956	3328	128	5	182	6	173	5
>=37	2500	3166	3906	261	10	295	9	294	8
Total	7350	9023	10387	615	8	749	8	747	7

#### Table 18a. Use of patient-trigger ventilation according to birthweight group, by year

Distance	A 11 I	a hia a in at			Ва	abies with I	MV +PTV		
Birthweight	All I	Japies in st	uuy	20	04	200	)5	200	06
group (grains)	2004	2005	2006	No	%	No	%	No	%
<=500	38	32	50	2	5	1	3	0	0
501-1000	907	1098	1137	94	10	95	9	105	9
1001-1500	1846	2224	2399	108	6	173	8	159	7
1501-2500	2315	2899	3390	184	8	217	7	223	7
>2500	2244	2770	3411	227	10	263	9	260	8
Total	7350	9023	10387	615	8	749	8	747	7

Gestational	All	babies in s	study		В	abies who	surviv	ed		For surv	vivors, to	otal duration in day	n of ven <sup>/s</sup>	tilatory su	oport
age group (weeks)				200	4	200	5	2006	5	200	4	2005	;	200	5
(,	2004	2005	2006	No	%	No	%	No	%	Mean	SD	Mean	SD	Mean	SD
<22	9	5	20	0	0	0	0	5	25	0	0	0	0	11	10
22-24	168	173	190	12	7	18	10	23	12	35	26	32	26	32	26
25-27	601	607	610	281	47	274	45	289	47	19	21	20	20	23	20
28-31	1744	2116	2333	1150	66	1748	83	1963	84	7	12	6	10	8	11
32-36	2328	2956	3328	1710	73	2540	86	2894	87	4	7	3	6	4	6
>=37	2500	3166	3906	1865	75	2433	77	3097	79	4	5	4	8	5	9
Total	7350	9023	10387	5018	68	7013	78	8271	80	6	10	5	9	6	10

Table 19. Mean total duration of ventilatory support according to gestational age group, by year

 Table 19a. Mean total duration of ventilatory support according to birthweight group, by year

Gestational	All	babies in	study			Babies wl	ho surviv	ved		For surv	vivors, to	tal durati in d	on of ver ays	ntilatory s	upport
age group			•	200	4	200	)5	200	06	20	04	20	05	20	06
(weeks)	2004	2005	2006	No	%	No	%	No	%	Mean	SD	Mean	SD	Mean	SD
<=500	38	32	50	0	0	2	6	3	6	0	0	3	1	8	9
501-1000	907	1098	1137	351	39	509	46	550	48	18	22	15	18	20	19
1001-1500	1846	2224	2399	1095	59	1904	86	2068	86	7	10	5	10	8	10
1501-2500	2315	2899	3390	1815	78	2381	82	2864	84	4	7	4	7	4	8
>2500	2244	2770	3411	1757	78	2217	80	2786	82	4	5	4	7	4	6
Total	7350	9023	10387	5018	68	7013	78	8271	80	6	10	5	9	6	10

Birthweight		abies in	ctudy		N	o to ar	ntibio	tic			Y	es to an	tibiot	ic				Penic	ilin		
group		ables III	study	200	)4	200	)5	200	6	200	4	200	5	200	6	200	4	200	5	200	6
(grams)	2004	2005	2006	No	%	No	%	No	%	No	%	No	%	No	%	No	%	No	%	No	%
<=500	38	32	50	25	66	25	78	41	82	12	32	7	22	9	18	12	32	7	22	9	18
501-1000	907	1098	1137	172	19	187	17	219	19	735	81	910	83	917	81	712	79	885	81	889	78
1001-1500	1846	2224	2399	193	10	264	12	254	11	1651	89	1959	88	2145	89	1594	86	1891	85	2071	86
1501-2500	2315	2899	3390	212	9	292	10	465	14	2100	91	2607	90	2922	86	2018	87	2510	87	2819	83
>2500	2244	2770	3411	139	6	209	8	563	17	2097	93	2561	92	2848	83	2020	90	2460	89	2731	80
Total	7350	9023	10387	741	10	977	11	1542	15	6595	90	8044	89	8841	85	6356	86	7753	86	8519	82

Table 20. Use of antibiotic according to BW group, by year

Birthweight		A	minogly	cosid	е		2 <sup>nd</sup>	gene	eration co	epha	losporin			3 <sup>rd</sup> gen	eration C	Cephalo	osporin	
group	200	4	200	5	200	6	2004	Ļ	2005		2006	5	200	4	200	)5	200	6
(grams)	No	%	No	%	No	%	No	%	No	%	No	%	No	%	No	%	No	%
<=500	11	29	6	19	9	18	0	0	0	0	0	0	0	0	2	6	1	2
501-1000	666	73	849	77	832	73	46	5	48	4	60	5	150	17	203	18	244	21
1001-1500	1504	81	1804	81	1945	81	102	6	83	4	155	6	299	16	344	15	404	17
1501-2500	1903	82	2400	83	2584	76	147	6	111	4	171	5	311	13	364	13	434	13
>2500	1857	83	2318	84	2471	72	130	6	106	4	149	4	313	14	386	14	471	14
Total	5941	81	7377	82	7841	75	425	6	348	4	535	5	1073	15	1299	14	1554	15

Birthweight		4 <sup>th</sup> ge	neration	Cephalo	sporin				Vanco	omycin		
group	20	04	20	05	20	06	20	04	20	05	20	006
(grams)	No	%	No	%	No	%	No	%	No	%	No	%
<=500	0	0	0	0	0	0	1	3	1	3	0	0
501-1000	35	4	63	6	76	7	206	23	211	19	269	24
1001-1500	57	3	94	4	123	5	277	15	264	12	300	13
1501-2500	39	2	66	2	116	3	209	9	158	5	236	7
>2500	36	2	61	2	88	3	165	7	167	6	201	6
Total	167	2	284	3	403	4	858	12	801	9	1006	10

		abias in st	udv			Carbap	enem					Oth	ers		
Birthweight group (grams)		Japies III St	luuy	20	04	20	05	20	06	20	04	20	05	20	06
8 p (8)	2004	2005	2006	No	%	No	%	No	%	No	%	No	%	No	%
<=500	38	32	50	2	5	1	3	1	2	1	3	0	0	0	0
501-1000	907	1098	1137	259	29	292	27	335	29	142	16	155	14	132	12
1001-1500	1846	2224	2399	347	19	373	17	389	16	256	14	235	11	216	9
1501-2500	2315	2899	3390	232	10	285	10	328	10	254	11	231	8	234	7
>2500	2244	2770	3411	196	9	223	8	246	7	207	9	204	7	217	6
Total	7350	9023	10387	1036	14	1174	13	1299	13	860	12	825	9	799	8

Table 20. Con'td Use of antibiotic according to BW group, by year

Table 21. Use of surfactant according to birthweight group, by year

Birthweight	All b	abies in :	studv		Bab	ies given	surfact	tant		Of bab tl	ies giv hose <	en surfac =2 hours	tant,	C surfact	f bab ant, t	ies given hose >2	hours
group			,	200	04	200	5	200	)6	200	5	200	6	200	5	200	06
(grains)	2004	2005	2006	No	%	No	%	No	%	No	%	No	%	No	%	No	%
<=500	38	32	50	6	16	3	9	3	6	2	67	0	0	1	33	3	100
501-1000	907	1098	1137	470	52	576	52	630	55	335	58	388	62	239	41	242	38
1001-1500	1846	2224	2399	696	38	823	37	934	39	396	48	518	55	427	52	416	45
1501-2500	2315	2899	3390	549	24	698	24	856	25	239	34	360	42	457	65	496	58
>2500	2244	2770	3411	143	6	171	6	229	7	48	28	84	37	123	72	145	63
Total	7350	9023	10387	1864	25	2271	25	2652	26	1020	45	1350	51	1247	55	1302	49

Birthweight	All b	pabies in s	studv		Babies giv	ven postn	atal sterc	oid for CL	D
group				20	004	20	05	20	006
(grams)	2004	2005	2006	No	%	No	%	No	%
<=500	38	32	50	0	0	0	0	0	0
501-1000	907	1098	1137	111	12	122	11	127	11
1001-1500	1846	2224	2399	92	5	96	4	106	4
1501-2500	2315	2899	3390	31	1	47	2	53	2
>2500	2244	2770	3411	45	2	68	2	69	2
Total	7350	9023	10387	279	4	333	4	355	3

Table 22. Use of postnatal steroid for CLD according to birthweight group, by year

Table 23. Use of parenteral nutrition according to birthweight group, by year

Birthweight	All ł	pabies in s	tudv		Babies	given par	enteral r	nutrition	
group			,	20	04	20	05	200	06
(grams)	2004	2005	2006	No	%	No	%	No	%
<=500	38	32	50	5	13	4	13	2	4
501-1000	907	1098	1137	403	44	475	43	565	50
1001-1500	1846	2224	2399	655	35	654	29	715	30
<1501	2791	3354	3586	1063	38	1133	34	1282	36
1501-2500	2315	2899	3390	346	15	336	12	405	12
>2500	2244	2770	3411	260	12	203	7	265	8
Total	7350	9023	10387	1669	23	1672	19	1952	19

Birthweight	All	babies in	study		No	) Enteral	nutriti	on		Exc	lusive	breastfe fee	eding , eds	/ breastm	ilk
group (grams)				200	4	200	5	200	6	20	04	200	5	200	6
	2004	2005	2006	No	%	No	%	No	%	No	%	No	%	No	%
<=500	38	32	50	36	95	29	91	47	94	0	0	2	6	2	4
501-1000	907	1098	1137	387	43	511	47	530	47	0	0	138	13	177	16
1001-1500	1846	2224	2399	203	11	272	12	296	12	0	0	546	25	714	30
1501-2500	2315	2899	3390	326	14	459	16	488	14	0	0	883	30	1167	34
>2500	2244	2770	3411	396	18	499	18	601	18	0	0	806	29	1225	36
Total	7350	9023	10387	1348	18	1770	20	1962	19	0	0	2375	26	3285	32

			Mixed	feeds				Ex	clusive fo	ormula f	eeds	
Birthweight group (grams)	200	4	200	5	200	6	20	04	20	05	200	6
	No	%	No	%	No	%	No	%	No	%	No	%
<=500	0	0	1	3	1	2	0	0	0	0	0	0
501-1000	0	0	355	32	306	27	0	0	91	8	123	11
1001-1500	0	0	1186	53	1132	47	0	0	220	10	257	11
1501-2500	0	0	1367	47	1439	42	0	0	188	6	293	9
>2500	0	0	1281	46	1250	37	0	0	184	7	335	10
Total	0	0	4190	46	4128	40	0	0	683	8	1008	10

Gestational	All k	oabies in s	study	Ba	bies w	ho surviv	ed on	discharge	9	Bal	bies w	ho surviv screer	ed and ning	l had ROF	)
age group (weeks)				200	4	200	5	200	6	200	4	200	5	200	6
(meens)	2004	2005	2006	No	%	No	%	No	%	No	%	No	%	No	%
<22	9	5	20	0	0	0	0	5	25	0	0	0	0	3	60
22-24	168	173	190	14	8	18	10	23	12	12	86	17	94	21	91
25-27	601	607	610	307	51	274	45	289	47	271	88	257	94	270	93
28-31	1744	2116	2333	1424	82	1748	83	1963	84	1123	79	1307	75	1422	72
<32	2522	2901	3153	1745	69	2040	70	2280	72	1406	81	1581	78	1716	75
32-36	2328	2956	3328	1989	85	2540	86	2894	87	780	39	784	31	834	29
>=37	2500	3166	3906	1890	76	2433	77	3097	79	39	2	40	2	39	1
Total	7350	9023	10387	5624	77	7013	78	8271	80	2225	40	2405	34	2589	31

 Table 25. ROP screening according to gestational age group by year

Table 25a. ROP screening according to birthweight group, by year

Birthweight	All E	Babies in s	study	Bal	bies w	ho surviv	ed on	discharge	)	Ва	bies w	ho survive screen	ed and ing	had ROP	)
group				200	4	200	5	200	6	200	4	200	5	200	6
(Grams)	2004	2005	2006	No	%	No	%	No	%	No	%	No	%	No	%
<=500	38	32	50	0	0	2	6	3	6	0	0	0	0	1	33
501-1000	907	1098	1137	392	43	509	46	550	48	347	89	481	94	520	95
1001-1500	747	886	923	599	80	709	80	755	82	513	86	591	83	621	82
<1251	1692	2016	2110	991	59	1220	61	1308	62	860	87	1072	88	1142	87
1251-1500	1099	1338	1476	968	88	1195	89	1313	89	653	67	706	59	819	62
1501-2500	2315	2899	3390	1907	82	2381	82	2864	84	673	35	599	25	593	21
>2500	2244	2770	3411	1758	78	2217	80	2786	82	39	2	28	1	35	1
Total	7350	9023	10387	5624	77	7013	78	8271	80	2225	40	2405	34	2589	31

Birthweight group		) II hahiaa in atu	al	Babies with ultrasound brain								
Birthweight group	, , , , , , , , , , , , , , , , , , ,	All bables in stu	uy	200	)4	20	05	2006				
(8	2004	2005	2006	No	%	No	%	No	%			
<=500	38	32	50	5	13	4	13	3	6			
501-1000	907	1098	1137	522	58	714	65	781	69			
1001-1500	1846	2224	2399	1133	61	1525	69	1629	68			
<1501	2791	3354	3586	1660	59	2243	67	2413	67			
1501-2500	2315	2899	3390	794	34	1060	37	1235	36			
>2500	2244	2770	3411	474	21	642	23	729	21			
Total	7350	9023	10387	2928	40	3945	44	4377	42			

Table 26. Cerebral ultrasound scanning according to birth weight group, by year

Gestational		All babies in study			E	Babies w	ho surv	ived		For survivors, total discharge weight in grams					
age group		bables in	study	2004		200	2005		2006		04	2005		2006	
(weeks)	2004	2005	2006	No	%	No	%	No	%	Mean	SD	Mean	SD	Mean	SD
<22	9	5	20	0	0	0	0	5	25	0	0	0	0	2267	680
22-24	168	173	190	14	8	18	10	23	12	2041	473	2012	465	2142	835
25-27	601	607	610	307	51	274	45	289	47	1915	687	2019	641	1922	456
28-31	1742	2116	2333	1422	82	1748	83	1963	84	1848	741	1879	500	1839	320
32-36	2322	2956	3328	1985	85	2540	86	2894	87	2076	949	2024	473	2031	452
>=37	2498	3165	3906	1888	76	2432	77	3097	79	3048	801	3013	623	3001	605
Total	7340	9022	10387	5616	77	7012	78	8271	80	2336	982	2331	738	2345	710

 Table 27. Mean Discharge weight according to gestational age group, by year

 Table 27a. Mean Discharge weight according to birthweight group, by year

Birthweight	<b>A</b> 11 <b>h</b>	All babies in study			Babies who survived						For survivors, total discharge weight in grams						
group			study	2004		2005		2006		2004		2005		2006			
(grams)	2004	2005	2006	No	%	No	%	No	%	Mean	SD	Mean	SD	Mean	SD		
<=500	38	32	50	0	0	2	6	3	6	0	0	2715	403	2377	556		
501-1000	906	1098	1137	391	43	509	46	550	48	1842	540	1920	620	1864	435		
1001-1500	1844	2224	2399	1566	85	1904	86	2068	86	1848	905	1820	429	1804	302		
1501-2500	2310	2899	3390	1903	82	2381	82	2864	84	2052	765	2053	407	2045	351		
>2500	2242	2769	3411	1756	78	2216	80	2786	82	3190	755	3162	513	3151	511		
Total	7340	9022	10387	5616	77	7012	78	8271	80	2336	982	2331	738	2345	710		

Gestational		All babies in study			Babies who survived						For survivors, total duration of hospital stay in days					
age group		ables in s	study	2004		2005		2006		2004		2005		2006		
(weeks)	2004	2005	2006	No	%	No	%	No	%	Mean	SD	Mean	SD	Mean	SD	
<22	9	5	20	0	0	0	0	5	25	0	0	0	0	43	38	
22-24	167	173	190	14	8	18	10	23	12	86	40	91	40	102	69	
25-27	599	606	610	307	51	273	45	289	47	67	41	75	42	73	30	
28-31	1741	2116	2333	1424	82	1748	83	1963	84	39	24	43	27	42	24	
32-36	2327	2956	3328	1989	85	2540	86	2894	87	22	18	23	22	23	23	
>=37	2500	3166	3906	1890	76	2433	77	3097	79	13	14	14	19	14	22	
Total	7343	9022	10387	5624	77	7012	78	8271	80	26	25	27	28	26	27	

Table 28. Mean total duration of hospital stay according to gestational age group, by year

Table 28a. Mean total duration of hospital stay according to birthweight, by year

Birthweight	All babies in study				Babies who survived						For survivors, total duration of hospital stay in days						
group			study	200	2004		2005		2006		04	20	05	2006			
(grams)	2004	2005	2006	No	%	No	%	No	%	Mean	SD	Mean	SD	Mean	SD		
<=500	38	32	50	0	0	2	6	3	6	0	0	8	1	22	27		
501-1000	904	1098	1137	392	43	509	46	550	48	68	36	74	34	75	30		
1001-1500	1846	2223	2399	1567	85	1903	86	2068	86	39	23	40	24	41	21		
1501-2500	2311	2899	3390	1907	83	2381	82	2864	84	19	16	19	19	19	21		
>2500	2244	2770	3411	1758	78	2217	80	2786	82	13	14	13	20	13	21		
Total	7343	9022	10387	5624	77	7012	78	8271	80	26	25	27	28	26	27		

		Dabiaa in	a ku alu	Babies who survived								
Gestational age group (weeks)		Sables In	study	20	04	200	)5	200	06			
	2004	2005	2006	No	%	No	%	No	%			
<22	9	5	20	0	0	0	0	5	25			
22	25	22	29	0	0	1	5	0	0			
23	47	51	51	2	4	6	12	4	8			
24	96	100	110	12	13	11	11	19	17			
25	122	120	143	38	31	36	30	40	28			
26	218	231	223	108	50	95	41	101	45			
27	261	256	244	161	62	143	56	148	61			
28	373	393	429	259	69	277	70	317	74			
29	349	414	471	278	80	332	80	390	83			
30	496	670	704	416	84	562	84	594	84			
31	526	639	729	471	90	577	90	662	91			
32	589	812	835	519	88	714	88	736	88			
33	518	564	692	453	87	504	89	626	90			
34	471	639	727	403	86	554	87	643	88			
35	354	426	501	291	82	357	84	422	84			
36	396	515	573	323	82	411	80	467	82			
>=37	2500	3166	3906	1890	76	2433	77	3097	79			
Total	7350	9023	10387	5624	77	7013	78	8271	80			
22-24	168	173	190	14	8	18	10	23	12			
25-27	601	607	610	307	51	274	45	289	47			
28-31	1744	2116	2333	1424	82	1748	83	1963	84			
22-31	2513	2896	3133	1745	69	2040	70	2275	73			
32-36	2328	2956	3328	1989	85	2540	86	2894	87			
>=37	2500	3166	3906	1890	76	2433	77	3097	79			

## Table 29.Survival according to gestation (gestational age group), by year

	A II I	a bios in d	-+d./	Babies who survived								
Birthweight group (grams)			study	20	04	200	)5	200	06			
(grains)	2004	2005	2006	No	%	No	%	No	%			
<=500	38	32	50	0	0	2	6	3	6			
501-600	107	115	114	10	9	7	6	16	14			
601-700	116	155	170	18	16	38	25	37	22			
701-800	177	208	232	60	34	72	35	99	43			
801-900	207	277	256	110	53	162	58	143	56			
901-1000	300	343	365	194	65	230	67	255	70			
1001-1000	284	365	324	209	74	279	76	254	78			
1101-1200	332	370	404	278	84	305	82	331	82			
1201-1300	373	441	513	324	87	374	85	450	88			
1301-1400	419	489	538	370	88	440	90	474	88			
1401-1500	438	559	620	386	88	506	91	559	90			
1501-2500	2315	2899	3390	1907	82	2381	82	2864	84			
>2500	2244	2770	3411	1758	78	2217	80	2786	82			
Total	7350	9023	10387	5624	77	7013	78	8271	80			
501-1000	907	1098	1137	392	43	509	46	550	48			
1001-1500	1846	2224	2399	1567	85	1904	86	2068	86			
501-1500	2753	3322	3536	1959	71	2413	73	2618	74			

## Table 29a. Survival according to birthweight group, by year

Birthweight group (grams)	Home	Other non paeds wards	Transfer to other hospitals	Social welfare home	Still hospitalized as of first birthday
<=500	3	0	0	0	0
501-1000	498	0	49	3	0
1001-1500	1890	0	173	5	0
1501-2500	2689	0	170	4	1
>2500	2609	0	171	6	0
Total	7689	0	563	18	1

Table 30. Place of discharge, if child alive, according to birthweight group 2006

## Table 31. Reasons for transfer to other hospitals according to centres, 2006

Reason for transfer	No	%
Lack of NICU bed	23	4
For stepdown care	163	29
For chronic care	16	3
For surgery/diagnostic services	213	38
Due to social/logistic reason	124	22
Due to other reason	23	4
Total cases	562	100

#### Table 32. Post-transfer disposition

Place of disposition	No	%
Home	476	85
Transferred again to another hospital	6	1
Death	47	8
Readmitted to your hospital	33	6
Still hospitalized as of first birthday	1	0
Total Cases	563	100

### **PROBLEMS and DIAGNOSIS**

	501-1000 gm		1001-1500 gm		1501-2	500 gm	>250	0 gm	Total
	No	%	No	%	No	%	No	%	No
RDS Yes	949	83	1590	66	1661	49	341	10	4541
RDS No	187	16	809	34	1725	51	3070	90	5791
No PDA	654	58	1771	74	2681	79	2783	82	7889
Indomethacin/ibuprofen >24hr	166	15	243	10	99	3	8	0.2	516
Ligation	0	0	6	0.3	4	0.1	8	0.2	18
Not treated	113	10	147	6	175	5	135	4	570
NA/Unkown	206	18	234	10	432	13	478	14	1350
Pneumothorax Yes	85	7	79	3	125	4	214	6	503
Pneumothorax No	1050	92	2320	97	3258	96	3194	94	9822
NEC None	839	74	2087	87	3037	90	3039	89	9002
Medical Rx	92	8	133	6	83	2	40	1	348
Surgical Rx	17	1	28	1	20	1	10	0.3	75
NA/Unknown	189	17	151	6	250	7	322	9	912
Supplemental oxygen at 28 days Yes	224	20	169	7	103	3	92	3	588
Supplemental oxygen at 28 days No	912	80	2229	93	3283	97	3319	97	9743
Supplemental oxygen at 36 weeks corrected age									
Yes	65	6	55	2	71	2	60	2	251
Supplemental oxygen at 36 weeks corrected age									
No	1071	94	2343	98	3311	98	3338	98	10063
Seizures None	933	82	2178	91	3030	89	2661	78	8802
Seizures suspected	15	1	21	1	43	1	121	4	200
Seizures definite	56	5	57	2	171	5	512	15	796
Seizures NA/Unknown	133	12	143	6	146	4	117	3	539
Infection None	215	19	266	11	514	15	598	18	1593
Presumed sepsis	474	42	1427	59	2175	64	2048	60	6124
Clinical sepsis	255	22	452	19	484	14	530	16	1721
Confirmed sepsis	240	21	324	14	262	8	264	8	1090
For confirmed sepsis Group B strep	7	1	15	1	42	1	53	2	117
MRSA	41	4	66	3	45	1	40	1	192
CoNS	48	4	67	3	42	1	51	1	208
ESBL organisms	21	2	20	1	25	1	13	0	79
Fungal	31	3	24	1	14	0	9	0	78
Others	124	11	162	7	117	3	112	3	515
IVH None	396	35	1234	51	1135	33	738	22	3503

## Table 33a. Specific morbidities according to birthweight group, 2006

	501-1000 gm		1001-1500 gm		1501-2	500 gm	>250	) gm	Total
	No	%	No	%	No	%	No	%	No
Grade 2 IVH	127	11	121	5	39	1	9	1	296
Grade 3 IVH	101	9	67	3	21	1	5	1	194
Grade 4 IVH	81	7	44	2	14	0	6	0	145
IVH not applicable/not checked	346	30	761	32	2104	62	2631	62	5842
VP shunt/reservoir inserted	1	0.1	2	0.1	1	0	9	0	13
ROP none	333	29	1215	51	561	17	97	17	2206
Stage 1 ROP	89	8	102	4	19	1	1	1	211
Stage 2 ROP	73	6	67	3	4	0.1	2	0.1	146
Stage 3 ROP	60	5	29	1	2	0.1	0	0.1	91
Stage 4 ROP	1	0.1	3	0.1	0	0	1	0	5
Stage 5 ROP	2	0.2	2	0.1	2	0.1	1	0.1	7
Not applicable/Not Checked	583	51	985	41	2799	83	3308	83	7675
Laser for ROP	39	3	18	1	2	0.1	0	0.1	59
Cryotherapy for ROP	4	0.4	2	0.1	0	0	0	0	6
Other diagnosis									
Meconium aspiration syndrome	1	0.1	9	0	116	3	668	20	794
Transient tachypnoea of newborn	4	0.4	56	2	178	5	162	5	400
Pulmonary haemorrhage	104	9	79	3	51	2	53	2	287
Pneumonia	167		324	14	660	19	887	26	2038
Neonatal encephalopathy	8	15	12	1	38	1	90	3	148
Neonatal meninigitis	11	1	36	2	38	1	54	2	139
Bruises, superficial	20	1	20	1	14	0	10	0	64
Cephalhaematoma	0	2	2	0	10	0	35	1	47
Subaponeurotic haemorrhage	1	0	2	0	8	0	130	4	141
Erb's palsy	0	0.1	0	0	1	0	28	1	29
Renal failure due to any cause	86	0	86	4	87	3	111	3	370
		8		0		0		0	
DIVC	65	0	43	2	64	2	98	3	270
Polycythaemia	5	6	26	1	27	1	14	0	72
Anaemia of prematurity	336	0.4	512	21	146	4	22	1	1016
Persistent foetal circulation	19	30	22	1	116	3	335	10	492
Inquinal hernia	36	2	17	1	6	0	11	0	70
Congenital intrauterine infection	4	3	6	0	11	0	6	0	27
		0.4		0		0		0	
Other diagnosis	91	0	183	8	224	7	220	6	718

\*Total in Table 33 is the total of babies with BW>500

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	501-10	00 gm	1001-15	500 gm	1501-25 gm	00	>2500 g	m	Total
	No	%	No	%	No	%	No	%	No
Infants with no congenital anomalies	1059	13	2165	26	2684	32	2557	30	8465
Down syndrome	4	2	11	5	87	41	108	51	210
Edward syndrome	6	5	38	32	68	57	8	7	120
Patau syndrome	3	6	5	9	33	61	13	24	54
Other syndrome	6	4	18	12	63	40	69	44	156
Total syndromes	19		72		251		198		540
Infants with non-syndromes (single or multiple anomalies)									1382
CVS Cyanotic	3	1	17	7	86	35	141	57	247
CVS Acyanotic	16	5	63	20	111	35	130	41	320
CNS hydrocephalus	9	8	25	21	33	28	53	44	120
CNS others	7	10	9	13	18	27	33	49	67
Neural tube defect Spina bifida	3	8	1	3	8	22	24	67	36
Anencephaly	7	8	13	16	42	51	21	25	83
Others	4	7	3	5	19	33	31	54	57
Skeletal dysplasia	2	3	9	14	32	50	21	33	64
Respiratory anomalies	4	3	17	13	52	41	53	42	126
GIT anomalies	5	2	19	8	109	48	95	42	228
Hydrops	0	0	8	21	20	53	10	26	38
Renal	6	7	20	22	33	37	31	34	90
Cleft lip	0	0	5	13	11	28	23	59	39
Cleft palate	2	3	4	6	23	34	38	57	67
Cleft lip and palate	4	2	12	7	45	26	109	64	170
Other isolated anomalies	9	4	23	11	84	39	97	46	213

## Table 33b. Congenital anomalies according to birthweight group, 2006

\*Total in Table 33 is the total of babies with BW>500

Table 35C. Telvi according to birthweight group, 2006
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	501-10	00 gm	1001-15	500 gm	1501-2500 gm		>2500 gm		Total
	No	%	No	%	No	%	No	%	No
Inborn errors of metabolism (IEM)	2	2	11	10	29	28	63	60	105

Birthweight group (grams)	None	Mild/moderate	Severe	NA/Unknown	Not applicable
<=500	24	0	0	10	16
501-1000	566	14	5	74	478
1001-1500	1496	35	5	82	781
1501-2000	1165	46	21	75	584
2001-2500	1192	117	72	35	83
2501-3000	1135	254	91	42	78
3001-3500	825	199	92	28	63
3501-4000	314	73	24	12	19
4001-4500	85	18	11	3	2
4501-5000	23	6	3	0	0
>5000	7	2	2	0	0
Total	6832	764	326	361	2104

## Table 34. HIE according to birthweight group, 2006

Table 35. Mean highest total serum bilirubin according to birthweight group, 2006

Birthweight group	All babies in	Highest total serum bilirubin in umol/L					
(grams)	study	Mean	SD				
<=500	50	162.00	3.61				
501-1000	1137	181.27	72.50				
1001-1500	2399	199.18	61.05				
1501-2500	3390	217.35	66.58				
>2500	3411	209.37	94.37				
Overall	10387	206.60	74.93				

#### Table 36. Episodes of confirmed bacterial sepsis according to birthweight group and survival status, 2006.

(Bacterial sepsis = Grp B strep, MRSA, CoNS, RSBL and Others (excludes fungal sepsis). 1 tick for any of these is 1 episode of bacterial sepsis)

Birthweight group	All babies in	Overall epi of confirr bacterial s	Overall episodes of confirmed bacterial sepsis		Overall episodes of fungal sepsis		rs per oup	Episodes of confirmed bacterial sepsis among survivors		
(grams)	study	No	%	No	%	No %		No	%	
<=500	50	0	0	0	0	3	6	0	0	
501-1000	1137	241	21	31	3	550	48	140	12	
1001-1500	2399	330	14	24	1	2068	86	266	11	
1501-2500	3390	271	8	14	0	2864	84	202	6	
>2500	3411	269	8	9	0	2786	82	204	6	
Overall	10387	1111	11	78	1	8271	80	812	8	

Table 37. Mortality rate of confirmed bacterial sepsis according to birthweight group, 2006

Birthweight group (grams)	All babies in study	All Babies with any confirmed bacterial sepsis		Babies w confin bacterial who c	Babies with any confirmed bacterial sepsis who died		vithout firmed I sepsis	Babies without any confirmed bacterial sepsis who died		
		No	%	No	%	No	%	No	%	
<=500	50	0	0	0	0	50	100	47	94	
501-1000	1137	221	19	92	8	916	81	495	44	
1001-1500	2399	306	13	57	2	2093	87	274	11	
1501-2500	3390	254	7	62	2	3136	93	464	14	
>2500	3411	255	7	61	2	3156	93	564	17	
Overall	10387	1036	10	272	3	9351	90	1844	18	

Table 38. Mortality rate of confirmed fungal sepsis according to birthweight group, 2006

Birthweight group (grams)	All babies in	Babies with any fungal sepsis		Babies v fungal se die	vith any psis who ed	Babies without any fungal sepsis		Babies without any fungal sepsis who died	
10 1 17	study	No	%	No	%	No	%	No	%
<=500	50	0	0	0	0	50	100	47	94
501-1000	1137	31	3	12	1	1106	97	575	51
1001-1500	2399	24	1	7	0	2375	99	324	14
1501-2500	3390	14	0	6	0	3376	100	520	15
>2500	3411	9	0	3	0	3402	100	622	18
Overall	10387	78	1	28	0	10309	99	2088	20

Birthweight group (grams)	All babies in study	Babies survi	s who ived	Babies who survived and on oxygen at Day 28Babies who survived and on oxygen at 36 weeks corrected gestational		Babies die	Babies who died		Babies who died and on oxygen at Day 28		Babies who died and on oxygen at 36 weeks corrected gestational		
		No	%	No	%	No	%	No	%	No	%	No	%
<=500	50	3	6	0	0	0	0	47	94	0	0	0	0
501-1000	1137	550	48	192	35	58	11	587	52	32	5	7	1
1001-1500	2399	2068	86	144	7	48	2	331	14	25	8	7	2
1501-2500	3390	2864	84	73	3	53	2	526	16	30	6	18	3
>2500	3411	2786	82	54	2	40	1	625	18	38	6	20	3
Overall	10387	8271	80	463	6	199	2	2116	20	125	6	52	2

 Table 39. Supplemental oxygen use according to survival status of birthweight group, 2006

Table 39a. Supplemental oxygen use according to survival status of gestational age group, 2006

Gestational age group (weeks)	All babies in	Babies survi	Babies who survived		Babies who survived and on oxygen at Day 28		Babies who survived and on oxygen at 36 weeks corrected gestational		Babies who died		Babies who died and on oxygen at Day 28		Babies who died and on oxygen at 36 weeks corrected gestational	
	study	No	%	No	%	No	%	No	%	No	%	No	%	
<22	20	5	25	1	20	1	20	15	75	0	0	0	0	
22-24	190	23	12	14	61	4	17	167	88	4	2	1	1	
25-27	610	289	47	125	43	30	10	321	53	17	5	3	1	
28-31	2333	1963	84	184	9	61	3	370	16	26	7	8	2	
32-36	3328	2894	87	76	3	63	2	434	13	33	8	17	4	
>=37	3906	3097	79	63	2	40	1	809	21	45	6	23	3	
Overall	10387	8271	80	463	6	199	2	2116	20	125	6	52	2	

Centres	Babies < 32 weeks	Babies < 32 antenata	weeks given I steroids	Inborn babies < 32 weeks	Inborn babies given antena	Inborn babies < 32 weeks given antenatal steroids		
		No	%	gestation	No	%		
All centres	3153	1833	58	2719	1720	63		
2	166	108	65	136	95	70		
3	170	130	76	149	122	82		
4	75	46	61	71	46	65		
5	191	91	48	158	83	53		
6	92	24	26	72	21	29		
7	240	159	66	225	157	70		
8	167	80	48	147	75	51		
9	120	87	73	109	86	79		
10	95	36	38	84	34	40		
11	33	23	70	31	22	71		
12	86	54	63	73	47	64		
13	67	42	63	53	39	74		
14	37	34	92	32	29	91		
15	78	38	49	67	36	54		
16	150	76	51	134	72	54		
17	122	43	35	102	43	42		
18	41	32	78	40	32	80		
19	122	96	79	98	88	90		
20	87	69	79	81	69	85		
21	33	15	45	30	15	50		
22	106	80	75	98	77	79		
23	227	183	81	202	170	84		
24	177	95	54	133	84	63		
25	83	47	57	68	43	63		
26	170	48	28	144	45	31		
27	91	46	51	73	43	59		
28	32	3	9	25	3	12		
29	60	24	40	57	24	42		
30	21	16	76	18	13	72		
31	14	8	57	9	7	78		

#### Table 40. Use of antenatal steroid to centres, 2006 (Inborn)

Centres	Babies < 32 weeks	Babies < 32 v antenatal	weeks given steroids	Outborn babies < 32 weeks	Outborn babi given anten	es < 32 weeks atal steroids
		No	%	gestation	No	%
All centres	3153	1833	58	434	113	26
2	166	108	65	30	13	43
3	170	130	76	21	8	38
4	75	46	61	4	0	0
5	191	91	48	33	8	24
6	92	24	26	20	3	15
7	240	159	66	15	2	13
8	167	80	48	20	5	25
9	120	87	73	11	1	9
10	95	36	38	11	2	18
11	33	23	70	2	1	50
12	86	54	63	13	7	54
13	67	42	63	14	3	21
14	37	34	92	5	5	100
15	78	38	49	11	2	18
16	150	76	51	16	4	25
17	122	43	35	20	0	0
18	41	32	78	1	0	0
19	122	96	79	24	8	33
20	87	69	79	6	0	0
21	33	15	45	3	0	0
22	106	80	75	8	3	38
23	227	183	81	25	13	52
24	177	95	54	44	11	25
25	83	47	57	15	4	27
26	170	48	28	26	3	12
27	91	46	51	18	3	17
28	32	3	9	7	0	0
29	60	24	40	3	0	0
30	21	16	76	3	3	100
31	14	8	57	5	1	20

#### Table 40a. Use of antenatal steroid to centres, 2006 (Outborn)

Centres	All babies in study	Babies wi	th RDS	Babies wi requirir	ith RDS ng VS	Babies with RDS requiring VS given surfactant		
	No	No	%	No	%	No	%	
All centres	10387	4567	44	4226	93	2386	56	
2	566	215	38	201	93	167	83	
3	494	243	49	230	95	160	70	
4	265	130	49	123	95	47	38	
5	633	221	35	188	85	93	49	
6	438	123	28	111	90	71	64	
7	862	322	37	305	95	141	46	
8	548	234	43	217	93	157	72	
9	380	139	37	117	84	58	50	
10	329	120	36	113	94	61	54	
11	104	35	34	35	100	23	66	
12	199	130	65	127	98	72	57	
13	280	141	50	141	100	32	23	
14	106	53	50	46	87	19	41	
15	241	126	52	110	87	56	51	
16	413	201	49	190	95	88	46	
17	368	149	40	147	99	52	35	
18	108	62	57	57	92	39	68	
19	364	163	45	158	97	124	78	
20	309	162	52	157	97	105	67	
21	119	50	42	46	92	25	54	
22	437	211	48	204	97	149	73	
23	627	392	63	358	91	201	56	
24	456	200	44	184	92	157	85	
25	293	131	45	124	95	99	80	
26	779	331	42	295	89	30	10	
27	179	84	47	70	83	54	77	
28	84	23	27	19	83	9	47	
29	266	113	42	98	87	78	80	
30	113	41	36	34	83	11	32	
31	27	22	81	21	95	8	38	

Table 41. Use of surfactant in Respiratory Distress Syndrome (RDS) according to centres, 2006

Centres	All babies in study	Babies wi 501-15	th BW 00g	Babies with 1500g give	BW 501- en PN	Babies v	vith VS	Babies with vs given PN	
	No	No	%	No	%	No	%	No	%
All centres	10387	3536	34	1280	36	8564	82	1849	22
2	566	212	37	110	52	457	81	128	28
3	494	169	34	119	70	395	80	180	46
4	265	86	32	27	31	234	88	39	17
5	633	219	35	75	34	414	65	85	21
6	438	120	27	2	2	339	77	10	3
7	862	257	30	99	39	752	87	128	17
8	548	170	31	98	58	500	91	182	36
9	380	133	35	33	25	255	67	39	15
10	329	114	35	37	32	284	86	49	17
11	104	34	33	3	9	86	83	8	9
12	199	82	41	23	28	185	93	36	19
13	280	80	29	38	48	264	94	57	22
14	106	35	33	15	43	92	87	17	18
15	241	79	33	40	51	166	69	57	34
16	413	139	34	90	65	355	86	112	32
17	368	120	33	44	37	355	96	50	14
18	108	40	37	27	68	82	76	40	49
19	364	137	38	53	39	278	76	58	21
20	309	95	31	46	48	277	90	57	21
21	119	32	27	13	41	111	93	20	18
22	437	115	26	47	41	385	88	56	15
23	627	256	41	68	27	541	86	82	15
24	456	178	39	14	8	333	73	33	10
25	293	95	32	86	91	260	89	236	91
26	779	303	39	46	15	671	86	54	8
27	179	87	49	13	15	123	69	16	13
28	84	35	42	3	9	58	69	1	2
29	266	80	30	4	5	206	77	3	1
30	113	26	23	1	4	84	74	4	5
31	27	8	30	6	75	22	81	12	55

Table 42. Use of Parenteral nutrition (PN) according to centres, 2006

Centres	All babies in study	Babies	with VS	Babies wit pneumo	h VS and othorax	Babies with VS and pnuemothorax who died		
	No	No	%	No	%	No	%	
All centres	10387	8564	82	498	6	222	45	
2	566	457	81	33	7	12	36	
3	494	395	80	8	2	3	38	
4	265	234	88	15	6	8	53	
5	633	414	65	22	5	6	27	
6	438	339	77	15	4	4	27	
7	862	752	87	33	4	13	39	
8	548	500	91	19	4	6	32	
9	380	255	67	30	12	17	57	
10	329	284	86	25	9	9	36	
11	104	86	83	3	3	0	0	
12	199	185	93	16	9	8	50	
13	280	264	94	6	2	2	33	
14	106	92	87	3	3	1	33	
15	241	166	69	11	7	4	36	
16	413	355	86	39	11	13	33	
17	368	355	96	20	6	11	55	
18	108	82	76	3	4	1	33	
19	364	278	76	13	5	5	38	
20	309	277	90	8	3	5	63	
21	119	111	93	5	5	2	40	
22	437	385	88	21	5	4	19	
23	627	541	86	24	4	13	54	
24	456	333	73	19	6	11	58	
25	293	260	89	22	8	15	68	
26	779	671	86	49	7	33	67	
27	179	123	69	17	14	11	65	
28	84	58	69	0	0	0	0	
29	266	206	77	12	6	3	25	
30	113	84	74	4	5	2	50	
31	27	22	81	3	14	0	0	

## Table 43. Pneumothorax according to centres, 2006

Centres	Babies with BW 501- 1000gms	Babies with BW 501- 1000gms who survived		Babies 501-1000 survived of oxyge	with BW Ogms who I with use en on day 28	Babies with BW 1001- 1500gm s	Babies BW 1 1500 wł survi	s with 001- gms no ived	Babies with BW 1001- 1500gms who survived with use of oxygen on day 28	
	No	No	%	No	%	No	No	%	No	%
All centres	1137	550	48	192	35	2399	2068	86	144	7
2	65	25	38	11	44	147	126	86	8	6
3	53	25	47	9	36	116	103	89	4	4
4	34	22	65	11	50	52	41	79	3	7
5	67	33	49	5	15	152	136	89	9	7
6	31	9	29	1	11	89	75	84	4	5
7	83	40	48	23	57	174	149	86	19	13
8	52	16	31	0	0	118	96	81	6	6
9	42	20	48	10	50	91	81	89	4	5
10	30	12	40	5	42	84	72	86	7	10
11	15	9	60	2	22	19	17	89	0	0
12	42	21	50	10	48	40	32	80	2	6
13	26	13	50	2	15	54	47	87	2	4
14	13	7	54	4	57	22	18	82	3	17
15	24	11	46	5	45	55	48	87	6	13
16	56	32	57	10	31	83	74	89	7	9
17	31	14	45	1	7	89	74	83	4	5
18	10	5	50	1	20	30	28	93	3	11
19	44	23	52	16	70	93	83	89	17	20
20	24	8	33	1	13	71	65	92	5	8
21	11	4	36	1	25	21	19	90	3	16
22	37	21	57	7	33	78	72	92	2	3
23	99	63	64	20	32	157	142	90	4	3
24	43	21	49	10	48	135	114	84	10	9
25	37	18	49	10	56	58	43	74	7	16
26	93	43	46	7	16	210	175	83	2	1
27	31	12	39	4	33	56	47	84	0	0
28	10	5	50	0	0	25	19	76	0	0
29	21	11	52	6	55	59	54	92	1	2
30	7	4	57	0	0	19	16	84	2	13
31	6	3	50	0	0	2	2	100	0	0

Table 44. Use of supplemental oxygen on day 28 for VLBW babies according to centres, 2006

# Table 44a. Use of supplemental oxygen at 36 weeks corrected gestation for VLBW babies according to centres,2006

Centres	Babies with BW 501- 1000g	Babies BW 5 1000g survi	with 501- who ived	Babies wit 1000g wh with use on 36	Babies with BW 501- 1000g who survived with use of oxygen on 36 weeks		Babies with BW 1001- 1500g who survived		Babies with BW 1001-1500g who survived with use of oxygen on 36 weeks		
	No	No	%	No	%	No	No	%	No	%	
All centres	1137	550	48	58	11	2399	2068	86	48	2	
2	65	25	38	3	12	147	126	86	1	1	
3	53	25	47	5	20	116	103	89	3	3	
4	34	22	65	0	0	52	41	79	2	5	
5	67	33	49	1	3	152	136	89	2	1	
6	31	9	29	0	0	89	75	84	1	1	
7	83	40	48	6	15	174	149	86	2	1	
8	52	16	31	2	13	118	96	81	2	2	
9	42	20	48	2	10	91	81	89	1	1	
10	30	12	40	0	0	84	72	86	2	3	
11	15	9	60	1	11	19	17	89	0	0	
12	42	21	50	6	29	40	32	80	2	6	
13	26	13	50	0	0	54	47	87	0	0	
14	13	7	54	2	29	22	18	82	0	0	
15	24	11	46	3	27	55	48	87	5	10	
16	56	32	57	5	16	83	74	89	2	3	
17	31	14	45	0	0	89	74	83	2	3	
18	10	5	50	0	0	30	28	93	0	0	
19	44	23	52	9	39	93	83	89	9	11	
20	24	8	33	0	0	71	65	92	0	0	
21	11	4	36	0	0	21	19	90	0	0	
22	37	21	57	2	10	78	72	92	2	3	
23	99	63	64	3	5	157	142	90	3	2	
24	43	21	49	1	5	135	114	84	0	0	
25	37	18	49	3	17	58	43	74	4	9	
26	93	43	46	2	5	210	175	83	1	1	
27	31	12	39	1	8	56	47	84	0	0	
28	10	5	50	0	0	25	19	76	0	0	
29	21	11	52	1	9	59	54	92	0	0	
30	7	4	57	0	0	19	16	84	2	13	
31	6	3	50	0	0	2	2	100	0	0	

	Babies in		Babies w	ith CUS	Babies w	vith CUS	Babies w	ith CUS	Babies with CUS		Babies with		
Contros	study	Babies	with CUS	who hav	e Grade	who hav	e Grade	who hav	e Grade	who hav	e Grade	Grade 3 d	or 4 IVH
Centres	study			1  \	/H	2	VH	3  \	/H	4 1\	И	who	died
	No	No	%	No	%	No	%	No	%	No	%	No	%
All centres	3536	2410	68	301	12	244	10	167	7	125	5	160	7
2	212	185	87	7	4	2	1	9	5	7	4	11	6
3	169	137	81	20	15	9	7	9	7	3	2	7	5
4	86	56	65	11	20	4	7	3	5	0	0	0	0
5	219	143	65	19	13	26	18	18	13	22	15	10	7
6	120	74	62	12	16	7	9	5	7	4	5	7	9
7	257	184	72	36	20	13	7	12	7	6	3	12	7
8	170	48	28	3	6	0	0	0	0	0	0	0	0
9	133	115	86	7	6	7	6	3	3	6	5	8	7
10	114	52	46	8	15	11	21	3	6	7	13	7	13
11	34	27	79	1	4	0	0	0	0	0	0	0	0
12	82	54	66	5	9	5	9	1	2	4	7	3	6
13	80	47	59	6	13	13	28	4	9	2	4	4	9
14	35	18	51	2	11	3	17	2	11	3	17	3	17
15	79	63	80	4	6	8	13	6	10	2	3	4	6
16	139	84	60	27	32	14	17	9	11	9	11	12	14
17	120	107	89	39	36	38	36	8	7	2	2	8	7
18	40	29	73	3	10	0	0	4	14	1	3	1	3
19	137	107	78	6	6	7	7	9	8	3	3	6	6
20	95	70	74	13	19	2	3	1	1	4	6	5	7
21	32	23	72	3	13	2	9	2	9	1	4	1	4
22	115	98	85	8	8	8	8	4	4	2	2	1	1
23	256	196	77	8	4	13	7	12	6	1	1	7	4
24	178	150	84	25	17	21	14	22	15	11	7	12	8
25	95	86	91	7	8	4	5	2	2	2	2	3	3
26	303	93	31	8	9	16	17	4	4	17	18	19	20
27	87	55	63	6	11	4	7	12	22	3	5	7	13
28	35	25	71	0	0	0	0	0	0	1	4	0	0
29	80	65	81	6	9	3	5	1	2	2	3	2	3
30	26	13	50	1	8	1	8	2	15	0	0	0	0
31	8	6	75	0	0	3	50	0	0	0	0	0	0

Table 45. Cerebral ultrasound scanning (CUS) and intraventricular haermorrhage (IVH) (Babies with BW 501-1500gms) according to centres, 2006

Centres	Babies in Babies who study survived		Babies who survived and had ROP screening		Babies wh and had RC with Gra	o survived DP screening Ide 3 ROP	Babies wh and had RC with Gra	no survived DP screening Ide 4 ROP	Babies who survived and had ROP screening with Grade 3 or 4 ROP		
	No	No	%	No	%	No	%	No	%	No	%
All centres	3153	2280	72	1716	75	79	5	5	0	84	5
2	166	103	62	86	83	2	2	0	0	2	2
3	170	125	74	63	50	3	5	0	0	3	5
4	75	55	73	43	78	11	26	1	2	12	28
5	191	139	73	103	74	2	2	0	0	2	2
6	92	60	65	31	52	0	0	0	0	0	0
7	240	173	72	144	83	3	2	0	0	3	2
8	167	110	66	94	85	2	2	0	0	2	2
9	120	83	69	61	73	1	2	0	0	1	2
10	95	70	74	48	69	1	2	0	0	1	2
11	33	25	76	22	88	1	5	0	0	1	5
12	86	59	69	47	80	3	6	0	0	3	6
13	67	48	72	34	71	1	3	0	0	1	3
14	37	30	81	16	53	0	0	0	0	0	0
15	78	61	78	56	92	1	2	0	0	1	2
16	150	115	77	81	70	5	6	0	0	5	6
17	122	90	74	70	78	5	7	0	0	5	7
18	41	30	73	20	67	1	5	1	5	2	10
19	122	97	80	92	95	1	1	0	0	1	1
20	87	66	76	47	71	3	6	0	0	3	6
21	33	24	73	21	88	0	0	0	0	0	0
22	106	84	79	82	98	5	6	0	0	5	6
23	227	184	81	154	84	15	10	1	1	16	10
24	177	142	80	74	52	3	4	0	0	3	4
25	83	52	63	49	94	1	2	0	0	1	2
26	170	103	61	63	61	5	8	1	2	6	10
27	91	62	68	47	76	1	2	0	0	1	2
28	32	20	63	10	50	0	0	0	0	0	0
29	60	47	78	40	85	2	5	0	0	2	5
30	21	14	67	12	86	1	8	1	8	2	17
31	14	9	64	6	67	0	0	0	0	0	0

Table 46. Retinopathy of prematurity (ROP) (Babies < 32 weeks gestation) according to centres, 2006

Centres	Babies with BW < 1250g	Babies who survived		Babies who survived and had ROP screening		Babies survived ROP scr with Grac	s who and had eening de 3 ROP	Babies who survived and had ROP screening with Grade 4 ROP		
	No	No	%	No	%	No	%	No	%	
All centres	2023	1231	61	1086	88	73	7	4	0	
2	126	72	57	66	92	2	3	0	0	
3	94	55	59	39	71	3	8	0	0	
4	52	34	65	31	91	11	35	1	3	
5	122	74	61	62	84	2	3	0	0	
6	59	29	49	23	79	0	0	0	0	
7	149	89	60	83	93	2	2	0	0	
8	92	46	50	38	83	0	0	0	0	
9	72	44	61	41	93	0	0	0	0	
10	56	34	61	31	91	1	3	0	0	
11	19	12	63	12	100	1	8	0	0	
12	66	38	58	34	89	3	9	0	0	
13	48	29	60	21	72	1	5	0	0	
14	23	13	57	10	77	0	0	0	0	
15	45	28	62	25	89	1	4	0	0	
16	92	60	65	55	92	6	11	0	0	
17	72	45	63	42	93	3	7	0	0	
18	25	16	64	13	81	1	8	1	8	
19	69	45	65	42	93	1	2	0	0	
20	50	29	58	27	93	3	11	0	0	
21	18	8	44	8	100	0	0	0	0	
22	62	43	69	43	100	2	5	0	0	
23	149	108	72	107	99	14	13	1	1	
24	99	68	69	46	68	3	7	0	0	
25	61	36	59	36	100	1	3	0	0	
26	168	97	58	78	80	8	10	0	0	
27	53	27	51	27	100	1	4	0	0	
28	19	11	58	5	45	0	0	0	0	
29	41	28	68	28	100	2	7	0	0	
30	16	10	63	10	100	1	10	1	10	
31	6	3	50	3	100	0	0	0	0	

Table 47. Retinopathy of prematurity (ROP) (Babies with BW < 1250g) according to centres, 2006

Centres	All Babies in study	Babies Cephalhae	with ematoma	Babies with Sub-aponeurotic haemorrhage		Babie Erb's	s with palsy	Babies with birth trauma	
	No	No	%	No	%	No	%	No	%
All centres	10387	47	0	141	1	29	0	288	3
2	566	0	0	3	1	4	1	12	2
3	494	2	0	2	0	0	0	6	1
4	265	1	0	0	0	1	0	9	3
5	633	3	0	6	1	2	0	11	2
6	438	3	1	10	2	1	0	14	3
7	862	6	1	4	0	3	0	22	3
8	548	4	1	33	6	3	1	42	8
9	380	1	0	0	0	2	1	4	1
10	329	1	0	2	1	0	0	7	2
11	104	1	1	4	4	1	1	8	8
12	199	1	1	2	1	0	0	5	3
13	280	1	0	2	1	1	0	10	4
14	106	0	0	4	4	0	0	7	7
15	241	1	0	2	1	0	0	6	2
16	413	1	0	12	3	0	0	19	5
17	368	5	1	7	2	0	0	16	4
18	108	1	1	5	5	0	0	6	6
19	364	0	0	0	0	0	0	4	1
20	309	1	0	4	1	0	0	7	2
21	119	0	0	1	1	0	0	3	3
22	437	2	0	8	2	1	0	10	2
23	627	0	0	1	0	4	1	9	1
24	456	1	0	6	1	0	0	8	2
25	293	0	0	6	2	0	0	7	2
26	779	4	1	10	1	3	0	15	2
27	179	2	1	1	1	0	0	6	3
28	84	0	0	0	0	0	0	1	1
29	266	3	1	5	2	3	1	11	4
30	113	2	2	1	1	0	0	3	3
31	27	0	0	0	0	0	0	0	0

Table 48. Cephalhaematoma, Sub-aponeurotic haemorrhage, Erb's palsy and Birth Trauma according to centres, 2006

\*Babies with Birth Trauma include babies with Bruises, Cephalhaematoma, Sub-aponeurotic haemorrhage and Erb's palsy

Centres	Babies with BW 501-1500gms	No wh	o died	Babies	with NEC	Babies with NEC who died		
	No	No	%	No	%	No	%	
All centres	3536	918	26	270	8	91	34	
2	212	61	29	20	9	9	45	
3	169	41	24	15	9	2	13	
4	86	23	27	13	15	3	23	
5	219	50	23	15	7	2	13	
6	120	36	30	4	3	2	50	
7	257	68	26	11	4	3	27	
8	170	58	34	22	13	9	41	
9	133	32	24	0	0	0	0	
10	114	30	26	13	11	2	15	
11	34	8	24	2	6	2	100	
12	82	29	35	8	10	5	63	
13	80	20	25	4	5	1	25	
14	35	10	29	0	0	0	0	
15	79	20	25	10	13	1	10	
16	139	33	24	14	10	3	21	
17	120	32	27	11	9	2	18	
18	40	7	18	5	13	0	0	
19	137	31	23	3	2	1	33	
20	95	22	23	7	7	3	43	
21	32	9	28	3	9	1	33	
22	115	22	19	3	3	1	33	
23	256	51	20	6	2	4	67	
24	178	43	24	12	7	6	50	
25	95	34	36	14	15	9	64	
26	303	85	28	38	13	13	34	
27	87	28	32	7	8	5	71	
28	35	11	31	1	3	0	0	
29	80	15	19	7	9	1	14	
30	26	6	23	1	4	0	0	
31	8	3	38	1	13	1	100	

Table 49. Necrotising enterocolitis (NEC) (babies with BW 501-1500gms) according to centres, 2006

No of episodes Total no of No of episodes of confirmed Babies episodes of **Babies** of confirmed Total bacterial with confirmed with BW bacterial sepsis **Babies** sepsis among BW bacterial sepsis 501among babies with BW Centres babies with > 1500 among babies 1500gms with BW > > 500gms BW 501with BW > gms 1500 gms 1500gms 500gms No No % No No % No No % All centres 

Table 50. Episodes of confirmed bacterial sepsis (exclude fungal sepsis) according to centres, 2006

Centres	All babies in study	No who died		Babies with seps	confirmed sis	Babies with confirmed bacterial sepsis who died		
	No	No	%	No	%	No	%	
All centres	10387	2116	20	1111	11	299	27	
2	566	134	24	54	10	12	22	
3	494	86	17	44	9	11	25	
4	265	46	17	32	12	6	19	
5	633	132	21	72	11	11	15	
6	438	110	25	47	11	14	30	
7	862	182	21	133	15	30	23	
8	548	121	22	91	17	21	23	
9	380	79	21	23	6	7	30	
10	329	59	18	38	12	11	29	
11	104	22	21	8	8	2	25	
12	199	44	22	15	8	7	47	
13	280	41	15	17	6	6	35	
14	106	17	16	15	14	1	7	
15	241	55	23	32	13	7	22	
16	413	70	17	38	9	14	37	
17	368	72	20	40	11	8	20	
18	108	26	24	11	10	2	18	
19	364	59	16	48	13	11	23	
20	309	51	17	7	2	1	14	
21	119	21	18	11	9	2	18	
22	437	63	14	20	5	10	50	
23	627	120	19	41	7	11	27	
24	456	81	18	37	8	8	22	
25	293	86	29	86	29	39	45	
26	779	198	25	114	15	37	32	
27	179	54	30	10	6	4	40	
28	84	32	38	0	0	0	0	
29	266	35	13	18	7	4	22	
30	113	14	12	6	5	0	0	
31	27	6	22	3	11	2	67	

Table 50a. Confirmed bacterial sepsis (exclude fungal sepsis) according to centres, 2006
Table 51. Confirmed bacterial sepsis in very low birthweight babies (501-1500gms) according to centres,2006

Centres	Babies with BW 501- 1000gms	Babies with BW 501-1000gms with confirmed sepsis		Babies with BW 1001- 1500gms	Babies with I 1500gms confirmed	BW 1001- with sepsis
	No	No	%	No	No	%
All centres	1137	241	21	2399	330	14
2	65	16	25	147	11	7
3	53	8	15	116	18	16
4	34	8	24	52	10	19
5	67	14	21	152	21	14
6	31	4	13	89	10	11
7	83	24	29	174	35	20
8	52	15	29	118	47	40
9	42	5	12	91	2	2
10	30	3	10	84	15	18
11	15	1	7	19	2	11
12	42	6	14	40	2	5
13	26	3	12	54	5	9
14	13	5	38	22	3	14
15	24	6	25	55	11	20
16	56	15	27	83	10	12
17	31	2	6	89	15	17
18	10	2	20	30	4	13
19	44	18	41	93	13	14
20	24	0	0	71	5	7
21	11	0	0	21	5	24
22	37	7	19	78	6	8
23	99	17	17	157	6	4
24	43	8	19	135	12	9
25	37	23	62	58	21	36
26	93	21	23	210	33	16
27	31	6	19	56	2	4
28	10	0	0	25	0	0
29	21	3	14	59	4	7
30	7	0	0	19	2	11
31	6	1	17	2	0	0

Centres	Babies with BW 501- 1000gms	Babies with BW 501- 1000gm with fungal sepsis		Babies with BW 1001- 1500gms	Babies with E 1500gms wit sepsi	3W 1001- :h fungal s
	No	No	%	No	No	%
All centres	1137	31	3	2399	24	1
2	65	0	0	147	0	0
3	53	1	2	116	3	3
4	34	1	3	52	0	0
5	67	2	3	152	0	0
6	31	0	0	89	0	0
7	83	4	5	174	2	1
8	52	0	0	118	4	3
9	42	0	0	91	0	0
10	30	0	0	84	0	0
11	15	3	20	19	1	5
12	42	1	2	40	1	3
13	26	0	0	54	0	0
14	13	1	8	22	0	0
15	24	0	0	55	0	0
16	56	1	2	83	2	2
17	31	0	0	89	2	2
18	10	0	0	30	0	0
19	44	7	16	93	4	4
20	24	1	4	71	0	0
21	11	0	0	21	0	0
22	37	0	0	78	0	0
23	99	5	5	157	1	1
24	43	0	0	135	2	1
25	37	3	8	58	2	3
26	93	0	0	210	0	0
27	31	1	3	56	0	0
28	10	0	0	25	0	0
29	21	0	0	59	0	0
30	7	0	0	19	0	0
31	6	0	0	2	0	0

Table 52. Fungal sepsis in very low birthweight babies (501-1500gm) according to centres, 2006

Centres	No. Stillbirths	No of Livebirths	Total Births	Inborn deaths < 7 days	Inborn deaths < 28 days	PMR per 1000 TBs	NMR per 1000 LBs
All centres	2226	237514	239740	1236	1557	14.44	6.56
2	101	10219	10320	68	88	16.38	8.61
3	69	9108	9177	58	68	13.84	7.47
4	51	5969	6020	27	36	12.96	6.03
5	128	10763	10891	76	95	18.73	8.83
6	128	12395	12523	68	90	15.65	7.26
7	162	16315	16477	125	146	17.42	8.95
8	116	10750	10866	56	78	15.83	7.26
9	99	9635	9734	54	63	15.72	6.54
10	64	6980	7044	32	47	13.63	6.73
11	17	4090	4107	13	15	7.30	3.67
12	51	5105	5156	24	32	14.55	6.27
13	32	5233	5265	21	30	10.07	5.73
14	27	4947	4974	12	14	7.84	2.83
15	78	6956	7034	35	44	16.06	6.33
16	81	10853	10934	43	57	11.34	5.25
17	51	8730	8781	37	51	10.02	5.84
18	18	3302	3320	22	25	12.05	7.57
19	47	4953	5000	31	39	15.60	7.87
20	66	6031	6097	33	42	16.24	6.96
21	39	4644	4683	14	18	11.32	3.88
22	94	8762	8856	39	47	15.02	5.36
23	150	14817	14967	68	88	14.57	5.94
24	85	11252	11337	44	56	11.38	4.98
25	71	6894	6965	32	51	14.79	7.40
26	221	19426	19647	116	136	17.15	7.00
27	35	5135	5170	32	38	12.96	7.40
28	44	3077	3121	19	20	20.19	6.50
29	80	7361	7441	25	29	14.11	3.94
30	18	3155	3173	11	12	9.14	3.80
31	3	657	660	1	2	6.06	3.04

Table 53. Perinatal and neonatal death and mortality rate according to centres, 2006

Table 54. Survival of extremely preterm (22-27 weeks' gestation) and very preterm (28-31 weeks' gestation) according to centres, 2006

Centres	Extremely preterm babies (gestation 22-27 weeks)	Extremely preterm who survived		Very preterm babies (gestation 28-31 weeks)	Very preterm who survived		Extremely and Very preterm babies	Extremely and Very preterm who survived	
	No	No	%	No	No	%	No	No	%
All centres	800	312	39	2333	1963	84	3133	2275	73
2	46	9	20	117	94	80	163	103	63
3	39	11	28	131	114	87	170	125	74
4	21	11	52	52	43	83	73	54	74
5	56	22	39	134	117	87	190	139	73
6	23	5	22	69	55	80	92	60	65
7	64	24	38	174	148	85	238	172	72
8	29	8	28	133	101	76	162	109	67
9	28	11	39	92	72	78	120	83	69
10	21	9	43	74	61	82	95	70	74
11	10	4	40	23	21	91	33	25	76
12	28	10	36	58	49	84	86	59	69
13	17	7	41	49	41	84	66	48	73
14	15	9	60	22	21	95	37	30	81
15	18	9	50	60	52	87	78	61	78
16	50	26	52	100	89	89	150	115	77
17	29	13	45	89	76	85	118	89	75
18	12	4	33	29	26	90	41	30	73
19	25	9	36	97	88	91	122	97	80
20	24	8	33	63	58	92	87	66	76
21	10	2	20	23	22	96	33	24	73
22	26	11	42	80	73	91	106	84	79
23	53	29	55	174	155	89	227	184	81
24	42	18	43	135	124	92	177	142	80
25	27	15	56	56	37	66	83	52	63
26	23	3	13	147	100	68	170	103	61
27	28	11	39	62	51	82	90	62	69
28	10	4	40	22	16	73	32	20	63
29	16	7	44	43	39	91	59	46	78
30	4	1	25	17	13	76	21	14	67
31	6	2	33	8	7	88	14	9	64

Centres	ELBW babies (BW501 - 1000gm)	ELBW survi	who ved	VLBW babies (BW1001 - 1500gm)	VLBW who survived		ELBW + VLBW	ELBW + VLBW who survived	
	No	No	%	No	No	%	No	No	%
All centres	1137	550	48	2399	2068	86	3536	2618	74
2	65	25	38	147	126	86	212	151	71
3	53	25	47	116	103	89	169	128	76
4	34	22	65	52	41	79	86	63	73
5	67	33	49	152	136	89	219	169	77
6	31	9	29	89	75	84	120	84	70
7	83	40	48	174	149	86	257	189	74
8	52	16	31	118	96	81	170	112	66
9	42	20	48	91	81	89	133	101	76
10	30	12	40	84	72	86	114	84	74
11	15	9	60	19	17	89	34	26	76
12	42	21	50	40	32	80	82	53	65
13	26	13	50	54	47	87	80	60	75
14	13	7	54	22	18	82	35	25	71
15	24	11	46	55	48	87	79	59	75
16	56	32	57	83	74	89	139	106	76
17	31	14	45	89	74	83	120	88	73
18	10	5	50	30	28	93	40	33	83
19	44	23	52	93	83	89	137	106	77
20	24	8	33	71	65	92	95	73	77
21	11	4	36	21	19	90	32	23	72
22	37	21	57	78	72	92	115	93	81
23	99	63	64	157	142	90	256	205	80
24	43	21	49	135	114	84	178	135	76
25	37	18	49	58	43	74	95	61	64
26	93	43	46	210	175	83	303	218	72
27	31	12	39	56	47	84	87	59	68
28	10	5	50	25	19	76	35	24	69
29	21	11	52	59	54	92	80	65	81
30	7	4	57	19	16	84	26	20	77
31	6	3	50	2	2	100	8	5	63

Table 55. Survival of extremely low birthweight (BW 501-1000gm) and very low birthweight (BW 1001-1500gm) according to centres, 2006

Centres	All babies in study	No w surviv	'ho /ed	Babies wi ventilatory su	th Ipport	Babies with VS who survived		
	No	No	%	No	%	No	%	
All centres	10387	8271	80	8564	82	7003	82	
2	566	432	76	457	81	352	77	
3	494	408	83	395	80	348	88	
4	265	219	83	234	88	200	85	
5	633	501	79	414	65	353	85	
6	438	328	75	339	77	261	77	
7	862	680	79	752	87	625	83	
8	548	427	78	500	91	405	81	
9	380	301	79	255	67	205	80	
10	329	270	82	284	86	236	83	
11	104	82	79	86	83	70	81	
12	199	155	78	185	93	151	82	
13	280	239	85	264	94	232	88	
14	106	89	84	92	87	79	86	
15	241	186	77	166	69	131	79	
16	413	343	83	355	86	291	82	
17	368	296	80	355	96	286	81	
18	108	82	76	82	76	69	84	
19	364	305	84	278	76	234	84	
20	309	258	83	277	90	243	88	
21	119	98	82	111	93	96	86	
22	437	374	86	385	88	340	88	
23	627	507	81	541	86	439	81	
24	456	375	82	333	73	268	80	
25	293	207	71	260	89	187	72	
26	779	581	75	671	86	505	75	
27	179	125	70	123	69	83	67	
28	84	52	62	58	69	39	67	
29	266	231	87	206	77	184	89	
30	113	99	88	84	74	75	89	
31	27	21	78	22	81	16	73	

Table 56. Survival of cases with ventilatory support (VS) according to centres, 2006

Centres	Babies in study	Babies surviv	who ed	For survi duration of stay in c	vors, hospital lays	Babie di	s who ed	For dead, du of hospital s days	ration tay in
	No	No	%	Mean	SD	No	%	Mean	SD
All centres	370	80	22	91	43	290	78	9	23
2	24	4	17	80	22	20	83	7	22
3	19	1	5	56	0	18	95	2	1
4	10	4	40	54	36	6	60	3	2
5	24	5	21	86	15	19	79	3	7
6	11	2	18	69	5	9	82	5	9
7	35	8	23	104	17	27	77	3	5
8	21	2	10	112	13	19	90	9	23
9	11	5	45	96	9	6	55	4	4
10	11	2	18	102	25	9	82	8	15
11	8	3	38	91	9	5	63	8	16
12	14	3	21	82	7	11	79	13	21
13	6	2	33	43	22	4	67	2	2
14	5	1	20	133	0	4	80	2	1
15	10	3	30	81	27	7	70	5	7
16	15	5	33	156	132	10	67	4	5
17	8	1	13	64	0	7	88	5	5
18	2	0	0	0	0	2	100	2	1
19	14	2	14	108	28	12	86	19	55
20	8	0	0	0	0	8	100	5	7
21	5	0	0	0	0	5	100	6	7
22	13	3	23	75	37	10	77	22	47
23	25	9	36	99	24	16	64	15	27
24	17	4	24	61	41	13	76	12	22
25	7	2	29	78	16	5	71	70	70
26	21	3	14	86	2	18	86	5	15
27	14	3	21	86	27	11	79	6	10
28	0	0	0	0	0	0	0	0	0
29	6	2	33	129	50	4	67	1	0
30	4	1	25	65	0	3	75	1	1
31	2	0	0	0	0	2	100	47	9

Table 57. Duration of hospital stay for babies of BW 501-750 gms according to centres, 2006

Babies in Centres study		Babies who survived		For survivors, duration of hospital stay in days		Babie: die	s who ed	For dead, duration of hospital stay in days	
	No	No	%	Mean	SD	No	%	Mean	SD
All centres	767	470	61	72	26	297	39	11	21
2	41	21	51	83	31	20	49	11	12
3	34	24	71	64	23	10	29	5	7
4	24	18	75	77	27	6	25	2	2
5	43	28	65	70	22	15	35	4	8
6	20	7	35	62	11	13	65	13	23
7	48	32	67	76	24	16	33	5	7
8	31	14	45	72	12	17	55	16	18
9	31	15	48	71	35	16	52	5	7
10	19	10	53	60	7	9	47	9	7
11	7	6	86	86	46	1	14	31	0
12	28	18	64	77	24	10	36	7	9
13	20	11	55	51	16	9	45	10	16
14	8	6	75	87	27	2	25	21	27
15	14	8	57	86	44	6	43	20	35
16	41	27	66	79	19	14	34	9	9
17	23	13	57	62	14	10	43	4	5
18	8	5	63	52	37	3	38	1	1
19	30	21	70	87	34	9	30	27	63
20	16	8	50	58	19	8	50	14	23
21	6	4	67	78	33	2	33	2	1
22	24	18	75	88	14	6	25	35	75
23	74	54	73	77	22	20	27	9	8
24	26	17	65	76	27	9	35	13	19
25	30	16	53	70	15	14	47	17	19
26	72	40	56	55	20	32	44	6	9
27	17	9	53	80	19	8	47	17	25
28	10	5	50	24	31	5	50	2	2
29	15	9	60	74	23	6	40	11	20
30	3	3	100	60	5	0	0	0	0
31	4	3	75	87	48	1	25	75	0

Table 57a. Duration of hospital stay for babies of BW 751-1000 gms according to centres, 2006

Babies Centres in study		Babies who survived		For surviv duration of h stay in da	For survivors, duration of hospital stay in days		s who ed	For dead, duration of hospital stay in days	
	No	No	%	Mean	SD	No	%	Mean	SD
All centres	923	755	82	51	21	168	18	15	30
2	62	52	84	52	20	10	16	6	4
3	38	30	79	40	15	8	21	18	34
4	19	14	74	60	19	5	26	9	11
5	60	51	85	52	18	9	15	19	38
6	29	24	83	45	13	5	17	18	20
7	67	55	82	53	19	12	18	26	68
8	39	31	79	62	24	8	21	12	13
9	33	28	85	49	17	5	15	8	15
10	26	23	88	49	12	3	12	14	20
11	4	3	75	45	14	1	25	32	0
12	24	18	75	60	35	6	25	6	5
13	21	17	81	47	22	4	19	13	8
14	11	7	64	53	15	4	36	42	72
15	24	20	83	54	32	4	17	44	59
16	36	30	83	53	20	6	17	3	2
17	41	33	80	53	15	8	20	5	7
18	12	11	92	55	19	1	8	11	0
19	27	24	89	63	35	3	11	30	45
20	26	22	85	47	16	4	15	5	4
21	6	4	67	41	6	2	33	45	61
22	26	23	88	65	23	3	12	20	26
23	70	62	89	49	24	8	11	14	24
24	58	50	86	44	11	8	14	5	6
25	25	18	72	53	25	7	28	14	18
26	80	59	74	42	20	21	26	18	31
27	20	15	75	51	10	5	25	7	10
28	8	6	75	50	8	2	25	28	23
29	21	18	86	48	8	3	14	7	8
30	10	7	70	53	13	3	30	1	1
31	0	0	0	0	0	0	0	0	0

Table 57b. Duration of hospital stay for babies of BW 1001-1250 gms according to centres, 2006

Babies in Centres study		Babies who survived		For surviv duration of h stay in da	For survivors, duration of hospital stay in days		who d	For dead, duration of hospital stay in days	
	No	No	%	Mean	SD	No	%	Mean	SD
All centres	1476	1313	89	35	19	163	11	11	26
2	85	74	87	37	13	11	13	7	9
3	78	73	94	28	12	5	6	3	3
4	33	27	82	33	18	6	18	19	35
5	92	85	92	36	12	7	8	39	89
6	60	51	85	37	19	9	15	2	2
7	107	94	88	36	13	13	12	18	30
8	79	65	82	46	21	14	18	15	22
9	58	53	91	35	13	5	9	17	28
10	58	49	84	36	16	9	16	8	7
11	15	14	93	34	11	1	7	1	0
12	16	14	88	35	12	2	13	26	35
13	33	30	91	25	12	3	9	4	5
14	11	11	100	43	12	0	0	0	0
15	31	28	90	41	21	3	10	7	7
16	47	44	94	33	16	3	6	8	12
17	48	41	85	34	16	7	15	14	15
18	18	17	94	34	8	1	6	1	0
19	66	59	89	42	24	7	11	5	6
20	45	43	96	35	11	2	4	1	0
21	15	15	100	33	12	0	0	0	0
22	52	49	94	54	50	3	6	19	26
23	87	80	92	35	17	7	8	17	41
24	77	64	83	30	13	13	17	8	11
25	33	25	76	36	14	8	24	16	19
26	130	116	89	25	14	14	11	4	5
27	36	32	89	32	10	4	11	8	6
28	17	13	76	31	17	4	24	4	3
29	38	36	95	37	27	2	5	2	1
30	9	9	100	41	20	0	0	0	0
31	2	2	100	32	6	0	0	0	0

Table 57c. Duration of hospital stay for babies of BW 1251-1500 gm according to centres, 2006

Centres	Babies in study	Babies surviv	Babies who survived Stay in days		Bab who	ies died	For dead, duration of hospital stay in days		
	No	No	%	Mean	SD	No	%	Mean	SD
All centres	3390	2864	84	19	21	526	16	11	27
2	163	133	82	20	18	30	18	20	61
3	178	157	88	15	12	21	12	9	18
4	89	79	89	16	11	10	11	11	15
5	203	171	84	19	19	32	16	6	10
6	135	104	77	21	16	31	23	7	10
7	291	241	83	19	16	50	17	13	38
8	167	140	84	18	13	27	16	13	21
9	120	91	76	22	24	29	24	7	20
10	117	107	91	18	17	10	9	5	6
11	31	25	81	18	9	6	19	12	24
12	64	57	89	19	14	7	11	48	62
13	102	93	91	13	7	9	9	12	18
14	36	31	86	16	9	5	14	15	27
15	86	69	80	27	25	17	20	8	15
16	134	123	92	21	21	11	8	11	12
17	115	98	85	15	10	17	15	7	9
18	35	30	86	18	11	5	14	7	10
19	134	121	90	27	26	13	10	22	41
20	140	128	91	14	10	12	9	4	6
21	38	35	92	17	11	3	8	9	13
22	143	125	87	29	58	18	13	14	39
23	220	182	83	16	14	38	17	5	8
24	151	135	89	16	13	16	11	14	26
25	76	54	71	20	19	22	29	6	8
26	229	174	76	17	28	55	24	9	23
27	44	34	77	25	16	10	23	11	26
28	22	15	68	18	7	7	32	7	11
29	80	71	89	15	11	9	11	8	15
30	37	33	89	12	9	4	11	2	2
31	10	8	80	28	21	2	20	8	8

Table 57d. Duration of hospital stay for babies of BW 1501-2500 gms according to centres, 2006

Babies in Centres study		Babies who survived		For surv duration of stay in (	For survivors, duration of hospital stay in days		who 1	For dead, duration of hospital stay in days	
	No	No	%	Mean	SD	No	%	Mean	SD
All centres	3411	2786	82	13	21	625	18	9	21
2	187	148	79	16	18	39	21	9	21
3	144	123	85	9	9	21	15	7	10
4	88	76	86	11	14	12	14	9	11
5	204	160	78	14	15	44	22	19	37
6	180	140	78	14	20	40	22	5	6
7	308	250	81	13	16	58	19	10	15
8	209	175	84	13	14	34	16	8	11
9	125	109	87	13	12	16	13	3	6
10	97	79	81	10	8	18	19	16	30
11	39	31	79	18	19	8	21	6	9
12	52	45	87	13	11	7	13	2	2
13	96	86	90	10	9	10	10	14	25
14	35	33	94	15	12	2	6	1	0
15	75	57	76	13	12	18	24	21	37
16	138	114	83	11	10	24	17	29	56
17	131	110	84	11	8	21	16	13	20
18	30	19	63	13	14	11	37	4	8
19	93	78	84	13	11	15	16	6	7
20	73	57	78	11	11	16	22	3	3
21	48	40	83	13	13	8	17	3	4
22	178	156	88	21	59	22	12	4	11
23	150	120	80	10	16	30	20	4	4
24	126	105	83	12	12	21	17	9	18
25	122	92	75	20	32	30	25	9	9
26	246	189	77	14	15	57	23	4	8
27	46	32	70	12	10	14	30	8	12
28	26	13	50	12	9	13	50	5	9
29	106	95	90	10	10	11	10	7	10
30	50	46	92	11	10	4	8	12	18
31	9	8	89	42	74	1	11	1	0

Table 57e. Duration of hospital stay for babies of BW > 2500 gms according to centres, 2006

Centres	Babies <32 weeks	Babies wee wit anten stero	<32 ks h atal ids	Babies weeks anter steroid ventila supp	s <32 with latal ls and atory port	Bab <3 we wi anter ster with on	ies 2 eks th natal oids CPAP ly	Babies wee witho anten stero	<32 ks but atal ids	Babie we with ante steroi venti sup	es <32 eks nout natal ds and latory port	Bab <3 wee with anter stere with on	vies 2 eks nout natal oids CPAP
		No	%	No	%	No	%	No	%	No	%	No	%
All													
centres	3153	1833	58	1586	87	216	12	1318	42	966	73	149	11
2	166	108	65	92	85	6	6	58	35	44	76	4	7
3	170	130	76	110	85	32	25	39	23	22	56	2	5
4	75	46	61	44	96	8	17	29	39	20	69	2	7
5	191	91	48	65	71	13	14	100	52	59	59	12	12
6	92	24	26	20	83	5	21	68	74	52	76	8	12
7	240	159	66	150	94	18	11	81	34	55	68	7	9
8	167	80	48	73	91	11	14	87	52	68	78	8	9
9	120	87	73	64	74	8	9	33	28	17	52	2	6
10	95	36	38	31	86	2	6	59	62	48	81	9	15
11	33	23	70	17	74	1	4	10	30	8	80	1	10
12	86	54	63	50	93	5	9	32	37	27	84	4	13
13	67	42	63	39	93	12	29	25	37	21	84	8	32
14	37	34	92	25	74	4	12	3	8	3	100	0	0
15	78	38	49	36	95	9	24	40	51	27	68	6	15
16	150	76	51	68	89	14	18	73	49	62	85	6	8
17	122	43	35	40	93	6	14	79	65	74	94	15	19
18	41	32	78	26	81	4	13	9	22	5	56	1	11
19	122	96	79	87	91	6	6	26	21	20	77	2	8
20	87	69	79	61	88	9	13	18	21	12	67	0	0
21	33	15	45	14	93	1	7	18	55	14	78	4	22
22	106	80	75	78	98	4	5	26	25	20	77	1	4
23	227	183	81	164	90	11	6	44	19	34	77	3	7
24	177	95	54	79	83	1	1	82	46	49	60	1	1
25	83	47	57	45	96	5	11	36	43	34	94	0	0
26	170	48	28	40	83	20	42	122	72	95	78	39	32
27	91	46	51	29	63	0	0	45	49	26	58	1	2
28	32	3	9	1	33	0	0	29	91	17	59	1	3
29	60	24	40	18	75	0	0	36	60	25	69	0	0
30	21	16	76	13	81	1	6	5	24	4	80	1	20
31	14	8	57	7	88	0	0	6	43	4	67	1	17

Table 58a. Administration maternal antenatal steroid to mothers of babies born <32 weeks according to centres, 2006

Centres	Babies <1500 gms	Babi <1500 wit anten stero	es gms h atal ids	Bab <1500 wit anter steroid ventila supp	ies ) gms th natal Is and atory port	Bab <19 gms anter ster with on	oies 500 with natal oids CPAP ily	Babi <1500 witho anten stero	es gms out atal ids	Bab <1500 with anter steroid ventila supp	ies gms out atal s and atory oort	Bab <15 gn with anter stere with on	vies 500 ns nout natal pids CPAP ly
		No	%	No	%	No	%	No	%	No	%	No	%
All centres	3586	1978	55	1575	80	241	12	1606	45	1056	66	172	11
2	216	137	63	92	67	8	6	79	37	46	58	4	5
3	172	131	76	108	82	30	23	40	23	22	55	2	5
4	88	50	57	43	86	7	14	38	43	22	58	1	3
5	226	97	43	60	62	10	10	129	57	71	55	12	9
6	123	31	25	17	55	3	10	92	75	59	64	11	12
7	263	162	62	149	92	19	12	101	38	66	65	9	9
8	172	72	42	67	93	9	13	100	58	70	70	12	12
9	135	93	69	64	69	10	11	41	30	18	44	3	7
10	115	42	37	35	83	3	7	73	63	50	68	6	8
11	34	25	74	16	64	1	4	9	26	7	78	0	0
12	83	53	64	49	92	6	11	30	36	24	80	3	10
13	82	55	67	51	93	21	38	27	33	20	74	6	22
14	35	29	83	24	83	3	10	6	17	5	83	1	17
15	80	38	48	32	84	9	24	42	53	22	52	4	10
16	141	77	55	59	77	9	12	64	45	55	86	4	6
17	122	41	34	38	93	7	17	81	66	74	91	16	20
18	43	32	74	21	66	5	16	11	26	8	73	2	18
19	137	100	73	79	79	9	9	37	27	22	59	2	5
20	96	72	75	63	88	15	21	24	25	17	71	6	25
21	33	14	42	13	93	3	21	19	58	13	68	3	16
22	116	83	72	74	89	5	6	33	28	23	70	2	6
23	257	207	81	169	82	9	4	50	19	36	72	2	4
24	179	84	47	71	85	1	1	95	53	53	56	0	0
25	95	58	61	52	90	6	10	37	39	32	86	0	0
26	304	90	30	64	71	30	33	214	70	148	69	58	27
27	89	47	53	27	57	0	0	42	47	24	57	1	2
28	36	2	6	0	0	0	0	34	94	18	53	1	3
29	80	31	39	19	61	1	3	49	61	26	53	1	2
30	26	21	81	15	71	2	10	5	19	3	60	0	0
31	8	4	50	4	100	0	0	4	50	2	50	0	0

Table 58b. Administration of maternal antenatal steroid to mothers of babies born <1500gms according to centres, 2006

Centre	All babies	Babies with Birthweight <u>&lt;</u> 1500 gms		Babie Birthweig gms ai	s with ght <u>&lt;</u> 1500 nd RDS	Babies with Birthweight ≤1500 gms and RDS with Ventilatory support		
		No	%	No	%	No	%	
All centres	10387	3586	35	2565	72	2280	89	
2	566	216	38	128	59	115	90	
3	494	172	35	122	71	114	93	
4	265	88	33	63	72	57	90	
5	633	226	36	136	60	107	79	
6	438	123	28	76	62	64	84	
7	862	263	31	159	60	146	92	
8	548	172	31	130	76	115	88	
9	380	135	36	90	67	72	80	
10	329	115	35	73	63	66	90	
11	104	34	33	20	59	20	100	
12	199	83	42	72	87	69	96	
13	280	82	29	61	74	61	100	
14	106	35	33	32	91	27	84	
15	241	80	33	64	80	53	83	
16	413	141	34	115	82	105	91	
17	368	122	33	80	66	78	98	
18	108	43	40	32	74	27	84	
19	364	137	38	92	67	87	95	
20	309	96	31	74	77	69	93	
21	119	33	28	28	85	24	86	
22	437	116	27	97	84	90	93	
23	627	257	41	226	88	202	89	
24	456	179	39	124	69	114	92	
25	293	95	32	83	87	80	96	
26	779	304	39	232	76	196	84	
27	179	89	50	56	63	48	86	
28	84	36	43	16	44	12	75	
29	266	80	30	53	66	39	74	
30	113	26	23	24	92	17	71	
31	27	8	30	7	88	6	86	

Table 59a. Babies with birth weights <1500gms with RDS requiring ventilator support according to centres, 2006

		Babies with Birthweight		Babies	with	Babies with Birthweight		
Contro	All babies			Birthweig	nt <u>&lt;</u> 1500	<u>&lt;</u> 1500 gms and	d RDS with	
Centre		<u>&lt;</u> 1500	gms	gms an	d RDS	CPAP o	only	
		No	%	No	%	No	%	
All centres	10387	3586	35	2565	72	317	12	
2	566	216	38	128	59	71	55	
3	494	172	35	122	71	101	83	
4	265	88	33	63	72	33	52	
5	633	226	36	136	60	75	55	
6	438	123	28	76	62	35	46	
7	862	263	31	159	60	95	60	
8	548	172	31	130	76	86	66	
9	380	135	36	90	67	56	62	
10	329	115	35	73	63	43	59	
11	104	34	33	20	59	1	5	
12	199	83	42	72	87	25	35	
13	280	82	29	61	74	49	80	
14	106	35	33	32	91	16	50	
15	241	80	33	64	80	35	55	
16	413	141	34	115	82	68	59	
17	368	122	33	80	66	29	36	
18	108	43	40	32	74	21	66	
19	364	137	38	92	67	50	54	
20	309	96	31	74	77	62	84	
21	119	33	28	28	85	12	43	
22	437	116	27	97	84	58	60	
23	627	257	41	226	88	131	58	
24	456	179	39	124	69	11	9	
25	293	95	32	83	87	13	16	
26	779	304	39	232	76	142	61	
27	179	89	50	56	63	7	13	
28	84	36	43	16	44	1	6	
29	266	80	30	53	66	10	19	
30	113	26	23	24	92	11	46	
31	27	8	30	7	88	4	57	

Table 59b. Babies with birth weights <1500g with RDS requiring CPAP only according to centres, 2006

		Babies	<32	Babies <	32 weeks	Babies <32 weeks and RDS with		
Centre	All babies	weel	s	and	RDS	ventilatory	support	
		No	%	No	%	No	%	
All centres	10387	3153	30	2492	79	2269	91	
2	566	166	29	129	78	119	92	
3	494	170	34	132	78	121	92	
4	265	75	28	60	80	58	97	
5	633	191	30	124	65	100	81	
6	438	92	21	76	83	65	86	
7	862	240	28	162	68	149	92	
8	548	167	30	137	82	124	91	
9	380	120	32	88	73	72	82	
10	329	95	29	68	72	64	94	
11	104	33	32	24	73	24	100	
12	199	86	43	76	88	73	96	
13	280	67	24	54	81	54	100	
14	106	37	35	34	92	27	79	
15	241	78	32	73	94	63	86	
16	413	150	36	126	84	120	95	
17	368	122	33	77	63	75	97	
18	108	41	38	32	78	29	91	
19	364	122	34	99	81	97	98	
20	309	87	28	73	84	68	93	
21	119	33	28	28	85	25	89	
22	437	106	24	103	97	97	94	
23	627	227	36	216	95	197	91	
24	456	177	39	127	72	118	93	
25	293	83	28	81	98	78	96	
26	779	170	22	144	85	128	89	
27	179	91	51	60	66	51	85	
28	84	32	38	15	47	11	73	
29	266	60	23	44	73	35	80	
30	113	21	19	18	86	16	89	
31	27	14	52	12	86	11	92	

Table 60a. Babies with gestation <32 weeks with RDS requiring ventilator support according to centres,</th>2006

		Babie	s <32	Babies <32 weeks		Babies <32 weeks and	
Centre	All babies	wee	eks	and	RDS	RDS with	CPAP only
		No	%	No	%	No	%
All centres	10387	3153	30	2492	79	288	12
2	566	166	29	129	78	67	52
3	494	170	34	132	78	109	83
4	265	75	28	60	80	35	58
5	633	191	30	124	65	71	57
6	438	92	21	76	83	33	43
7	862	240	28	162	68	95	59
8	548	167	30	137	82	94	69
9	380	120	32	88	73	53	60
10	329	95	29	68	72	44	65
11	104	33	32	24	73	2	8
12	199	86	43	76	88	29	38
13	280	67	24	54	81	44	81
14	106	37	35	34	92	16	47
15	241	78	32	73	94	40	55
16	413	150	36	126	84	79	63
17	368	122	33	77	63	24	31
18	108	41	38	32	78	23	72
19	364	122	34	99	81	51	52
20	309	87	28	73	84	61	84
21	119	33	28	28	85	11	39
22	437	106	24	103	97	66	64
23	627	227	36	216	95	135	63
24	456	177	39	127	72	11	9
25	293	83	28	81	98	12	15
26	779	170	22	144	85	88	61
27	179	91	51	60	66	8	13
28	84	32	38	15	47	1	7
29	266	60	23	44	73	9	20
30	113	21	19	18	86	11	61
31	27	14	52	12	86	7	58

Table 60b. Babies with gestation <32 weeks with RDS requiring CPAP only according to centres, 2006

# 6.0 References

- Stevens TP, Blennow M, Myers EH,Soll R. Early surfactant administration with brief ventilation vs. selective surfactant and continued mechanical ventilation for preterm infants with or at risk for respiratory distress syndrome. *Cochrane Database of Systematic Reviews* 2007, Issue 4. Art. No.: CD003063. DOI: 10.1002/14651858. CD0030 63.pub3.
- Doyle LW, Halliday HL, Ehrenkranz RA et al, Impact of Postnatal Systemic Corticosteroids on Mortality and Cerebral Palsy in Preterm Infants: Effect Modification by Risk for Chronic Lung Disease, Pediatrics 2005;115:655-661
- 3. American Academy of Paediatrics Committee of Fetus and Newborn and the Canadian Pediatric Society Newborn and Fetus Committee, Postnatal Corticosteroids to treat or prevent chronic lung disease in preterm infants. *Paediatrics & Child Health* 2002;7(1): 20-28
- Papile LA, Burstein J, Burstein R et al. Incidence and evolution of subependymal and intraventricular hemorrhage: a study of infants with birth weights less than 1,500 gm. *J. Pediatrics* 1978;92(4):529-34

# **DEFINITIONS AND CRITERIA**

Centre Name: Name of participating hospital

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

### 'Case Status':

*Inborn*- born in the same hospital as the participating site. If born within the wards of the participating hospital to be considered as inborn (unless in the ambulance – born before arrival[BBA])

*Outborn*: Born in another place (includes BBA, transfers after birth from another hospital or home to the NNU of the participating site, and those born in the NNU hospital compound.)

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

### **SECTION 1: Patient Particulars**

- 1. Name of patient: Name as in hospital record
- 2. *RN:* Registration Number at participating hospital. If the baby dies in Labour room and has no RN, then use the mother's RN.
- 3. Mother's identity: New IC or Passport number
- 4. Date of Birth: dd/mm/yy
- 5. Time of Birth: am/pm
- 6. Ethnic group: Malay / Chinese / Indian / Orang Asli / Bumiputra Sabah / Bumiputra Sarawak / Non-citizen / Other Malaysian: If Bumiputra Sabah or Bumiputra Sarawak please specify the indigenous group. In the case of mixed marriages, ethnic group of the baby is defined by the ethnic group of the mother.
- 7. *Maternal Age:* Age in completed years.
- 8. GPA: Gravida\_Para\_Abortion (of current pregnancy before delivery of this child)
- 9. State 'yes' or 'no' if mother had insulin dependent diabetes (regardless of whether it is gestational or pre-gestational)

### **SECTION 2: Birth History**

- 10. *Antenatal steroid:* State 'yes' or 'no' if this has been given (regardless of number of doses or when it was given).
- 11. *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, not topical antibiotics.

- 12. **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.
- 13. 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 dates to be selected if done earlier than 25 weeks if there is a discrepancy with Last Menstrual Period (LMP) dates. Otherwise use LMP dates 2) New expanded Ballard scoring. If there is no definite estimate but baby is referred to as term baby, enter 40
- Growth status: based on Intrauterine Growth Curves (Composite Male / Female) chart. Small for Gestational Age (SGA) <10<sup>th</sup> centile; Appropriate for Gestational Age (AGA) 10-90<sup>th</sup> centile; Large for Gestational Age (LGA) >90<sup>th</sup> centile
- 15. *Gender*: Indicate Male, Female or Indeterminate
- 16. Place of birth: 1. University Hospital
  - 2. General Hospital
  - 3. Private Hospital
  - 4. District Hospital with specialist
  - 5. District Hospital without specialist
  - 6. Private Maternity Home
  - 7. Home
  - 8. Others (e.g. in transit, please specify)

All big city government hospitals are considered as General hospitals and ticked as 2. District hospitals with specialist refer to the availability of specialist post even if this post is not filled.

- 17. *Multiplicity:* To indicate as singleton, twin, triplet or others i.e. quadruplets, etc.
- 18. *Mode of delivery:* Tick as relevant. Rarely more than 1 may apply. All caesarians are considered as such without differentiation into upper or lower segment.
- 19. *CRIB(Clinical Risk Index for Babies) score*: Apply scoring sheet for all babies at less than 31 weeks' gestation or birth weight 501 1500 gm, add up the scores (obtained within 12 hours of birth) and state the total score. Indicate as NA if scoring was inadvertently not done and 'moribund' if case was in a very poor condition and resuscitation had failed or aggressive treatment was not attempted. In well babies score blood gas as normal if blood gas was not done.

# **SECTION 3: Neonatal Event**

20. Ventilatory support: 'Yes' or 'No'. If 'Yes' to tick what type of support was given

- 1. **CPAP** Use of Continuous Positive Airway Pressure administered by a nasal prong or nasopharyngeal apparatus, or via an endotracheal tube. Nasal cannula oxygen labeled as 'prongs' does not count as CPAP, but should be counted as 'Supplemental oxygen'.
- 2. Do not assume 'prongs' means nasal cannula: score as CPAP if there is pressure recorded, otherwise score as supplemental oxygen
- 3. **IMV** Intermittent Mandatory Ventilation given via a mechanical ventilator. Exclude manual hand-bagging during resuscitation at birth.
- 4. **IMV+PTV** Patient-triggered ventilation is inclusive of synchronized mandatory ventilation (SIMV) and other Assist-Control modes
- 5. HFPPV High frequency positive pressure ventilation of rate >120/min
- 6. HFOV High frequency oscillatory ventilation as delivered by an oscillator.
- 7. Nitric oxide Gas used as a pulmonary vasodilator and administered via a ventilator
- 8. Others may include High Frequency Jet Ventilation (HFJV) or Liquid ventilation

Oxygen hood/head-box therapy and incubator oxygen therapy are not included as ventilatory support.

- 21. *Total Duration of Ventilatory support*: Inclusive of CPAP (even if on air CPAP). State to next complete day i.e. < 24 hours is 1 day and 2 days 4 hours is 3 days.
- 22. **Antibiotics:** May choose more than one answer. Indicate as relevant. Penicillin is meant only for Penicillin, and not other 'penicillin' group of drugs
- 23. *Surfactant*: Indicate whether given or not. If 'yes' state if given within 2 hours.
- 24. *Post Natal Steroid for CLD*: Indicate given or not for chronic lung disease (CLD). Steroids given for other purposes e.g. hypotension and laryngeal oedema will not be included.
- 25. *Parenteral Nutrition*: Nutrition given intravenously. Parenteral nutrition must include amino acids with or without fats, hence plain dextrose saline infusion in not parenteral nutrition.
- 26. *Enteral Nutrition on Discharge:* State 'yes' if any form of feeding was given through the gastrointestinal tract. For type of feeding choose one option i.e. 'Exclusive breastfeeding / breast milk feeds', 'Exclusive formula feeds' or 'Mixed feeds'
- 27. *Retinopathy Of Premature (ROP) screening:* Indicate whether screening for retinopathy of prematuriy was done or not
- 28. Ultrasound brain: Indicate whether procedure was done or not

# **SECTION 4: Outcome**

- 29. *Date of discharge:* Enter the exact date
- 30. *Weight (grams) of discharge or death or transfer out:* Weight on Death is the last weight taken when the baby is alive. Enter the exact weight in grams.
- 31. *Growth Status at Discharge:* based on Intrauterine Growth Curves (Composite Male / Female) chart. SGA<10<sup>th</sup> centile; AGA 10-90<sup>th</sup> centile; LGA >90th centile.
- 32. *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.
- 33. *Outcome:* Alive or Dead Alive at discharge or died before discharge.

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

**Post transfer disposition.** If a case is transferred to another hospital in the NNR network, complete the CRF up to current status and send form with the baby. The referral centre would 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 'outcome' and 'duration of stay' information from the unit that the case was referred to.

If child died, state Place of Death to: Labour Room/OT, In Transit Neonatal Unit and others, specify.

### **SECTION 5: 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 in Appendix 3. 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

# **DEFINITIONS OF CERTAIN SPECIFIED DIAGNOSES** (modified from ICD 10)

Diagnosis	Definition
Respiratory distress syndrome (RDS). Tick 'yes' or 'no'	Respiratory distress syndrome or hyaline membrane disease (presence of clinical respiratory distress in a premature infant with/without characteristic CXR picture after exclusion of other causes)
Patent ductus arterious (PDA). State if absent (No) or how treated. More than one response is acceptable	As diagnosed clinically, i.e. murmur present with or without wide pulse pressure, or by echocardiography
Pneumothorax Tick 'yes' or 'no'	As diagnosed by chest X-ray, thoracentesis with documented removal of air or autopsy report. While placement of a chest tube is a common response, it is not necessary for diagnosis.
Necrotising enterocolitis (NEC) (Stage 2 and above) Tick only one response. If no NEC or only stage 1 tick 'none'. If managed medically only tick 'Medical Rx'. If managed medically and surgically tick 'Surgical Rx'	<ul> <li>NEC according to Bell's criteria stage 2 or higher</li> <li>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)</li> <li>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,</li> </ul>
	pneumatosis intestinalis, portal vein gas) <b>Stage 3 :</b> 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)
Hypoxic ischaemic encephalopathy (HIE)	Applies only to infants >2000 g with 1) History of perinatal event consistent with injury (fetal distress, low apgar scores, need for resuscitation) and Abnormal neurologic exam over the first 2-3 days of life

Highest total serum bilirubin (SB) If no jaundice or SB was not done tick 'NA'	Bilirubin level as determined on a blood sample
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.
Seizures	Confirmed as witnessed by two or more clinicians or diagnosed by EEG. Used synonymously with fits or convulsions
Infections An individual case may have > one episode of infection i.e. a confirmed bacterial sepsis (for which organism should be stated) and an episode of clinical sepsis. Tick both in this situation. If two episodes of confirmed sepsis, tick once, but indicate the organisms accordingly (may be once if they are the same in both infections)	<ul> <li>Presumed sepsis</li> <li>In the presence of risk factors for infection, for example, maternal pyrexia or preterm pre-labour rupture of membranes but subsequent clinical picture and investigations showed absence of infection</li> <li>Clinical sepsis</li> <li>One of the following clinical signs or symptoms with no other recognised cause: Fever (&gt;38°C), hypothermia (&lt;37°C), apnoea, bradycardia and all of the following:</li> <li>a. Blood culture not done or no organism or antigen detected in blood</li> <li>b. No apparent infection at another site</li> <li>c. Physician institutes appropriate antimicrobial therapy for sepsis</li> <li>Confirmed sepsis</li> <li>Clinical evidence of sepsis plus culture-proven infection</li> <li>e.g.: positive blood, urine, or CSF culture or positive bacterial antigen test. Include congenital pneumonia if blood culture was positive. State organism as indicated or specify others</li> </ul>
Intraventricular haemorrhage (IVH) State if 'None' or Grade 1 to 4. If ultrasound is not done state 'Not applicable /Not checked'. If present, state if VP shunt/reservoir was inserted	<ul> <li>Definition of the grades:</li> <li>Grade 1 : Isolated germinal matrix haemorrhage</li> <li>Grade 2 : Intraventricular haemorrhage with normal ventricular size</li> <li>Grade 3 : Intraventricular haemorrhage with acute ventricular dilation</li> <li>Grade 4 : Intraventricular haemorrhage with parenchymal haemorrhage</li> </ul>

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. If screening was not done tick 'Not Applicable/Not checked' State if laser or cryotherapy was done.	<ul> <li>Stage 1: Demarcation Line</li> <li>Stage 2: Ridge</li> <li>Stage 3: Ridge with Extraretinal Fibrovascular Proliferation</li> <li>Stage 4: Retinal Detachment</li> </ul>
Congenital anomalies Are listed according to known 'syndromes', 'inborn error of metabolism', 'multiple congenital abnormalities and 'important isolated anomaly'.	Please refer to WHO ICD 10 for definitions of various abnormalities
For 'Others' please specify.	
Meconium aspiration syndrome	Occurs when born via meconium-stained liquor with clinical picture of respiratory distress and subsequent Chest X-Ray changes consistent with meconium aspiration
Pulmonary haemorrhage	Pulmonary haemorrhage originating in the perinatal period (as diagnosed clinically by pink or red frothy liquid draining from the mouth or arising from the trachea between the vocal cord or suctioned through the endotracheal tube. Diagnosis may also be made on autopsy finding of haemorrhage in the lungs)
Pulmonary interstitial emphysema	X-ray findings of air-leak in the interstitium of the pulmonary system
Pneumonia	Infection of the lungs acquired prepartum, intrapartum, at birth or after birth. (Diagnosed with or without cultures). Diagnosis is made clinically and supported by CXR findings
Neonatal encephalopathy	Situation of disturbed neurological function in the infant at or near term during the first week after birth, manifested by difficulty in initiating and maintaining respiration, depression of tone and reflexes, altered consciousness, and often seizures but do not fulfill criteria for 'Birth Asphyxia' (see above)

Neonatal meningitis	Signs of clinical sepsis and evidence of meningeal infection as shown in cerebrospinal fluid findings (i.e. cytology, biochemistry or microbiologic findings)
Disseminated intravascular coagulation (DIVC)	Clinical bleeding and confirmed by prolonged Prothrombin Time (PT), Activated Partial Thromboblastin Time (APTT) and low platelets
Polycythaemia neonatorum	Venous or arterial haematocrit above 65%
Anaemia of prematurity	Defined as Haemoglobin (Hb) <8 gm% in a growing premie
Renal failure	Renal failure (due to any cause). Diagnosis is made clinically and supported by results of blood urea and or serum creatinine. Abnormal results that are readily reversible with appropriate hydration is not considered as renal failure
Congenital intrauterine infection	Diagnosis made clinically and supported by microbiological/serological results. State organism if known e.g. Rubella, CMV, herpes, and varicella or state unspecified

# **National Neonatal Registry**

# **MONTHLY BIRTH CENSUS**

Hospital	:		
Month	:		Year :
<b>Total Births</b>	:	Live Births:	Stillbirths:

# **Deliveries versus Birth Weight**

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				

\*\* CRF to be filled for each case

# 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				

\*\* CRF to be filled for each case

# **APPENDIX 2**

Ethi	nic 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 Malay	ysian				
TOTAL					

# **Births versus Ethnic Group**

\*\* CRF to be filled for each case

Remarks:

.....

.....

Name of Site Coordinator:	
Chop:	Date:

- 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.
- Samples of tracking forms are as follows.

# **APPENDIX 3**

Centre Name:		Inborn	Outborn	Office ,
		New Case	Readmission u	se:
Date of Admission:	(dd/mm/yy)	Referral from, if	relevant: C	centre:
SECTION 1 : PAT	IENT PARTICULARS			
1. Name:			1	2. RN:
3. Mother's I/C Number:	New IC:		Passport:	-
4. Date of Birth:			(dd/mm/yy)	
5. Time of Birth:	:	AM / PM		
6. Ethnic group:	Malay     Indian     Chinese     Orang A	Asli Dumiputra S	Sabah, specify: Sarawak, specify:	Other M'sian
7. Maternal Age:				
8. GPA:	G: P:	A:		
9. Insulin dependent diabetes in mother:	Yes	🗌 No		NA NA
SECTION 2 : BIRT	I H HISTORY			
Drugs Used In Labour	10. Antenatal Steroid:	Yes		No
	11. Intrapartum Antibiotic:	Yes	_	No
12. Birth Weight:		(grams)		
13. Gestation:		(weeks)		
14. Growth Status:	SGA	AGA		LGA
15. Gender:		Female		
16. Place of Birth:	General Hospital	District Hos	pital with Specialist	Others specify:
	Private Hospital	Private Mat	ernity Home	
17. Multiplicity:	Singleton Others, specify:	🗌 Twin		Triplet
18. Mode of Delivery:	SVD	Breech		Forceps
	Ventouse	Caesarean	Section	Unknown
19. CRIB Score for birth weight 501-1500 gms:	Score :	NA		Moribund
SECTION 3 : NEO	NATAL EVENT			
20. Ventilatory	Yes -> CPAP	IMV	HFOV	Others. specify:
Support: (Check all that apply)		IMV + PTV	Nitric Oxide	
21. Total Duration of Ventilatory Support:	(in days)			
22. Antibiotics: (Check all that	☐ Yes → ☐ Penicillin		3rd Cephalosporin	Carbapenem
apply)	No Aminoglyc 2nd Cepha	oside alosporin	<ul><li>4th Cephalosporin</li><li>Vancomycin</li></ul>	Others, specify:
23. Surfactant:	☐ Yes → ☐ ≤ 2 hrs No		> 2 hrs	
24. Post Natal Steroid for CLD:	Yes		No	
25. Parenteral Nutrition:	Yes		No	
26. Enteral Nutrition on discharge:	☐ Yes     →     Exclusive       ☐ No     / breastmil	breast feeding lk feeds	Exclusive formula feeds	Mixed feeds
27. ROP screening:	Yes	×	No	
	1			

29. Date of Disch	arge:			1	1		(dd/mm/yv)
30. Weight on Dis	scharge / De	ath / Transfer out:				(grams)	(da, iiii, yy)
31. Growth Status at discharge:			SGA	AGA		LGA	
32. Total Duration	n of hospital	stay (Neonatal / Paec	Is Care):	(in cor	npleted days)		
33. Outcome: P	Place of Disc	harge:					
Alive _	Home		Transfer to O	ther Hospitals			
<ul> <li>Social we</li> <li>Other No</li> <li>Still hospi</li> <li>birthday</li> </ul>		fare home	Name of Ho				
		n Paeds Ward	Reasons				
		talized as of 1st	of	Stepdown care Social / Logistic reason			
			Transfer:	Chronic care Others, specify:			
			Post Transfe	er Disposition			
				section if place transfer	Transformed to	t of the NNR Net	twork):
			Dea	th	Readmitted t	o your hospital	lospital
			Still	hospitalized as of 1st birt	hday		
			b. Duration	of stay in the hospital tra	nsferred to:	(in c	completed days)
Dead P	Place of Deat	n: Labour Room/	OT 🗌 In T	Fransit Neonatal I	Jnit 🗌 Others	s. specify:	
SECTION 5	: PROB	LEMS / DIAGN	OSES				
Mandatory fields	for diagnose	es / procedures:					
1. RDS		2. PDA		3. Pneumothorax		4. Suppleme	ental oxygen at:
No res		Indomethacin/lbu	profen > 24hrs			Day 28:	
		Ligation				fes	
		Not treated				36 weeks o	corrected age:
		NA / Unknown					
5. NEC (Stage 2 a	ind above)	6. ROP		7. IVH		8. HIE (BW >	> 2000 gm)
Medical Rx		Stage 1		Grade 1 Grade 2 Grade 3		Mild / Moderate	
Surgical Rx		Stage 2				Severe	
NA / Unknown		Stage 3				NA / Unknown	
		Stage 4		Grade 4	Checked	Not applie	cable
		Not Applicable / N	lot Checked	VP shunt / reservoir	insertion		
		Laser therapy					
		Cryotherapy					
9. Seizures		10. Infection		11. For confirmed sep	sis:	12. Highest	total bilirubin
Suspected		Presumed sepsis		MRSA		umoi/i	
Definite		Clinical sepsis				🗌 NA	
NA / Unknown		Confirmed sepsis		ESBL organisms			
				Fungal			
13 Congonital Ar	omalice			Uners, specify:			
13a. Congenital A	Anomalies		13b. Type	s of Abnormalities ( Ch	eck all that are r	present. Annlies	to all
Yes	No		inclu	iding 'syndromes' and '	not a recognise	d syndrome', 's	ingle' and '
¥			mult	iple abormalities' )		7	-
Syndrome (k	nown)	Not a Recognised	None			Abnormal Faci	ies, Specify:
+		Syndrome		Cyanotic Acvanotic		Respiratory	
Down		121				GIT	
Edward				Others, check		Hydrops	
Patau	necify (Place	e refer to ICD 101	1			Renal	
Utners, s	pecily (Pleas	e refer to ICD 10):	Neura	Spina bifida		Cleft -	Lip
			Tube	Apencephaly			Palate
			Detect	Others, check	ICD10		Lip and Palate
					[	Others, speci	ify:





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

# **Definition of Neonatal Facilities Based on Function**

# Level I Neonatal Care (Basic), well-newborn nursery: has the capabilities 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

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  $\geq$ 1500 g (1) who have physiologic 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

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 are subdivided into 3 categories:

Level III A: has the capability to

Provide comprehensive care for infants born at >28 weeks' gestation and weighing >1000g

Provide sustained life support limited to conventional mechanical ventilation Perform minor surgical procedures such as placement of central venous catheters or inguinal hernia repair

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 surgery 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

Level III C NICU: has the capabilities of a level III B NICU and also is located within an institution that has the capability to provide extracorporeal membrane oxygenation (ECMO) and surgical repair of complex congenital cardiac malformation that require cardiopulmonary bypass

#### PAPERS PRESENTED

- Cheah IGS. Overview of the Critically III Newborn Status and Survival Outcome in MNNR Hospitals. Presented at the MNNR Scientific Meeting, Selayang Hospital, Malaysia, 2008
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## **ABBREVIATIONS**

BPD	Bronchopulmonary Dysplasia
BW	Birthweight
СА	Congenital Abnormalities
CLD	Chronic Lung Disease
СРАР	Continuous Positive Airway Pressure
CRC	Clinical Research Centre MOH
<sup>c</sup> RF	Case Report Form
CUS	Cerebral Ultrasound Scan
ELBW	Extremely Low Birth Weight
HFOV	High Frequency Oscillatory Ventilation
HFPPV	High Frequency Positive Pressure Ventilation
IMV	Intermittent Mandatory Ventilation
IMV + PTV	Intermittent Mandatory Ventilation + Patient Triggered Ventilation
LSCS	Lower Segment Caesarean Section
MAS	Meconium Aspiration Syndrome
NE	Neonatal Encephalopathy
NEC	Necrotising Enterocolitis
NICU	Neonatal Intensive Care Unit
NNU	Neonatal Unit
NO	Nitric Oxide
NRU	Neonatal Registry Unit
PN	Parenteral Nutrition
PTX	Pneumothorax
RDS	Respiratory Distress Syndrome
ROP	Retinopathy of Prematurity
Rx	Treatment
SVD	Spontaneous Vertex Delivery
VLBW	Very Low Birth Weight
VS	Ventilatory Support