Report of the Malaysian National Neonatal Registry 2004

A Study of Critically Ill Babies in Neonatal Intensive Care Units

Edited by:
Nyok-Ling Lim

NNR Steering Committee:
Nyok-Ling Lim
Jimmy Lee
Irene Cheah
Anna Padma Soosai
Ismail Haron
Hans van Rostenberghe

Report of the

Malaysian National Neonatal Registry 2004

A Study of Critically Ill Babies in Neonatal Intensive Care Units

Edited by:
Nyok-Ling Lim

NNR Steering Committee:
Nyok-Ling Lim
Jimmy Lee
Irene Cheah
Anna Padma Soosai
Ismail. Haron
Hans van Rostenberghe

The Malaysian National Neonatal Registry is located at:

National Neonatal Registry Unit
Hospital Selayang,
Lebuhraya Selayang-Kepong,
68100, Batu Caves,
Selangor Darul Ehsan.
Tel: (603) **61352008** / 61203233 Ext. 8011
Fax: (603) 61352008
E-mail: nnr@acrm.org.my
Website: http://www.acrm.org.my/nnr

Suggested citation is:
Lim Nyok Ling for the MNNR. *The 2004 report of the Malaysian National Neonatal Registry,* Kuala Lumpur MNNR 2006.

Main Sponsors of the NNR 2004

- Office of the Deputy Director General of Health Malaysia (Research and Technical Support) Ministry of Health , Malaysia
- Clinical Research Centre, Hospital Kuala Lumpur

CONTENTS

LISTING OF TABLES

LISTING OF FIGURES

FOREWORD

It is with a great sigh of relief and satisfaction that this report is finally ready. As it is the report of the result of the first year study of the 'Outcome of Critically Ill Babies in the Neonatal Intensive Care Units (NICUs) in Malaysia' analysis of the data has been kept at quite a minimal level. The various outcomes e.g. survival rates, rates of infections and rates of screening for retinopathy of prematurity are described largely as overall outcomes in the main section of the report. Nevertheless data of a variety of outcome measures according to participating centres are also included in tables at the back section of the report.

The steering committee has identified some individual participants to use the data that has been captured in the NNR to study in further detail some important aspects of outcome of this group of ill babies e.g. 'Outcome of extremely low birth weight babies' and 'NICU outcome according to socioeconomic status of states'. These papers will be presented at certain forums and conferences and it is hoped that a few will be published in journals. We encourage all source data producers to be involved in more detailed report-writing of some specific aspects of NICU outcomes.

We appreciate the great amount of work and effort each hospital has put in to realise the establishment of this registry and we urge each centre to study its performance in relation to other centres. It will be seen that some centres may have better outcome in terms of mortality while others in terms of morbidity eg infection rate and duration of hospital stay.
It is important that we identify weaknesses and strengths of each centre to facilitate quality improvement strategies to be implemented. Some problems may pertain to infrastructure and equipment while others to expertise and manpower.

It is hoped that this registry will grow each year in terms of engaging participation of increasing numbers of NICUs, and in sophistication of the design and study protocol and data analysis. It is also hoped that it will be the stimulus for auditing of NICU performance and further research activity and hence serve as a vital source of data-based evidence on which to formulate best-care practices for sick newborns in the country.

Dato' Dr Lim Nyok Ling
Chairman
Malaysian National Neonatal Registry

ACKNOWLEGEMENTS

The National Neonatal Registry would like to express its grateful appreciation to all who have contributed in various ways to make the NNR a success.

We would like to especially thank the following:

- Y.B. Dato' Dr Chua Soi Lek, the Honorable Minister of Health for his encouragement and support.
- Yang Bahagia Datuk Dr Mohd Ismail Merican the Director-General of Health, Malaysia for approving a research grant to study the 'Outcome of critically ill babies in NICUs' in 2004 and hence spearheading the NNR project.
- Dato' Dr Zaki Morad B Mohd Zaher the chairman of the Ministry of Health Research Committee for his inspiration and challenge to clinicians to be involved in outcome studies and his guidance in setting up the Registry.
- Staff of the Clinical Research Centre of Ministry of Health for their technical support.
- Members of the Advisory Committee who provided conceptual and intellectual input to set the objectives, directions, policies and progress of the Registry
- Our dedicated source data providers consisting of all the doctors and nurses from the participating centres who continue to work hard at this project amidst their very hectic service load and other commitments in the NICUs.
- And of course not forgetting our sponsors and supporters from the professional bodies, industry, other institutions and individuals not listed here.

  Perinatal Society of Malaysia
  Malaysian Paediatric Foundation
  Abbott Laboratories (M) Sdn Bhd
  Yayasan Budi Penyayang Malaysia (PENYAYANG)
  Sekolah Menengah Sri Kuala Lumpur
  Dumex Sciences
  Mead Johnson Malaysia
  Frisenius Kabi Malaysia
  Hwang DBS (M) Berhad
  Lejadi Holdings Sdn Bhd
  B. Braun Medical Supplies Sdn Bhd
  Gadang Holdings Berhad

PARTICIPATING CENTRES

1. Alor Setar Hospital
2. Ipoh Hospital
3. Kajang Hospital
4. Kuala Lumpur Hospital
5. Kuala Terengganu Hospital
6. Likas Hospital
7. Melaka Hospital
8. Pulau Pinang Hospital
9. Putrajaya Hospital
10. Raja Perempuan Zainab II Hospital
11. Sarawak General Hospital
12. Seberang Jaya Hospital
13. Selayang Hospital
14. Seremban Hospital
15. Seri Manjung Hospital
16. Sibu Hospital
17. Sultanah Fatimah Specialist Hospital
18. Taiping Hospital
19. Teluk Intan Hospital
20. Temerloh Hospital
21. Tengku Ampuan Afzan Hospital
22. Tengku Ampuan Rahimah Hospital
23. Tengku Fuziah Hospital
24. Universiti Sains Malaysia Hospital

ADVISORY COMMITTEE

Member	Designation and Institution
Dato' Dr Lim Nyok Ling (Chairperson)	Head of Paediatric Department, Selayang Hospital
Dato' Dr Jimmy Lee Kok Foo	Head of Paediatric Department, Kuala Terengganu Hospital
Dr Angeline Wan Seng Lian	Head of Paediatric Department, Muar Hospital
Dr Angeline Yeoh	Head of Paediatric Department, Seberang Jaya Hospital
Dr Chan Lee Gaik	Head of Paediatric Department, Sarawak General Hospital
Dr Chin Choy Nyok	Head of Paediatric Department, Tengku Ampuan Afzan Hospital
Dr Hussain Imam b Hj Mohammad Ismail	Head of Paediatric Institute, Hospital Kuala Lumpur
Dr Irene Cheah	Head of Neonatal Unit, Paediatric Institute, Kuala Lumpur Hospital
Dr Jamaiyah Haniff	Head, Epidemiology Unit, CRC, HKL
Dr Leow Poy Lee	Consultant Paediatrician, Melaka Hospital
Dr Mohd. Hanifah b Mohd Jamil	Head of Paediatric Department, Raja Perempuan Zainab II Hospital
Dr Neoh Siew Hong	Head of Paediatric Department, Taiping Hospital
Dr Nooraziah bt Zainal Abidin	Principal Assistant Director, Medical Development Division, Ministry of Health Malaysia
Dr S Padma Soosai	Consultant Paediatrician and Neonatologist, Paediatric Department, Tengku Ampuan Rahimah Hospital
Dr S. Yogeswery Sithamparanathan	Head of Paediatric Department, Tengku Ampuan Rahimah Hospital
Dr Siti Mazliah bt Kassim	Consultant Paediatrician, Putrajaya Hospital

LIST OF SITE COORDINATORS

Institution	Head of Department	Coordinators
Paediatric Department Alor Setar Hospital	Dr Teh Keng Hwang	Dr Teh Keng Hwang Sr Nooraini bt Suhud S/N Rabiah
Paediatric Department Ipoh Hospital	Dr Amar Singh	Prof Dr Jackie Ho Sr Jamaliah bt Md Rif S/N Tan Hai Hon
Paediatric Department Kajang Hospital	Dr Soo Min Hong	Dr Soo Min Hong Sr. Lim Beaw S/N Normadiah bt Majuddin
Paediatric Department Kuala Lumpur Hospital	Dr Hussain Imam b Hj Mohammad Ismail	Dr Irene Cheah Sr Sudha A/P Krishnan Kutty S/N Vanaja A/P Ramasamy Pillay S/N Sharifah bt Adam S/N Norida bt Ibrahim
Pediatric Department Kuala Terengganu Hospital	Dato' Dr Jimmy Lee Kok Foo	Dato' Dr Jimmy Lee Kok Foo Sr Sity Rahmah S/N Aishah bt Hassan
Paediatric Department Likas Hospital	Dr. Soo Thian Lian	Dr. Soo Thian Lian Sr Tomblow bt Nagadiran S/N Susie Sulinol
Paediatric Department Melaka Hospital	Dr Kuan Geok Lan	Dr Leow Poy Lee Sr Lim Geok Poh
Paediatric Department Putrajaya Hospital	Dr Fuziah bt Md Zain	Dr Siti Mazliah bt Kassim Sr.Khadijah bt Saidin S/N Mastura Redzuan

Institution	Head of Department	Coordinators
Paediatric Department Raja Perempuan Zainab II Hospital	Dr Mohd Hanifah b Mohd Jamil	Dr Hasmawati bt Hassan S/N Nolmawati bt Hassan S/N Noriyah bt Mat
Paediatric Department Sarawak General Hospital	Dr Chan Lee Gaik	Dr Chan Lee Gaik Sr Maria Kilat S/N Sabariah bt Kiflie
Paediatric Department Seberang Jaya Hospital	Dr Angeline Yeoh	Dr Angeline Yeoh Sr Ku Azini Ku Mohamad S/N Lee Soon Mui
Paediatric Department Selayang Hospital	Dato' Dr Lim Nyok Ling	Dr Chew Thean Meng Sr Fatimah bt Ahmad S/N Narayani A/P Kunjiraman S/N Khatijah bt Yusof
Paediatric Department Seremban Hospital	Dr Tan Kah Kee	Dr Ummathevi Sr Latifah bt Dato' Hj Nawawi S/N Sumathi Ramasamy
Paediatric Department Seri Manjung Hospital	Datin Dr Chan Sow Keng	Datin Dr Chan Sow Keng Sr Ainan Abdul Karim S/N Tham Ngun Lee
Paediatric Department Sibu Hospital	Dr Wong See Chang	Dr Audrey Chieng Chae Hee Sr Mary Tang Sing Chuo S/N Ting Meng Ling
Paediatric Department Sultanah Fatimah Specialist Hospital	Dr Angeline Wan Seng Lian	Dr Angeline Wan Seng Lian Sr Loh Siew Lin S/N Radiah Md. Said S/N Lon bt Ahmad
Paediatric Department Taiping Hospital	Dr Neoh Siew Hong	Dr Neoh Siew Hong Sr Asmah bt Zainal Abidin S/N Salmah bt Mohd Yusoff

Institution	Head of Department	Coordinators
Paediatric Department Teluk Intan Hospital	Dr Jeyaseelan P. Nachiappan	Dr Jeyaseelan P. Nachiappan Sr Hamedah Mian S/N Che Noor Zaini
Paediatric Department Temerloh Hospital	Dr K. Yogavijayan Kandasamy	Dr Priadarshini Somasundaram Sr Rokiah bt Ismail S/N Rosmawani
Paediatric Department Tengku Ampuan Afzan Hospital	Dr Chin Choy Nyok	Dr Chin Choy Nyok Sr Teh Abas S/N Teoh Yook Foon
Paediatric Department Tengku Ampuan Rahimah Hospital	Dr Yogeswery Sithamparanathan	Dr Yogeswery Sithamparanathan Dr Wong Yoke Peng Sr Ham Fin Lan S/N Zalimah bt Tukmim
Paediatric Department Tengku Fuziah Hospital	Dr Jamaluddin b Mohammad	Dr Jamaluddin b Mohammad Sr Zarinah Ahmad S/N Zarini bt Johari
Paediatric Department Universiti Sains Malaysia Hospital	Dr Norizan bt Majid	Prof.Dr Hans van Rostenberghe Sr Fatimah bt Ismail S/N Tan Beng Geok
Paediatric Department Pulau Pinang Hospital	Dr Revathy Nallusamy	Dr Mehala Sr Lee Bee Hoon S/N Chiang Ah Ying

STAFF OF NATIONAL NEONATAL REGISTRY UNIT

Clinical Registry Manager	Ms. Jennifer Loong
Clinical Registry Assistants	Ms. Sabariah bt Abdullah Ms. Shahirah bt Safian

SUPPORTING STAFF FROM THE CLINICAL RESEARCH CENTRE

The Clinical Research Centre (CRC) of the Ministry of Health provides technical support for the National Neonatal Registry. The clinical epidemiologists provide methodological and epidemiological input while the database is supported on CRC's IT infrastructure.

Director	Dr Zaki Morad B Mohamad Zaher
Head	Dr. Lim Teck Onn
Clinical Epidemiologist	Dr. Jamaiyah Haniff
Clinical Epidemiologist	Dr. Anita Das
Information & Communication Technology (ICT) Manager	Ms. Celine Tsai Pao Chien
Network Administrator	Mr. Kevin Ng Hong Heng
Assistant Network Administrator	Mr. Adlan Ab. Rahman
Database Administrator	Ms. Lim Jie Ying
Webmaster	Mr. Patrick Lum See Kai
Programmer	Mr.Sebastian Thoo / Mr. John Chong
Desktop publisher	Ms. Azizah Alimat

BIOSTATISTICAL CONSULTANTS

Biostatistician	Dr. Sharon Chen Won Sun
Biostatistician	Ms. Teh Poh Geok

1. Organisation of the Malaysian National Neonatal Registry (NNR)

1.1 History

In October 2001 at a National Paediatricians' meeting it was decided that a registry should be set up to study the outcome of sick babies admitted to Neonatal Intensive Care Units in the country. It was recognised that a minimum data set and a data collection system at a national level are important to monitor mortality and morbidity of infants admitted to NICUs

In collaboration with the Clinical Research Centre (CRC), Ministry of Health of Malaysia, a pilot study was first conducted from 1st October to 31st December in which 14 centres participated. A report of this study has been published in October 2003. It was concluded that the NNR is feasible and very useful information can be obtained for purposes of clinical management, resource allocation and policy development. The NNR proper was then launched on 1st January 2004 and 24 Neonatal Intensive Care Units (NICUs) were recruited.

The Malaysian NNR aims:

1. To determine the frequency and distribution of critically ill neonates in Malaysia. These are useful measures of the health burden arising of 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 among ill babies in NICUs.
6. To study in further detail outcome of very low birth weight babies.
7. To stimulate and facilitate research on neonatal critical illness and its management.

1.2 Structure

The NNR consisted of an Advisory Committee and administrative staff. The Advisory Committee was made up of senior pediatricians and neonatologists of participating units, three academic neonatologists from the Universities, a clinical biostatistician and epidemiologist. This committee was to monitor and direct the functions of MNNR and to approve request of use of data when the necessary.

The administrative staff was headed by a Clinical Registry Manager who was assisted by two registry assistants. Statistical support was provided by the CRC.

1.3 Funding

The Ministry of Health of Malaysia provided a research grant for 2 years in 2004 and 2005 to 'Study the outcome of critically ill babies in NICUs'. Considerable funding was also obtained from the Perinatal Society of Malaysia, the Malaysian Paediatric Foundation, Penyayang, Abbott Laboratories, Sekolah Menengah Sri KL, Subang Jaya, Frisenius Kabi and Hwang DBS. Some other institutions and individuals had also made invaluable contribution to fund the NNR. We thank all involved for their very generous and encouraging support.

2. Data Set

2.1 Registration Criteria

The NNR 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 with a birth weight of 1500 grams and below
   3. Were ventilated
   .

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

Both inborn and out born babies will be included but out born 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

In the pilot study centres had the option of collecting data for all babies admitted to the NNU or only a sub-group of babies i.e. babies with birthweights <1.5 kg or babies who were ventilated. In the 2004 registry data collection was standardized in all centres to only babies with selected criteria as listed above. Data on all inborn births was also collected to facilitate calculation on perinatal and neonatal mortality rates of each hospital. *(Appendix I Birth Census)*

2.3 Data Collection Technique

The Case Report Forms (CRF) consisted of 4 pages of forms. *(AppendixII CRF)* The first page had 4 sections. Section 1 consisted of Patient Particulars, Section 2 Birth History, Section 3 Neonatal Events and Section 4 Outcome.
The second page, which had Section 5, was a list of diagnoses/problems, any of which if present mandated a tick on the corresponding box. The third page had the graphs of intrauterine growth charts while the last page was the scoring sheet for CRIB score.

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.

A first time admission to the NNU concerned was considered as a new case (even if it had been previously admitted else where) while a subsequent admission to the same NNU would be considered as a readmission. This would be accordingly indicated on the 1st sheet of the CRF. Information for Section 2 (Birth History) was not necessary to be provided again for a readmission while for Section 3 (Neonatal Event) only events occurring during the said admission needed to be recorded.
For Section 4 (Outcome) only information pertaining to the respective admission and for Section 5 only Diagnoses and Problems that were encountered or still being encountered during the said admission needed to be entered in the data sheet.

Hard copies CRFs were used and completed CRFs were sent to the Neonatal Registry Unit (NRU) after a defined period. (See below on monthly census and tracking of CRF forms).

2.4 Data Verification

Missing or anomalous data are identified and queried soon after entry onto the main database. Quantification of errors and the implementation of practices to minimize errors are continually refined.

3. Results

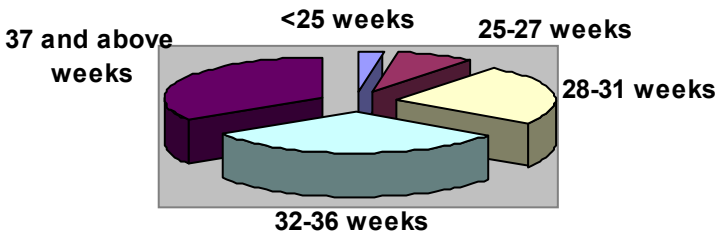
3.1 In General

In 2004, total births in the 24 participating centres totalled 196824 of which 1884 were stillbirths and 194940 were live births.

A total of 7350 babies however were admitted (admissions included outborns who were not delivered in respective hospitals of the participating centres) who met the criteria to be included in the MNNR. Of these 2522 (34.3%) were less than 32 completed weeks ***(Table 1)*** and 2753 (37.4%) had birthweights of 501-1500grams. ***(Table 2)*** There were 38 babies with BWs of less than or equal to 500grams.

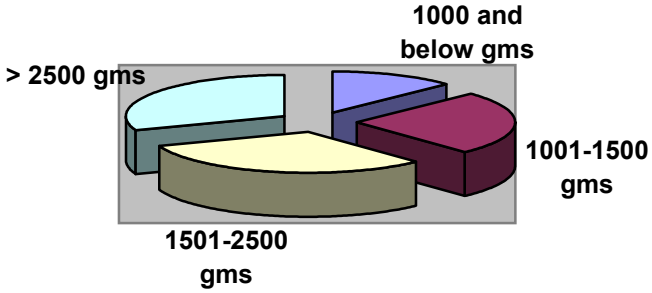
In terms of growth status 1277 (17%) of the whole study population was small for gestational age (SGA < 10^{th} centile for gestation according to Lubchenko chart). The SGA rate for VLBW infants (BW 501-1500g) was 28%. ***(Table 2b)***

Fig 1. Case distribution according to gestational age group, 2004



Gestational age group (weeks)	No cases	%
< 22	9	*0*
22-24	168	*2*
25-27	601	*8*
28-31	1744	*24*
32-36	2328	*32*
37 and above	2500	*34*

Fig 2. Case distribution according to birthweight group



Birth weight group (grams)	No cases	%
<500	38	*1*
501-1000	907	*12*
1001-1500	1846	*25*
1501-2500	2315	*31*
>2500	2244	*31*

Ventilatory support of whatever modes was given to a total of 6310 (85.8%) babies***(Table 3)***

While the babies who met the criteria for the study were generally babies requiring the most care they do not include many other babies admitted to the NICUs for other treatments and observation.
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 week's gestation or more. Very low birth weight (VLBW) babies are babies with birthweight (BW) 501-1500g and extremely low birthweight (ELBW) babies are babies with BW 501-1000g.

3.1.1 Registrants per Unit

Admissions of inborn babies to each Neonatal Unit are as shown in ***Table 4*** and registrants in the study from each centre in ***Table 5***. The number of babies who met the criteria for this audit ranged from 70 to 705 babies per centre. These numbers reflected the size of the centre, the case mix of their patients and the geography and population distributions of each area.

3.1.2 Levels of Neonatal Care

Care for the newborn is provided at three levels. 'Level I' care is for normal healthy babies, some of whom may need short-term observation during the first few hours of life. Level I care is mostly given to babies who are rooming –in with their mothers in obstetric wards

Level II or 'special care' refers to a nursery that generally has babies born at 32-36 weeks gestation or weighing around 1500-2500 grams at birth. It includes the care of babies who require intravenous therapy or antibiotics, and/or those who are convalescing after intensive care, and/or those who need their heart rate or breathing monitored, and/or those who need short term oxygen therapy. Babies who are above 35 weeks' gestation and have birth weights above 1.8 kg but are otherwise well are usually not admitted but managed in the obstetric wards.

Level III or intensive care refers to the care of newborn infants who require specialized care and treatment. It includes most babies born at less than 32 weeks gestation or less than birthweight 1500 grams birthweight, and others who may require intravenous feeding, and/or surgery, and/or cardio-respiratory monitoring for management of apnoea or seizures, and/or supplemental oxygen over 40% or long term oxygen.

Hospitals with a level III NICU provide all the above levels of care and are referred to in this report as tertiary hospitals. Most Level III NICUs were in Ministry of Health hospitals and a few were in university hospitals. Big private hospitals generally do provide neonatal intensive care but very few do so in the context of an actual NICU. Most provide level III care to sick babies in an adult intensive care. There were a total of about 30-35 centres in the country which provided neonatal intensive care to sick babies. For the 2004 audit 24 NICUs took part. Many more hospitals provided only Level I and II neonatal care and referred sicker babies to Level III NICUs when the need arose.

3.2 The Mother

Ethnicity as identified by the mother was reported as 64.4% Malays, 10.6% Chinese, 8.7 % Indians, 1.4 % Orang Asli, 4.0% Bumiputra Sabah, 4.4% Bumiputra Sarawak, 0.5% other Malaysians and 6.0% foreigners. ***(Table 6)*** Ethnic distribution of the population in Malaysia in 2004 was reported as 50.4% Malays, 23.7% Chinese, 7.1% Indians, 11% indigenous and 7.8% others (Information and Documentation Unit, Planning and Development Division, Ministry of Health Malaysia).

Single mothers accounted for 109 cases (1.5%) in the study out of which 24 (22.0%) died. ***(Table 7)*** This is identical to an overall mortality of 23.5% in the whole group.

The mean maternal age in the study group was 30 +/- 7 years. ***(Table 8)***

3.3 Antenatal events

3.3.1 Antenatal corticosteroids

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 2219 (61.2%) out of 3630 babies < 34 weeks (note babies 32-33 weeks who are not VLBW, and did not require ventilatory support or not died were not included in the study) and 60.3% < 32 weeks. ***(Table 1)***

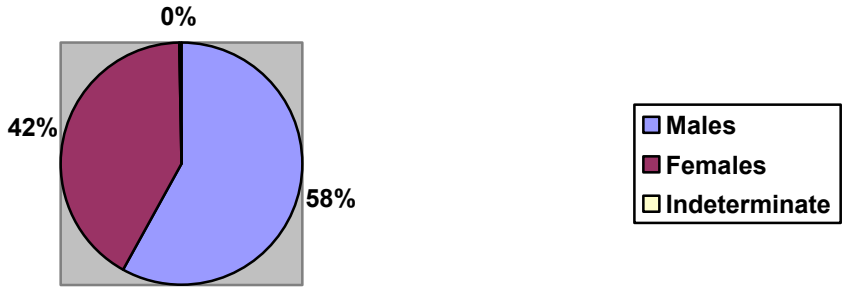
3.4 The baby

3.4.1 Multiple births

There were 6696 (91.1%) singletons, 597 (8.1%) twins, 54 (0.7%) triplets and 1 quadruplet in the study. ***(Table 9)***

The proportion of males in the study of 4259/7350 i.e. 57.9% compared to females of 3064/7350 i.e. 41.7 %. Sex was indeterminate in 27 babies (0.4%) (Fig 3). Sex ratio at birth of all babies in the country was estimated at 1.07 male / 1 female in 2005 (Information and Documentation Unit, Planning and Development Division, Ministry of Health Malaysia). Relatively more males admitted in the study implied that babies of the male sex were at higher risk of being critically ill at birth.

Fig 3. Case distribution according to sex, 2004



3.5 Birth

3.5.1 Inborn vs. Outborn Babies

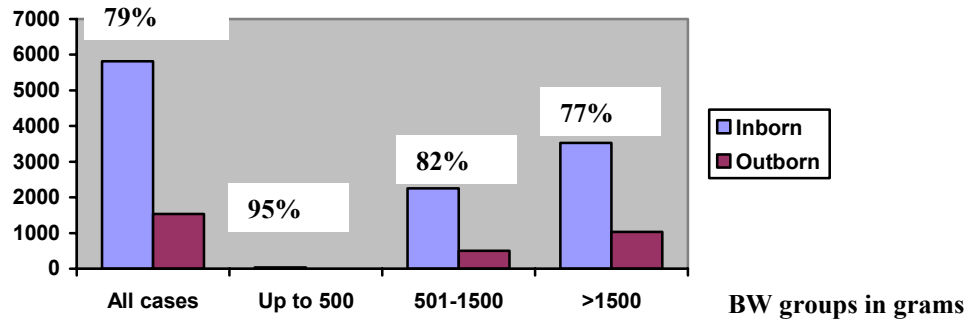
Babies are usually cared for in the hospital of their births. However some high-risk babies may need to be transferred to a hospital with a level III NICU, if care is being received at a hospital without NICU facilities. When this risk is anticipated both mother and baby may be transferred before birth (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 <34 weeks should be delivered in an obstetric unit in a hospital with an NICU.

In this cohort 5819 (79.2%) out of 7350 babies were inborn. For babies with BW 501-1500gm, 2252 (81.8%) out of 2753 babies were inborn. ***(Table 2)***

Fig 4. Case distribution according to BW groups and inborn – outborn status, 2004

(Percentages pertain to inborn cases)

No of cases



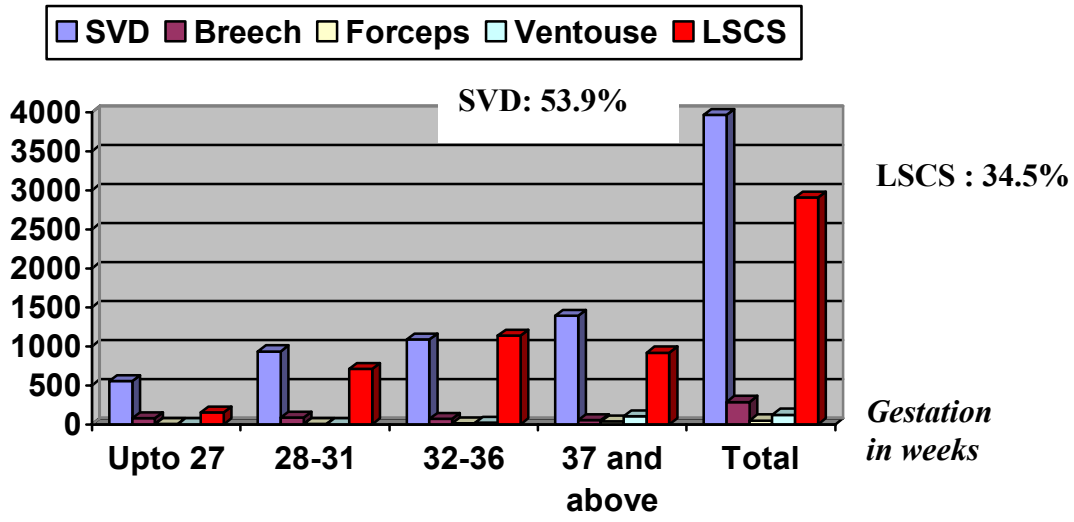
NICUs are generally placed in general hospitals, university hospitals and some district hospitals with specialist. Some private hospitals also provided neonatal intensive care to sick babies either in a separate NICU or as part of a general ICU. In the 2004 study however none of the private hospitals participated. Some babies delivered in private hospitals however have been transferred to NICUs in the participating hospitals.

3.5.2 Mode of delivery

Fig 5. Mode of delivery according to gestation, 2004

The overall spontaneous vertex delivery rate was 53.9 (3961/7350) and LSCS rate

No of cases

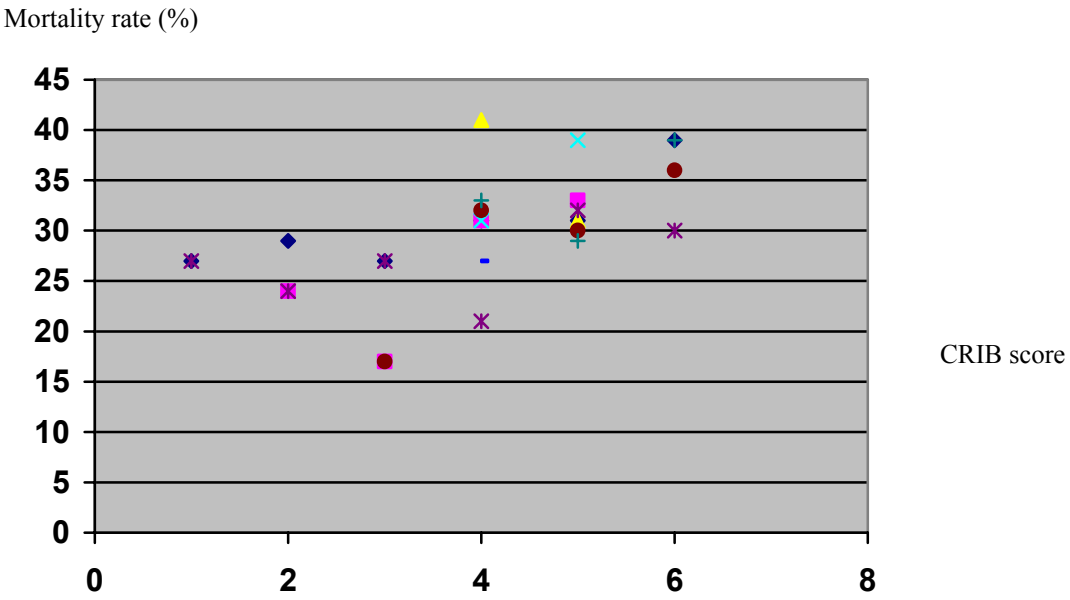


(Emergency and elective combined) 40% (n=2677+262 i.e. 2939)
For very preterm (<32 weeks) babies the combined LSCS rate was 34.5%. (869/2522) (Table 10)

3.5.3 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 that are independently associated with hospital deaths. *(Appendix II CRF).*
It is a tool for assessing initial risk and comparing performance of neonatal intensive care units.
The mean CRIB score of babies with BW < 1500gm was 4 +/- 4 and of overall mortality was 30.8%.
There was a weak correlation of CRIB score (Corr coeff of 0.53) with mortality rates among the centres ***(Table 11)***

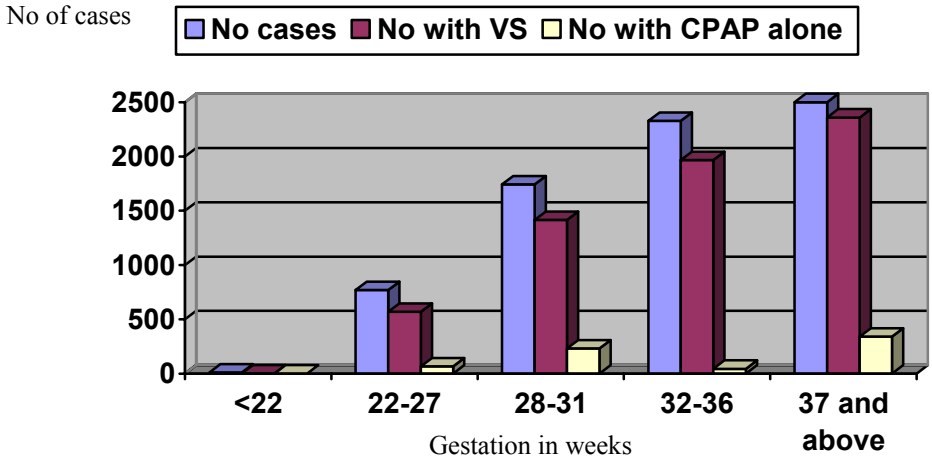
Fig 6. Mortality of VLBW babies according to centre and mean CRIB score, 2004



3.5.4 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 1984/2522 (78.8%) received ventilatory support which included CPAP, IMV, IMV + PTV, HFPPV, HFOV and NO as a single modality or in combination. CPAP alone as a mode of ventilatory support was given to 298 (11.8%) these very preterm babies. ***(Table3.)***

Fig 7. Ventilatory support according to gestational age group, 2004



It is noteworthy that of the 6310 babies requiring VS, 2359 (37.4%) were term babies.

High frequency oscillatory ventilation (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. Of the very preterm babies 66 (2.6%) was given HFOV. ***Table 12***. Use of other modes of ventilatory support is also as shown in the Table.

3.6 Morbidity

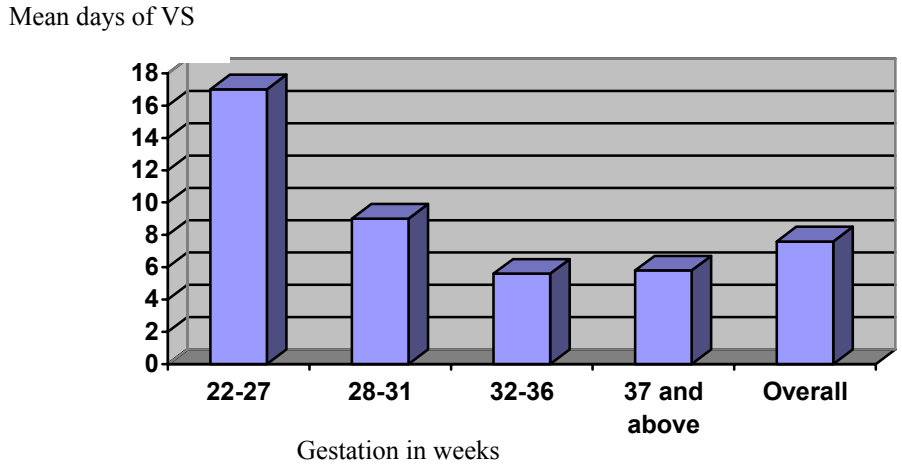
There is a high rate of morbidity amongst babies admitted to a level III NICU. These are principally associated with preterm births and complications arising in term babies necessitating ventilatory support.

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.

3.6.1 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 large a proportion of the use of resources in these sick babies.
Use of ventilatory support according to gestation has been alluded to above.
For preterm babies the duration of ventilatory support increased with decreasing gestational age. Duration of VS for term babies however was slightly longer on average (Mean of 5.8 +/- 10.2 days) compared to borderline preterm babies of 32-36 weeks gestation. (Mean of 5.6 +/- 8.9 days).
(Table 13.)
This is further illustrated in Fig 8.

Fig 8. Mean duration of Ventilatory Support (for VS >=24 hours) according to gestational group, 2004



Specific conditions in relation to respiratory morbidity

3.6.1.1 Respiratory distress syndrome (RDS)

Respiratory distress syndrome was the predominant respiratory diagnosis for babies in this study, being present in 3138 babies out of which 2867 (91.4%) needed ventilatory support. Overall mortality was 19% but was 52% for babies of 22-27 weeks gestation. ***(Table 14)***

3.6.1.2 Congenital Pneumonia (C Pneu)

There were 970 babies with congenital pneumonia of which 939 (96.8%) required VS and 98 (10.1%) died. ***(Table 15)***

3.6.1.3 Meconium Aspiration Syndrome (MAS)

There 552 babies with MAS, 544 (98.6%) required VS and 91 (16.5%) died. ***(Table 16)***

3.6.1.4 Neonatal Encephalopathy (NE)

A total of 1182 babies had NE of whom 1126 (95.3%) were given VS and 356 (30.1%) died.
(Table 17)

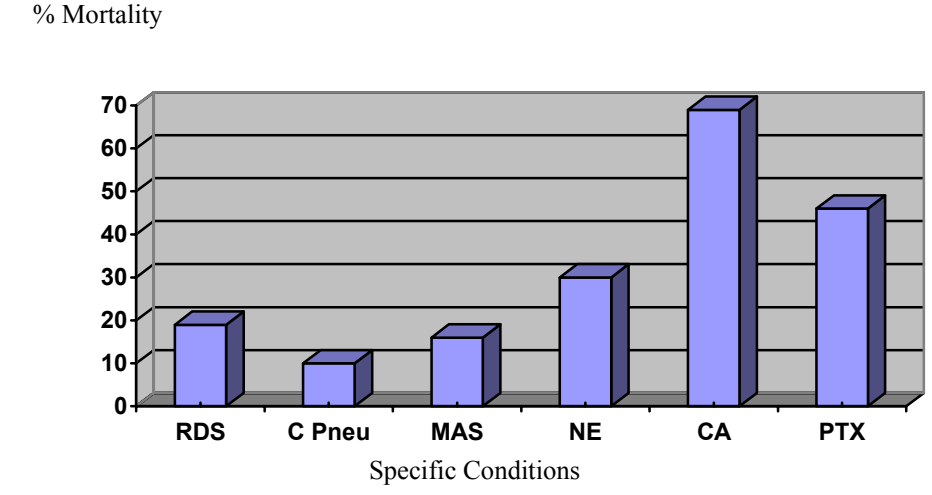
3.6.1.5 Congenital Anomalies (CA)

Only babies with congenital anomalies who required VS or had died were included in the study. Some with congenital anomalies were included based on other criteria of being very preterm or VLBW. These consisted of various abnormalities and many were heart defects. Of the 452 babies with CA, 271 (60.0%) were ventilated and 312 (69.0%) died. ***(Table 18)*** By nature of the inclusion criteria other babies with congenital anomalies who were not ventilated were either very preterm, VLBW or had died without being ventilated.

3.6.1.6 Pneumothorax (PTX)

Pneumothorax often complicates mechanical ventilation and contributes to further morbidity and mortality of babies. (Fig 9). A total of 281 (4.5%) babies who had ventilatory support developed pneumothorax out of which 128 died (45.6%) ***(Table 19)***

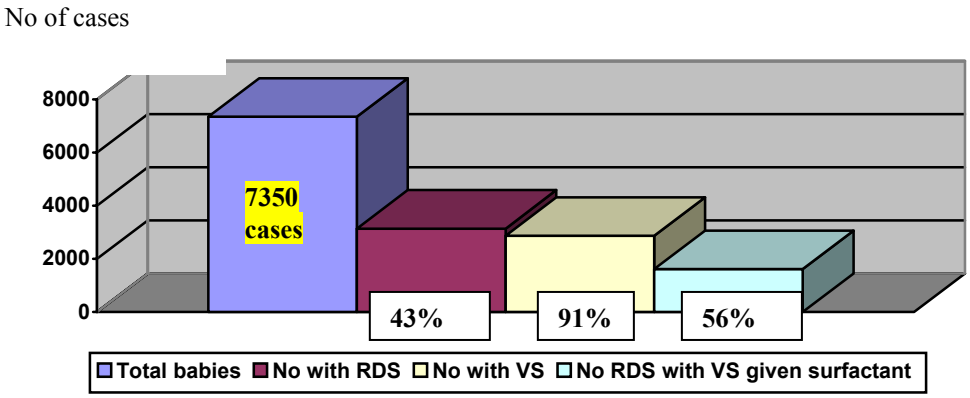
Fig 9. Mortality rate according to specific condition, 2004



3.6.1.7 Exogenous Surfactant

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 CPG is recommended for babies who are ventilated for RDS. In this study of those who had RDS and required ventilatory support 1614 (56.3%) were treated with surfactant.
(Table 20)

Fig 10. Use of surfactant in Respiratory Distress Syndrome, 2004



Very rarely surfactant may be given for other conditions e.g. meconium aspiration syndrome and hypoplastic lung with persistent pulmonary hypertension. A total of 243 (7.1%) babies who had VS but did not have RDS were also treated with surfactant. ***(Table 20a)***

Chronic lung disease (CLD) or bronchopulmonary dysplasia (BPD) which we used interchangeably as defined by clinical respiratory distress with oxygen dependency at 28 days of life in a background of acute lung injury in 1st 2 weeks of life *(Appendix III Instruction Manual)* occurred in 233 (3.2%) cases in the study. The highest incidence of chronic lung disease was among the ELBW babies i.e. 100 (11.0%) of 907 babies with BW 501-1000g. Mortality occurred in 48 (20.6%) babies of the total 233 with CLD.
(Table 21)

3.6.2 Cerebral Ultrasound Scan (CUS)

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 (Papile et al. 1978). Grade 1 and 2 are milder grades and generally do not affect outcome adversely while Grade 3 and 4 are markers of possible later disability.

Of the 2753 babies with BW 501-1500 g, 1655 (60.1%) had CUS and 191 (11.5%) had Grade 3 or 4 IVH. Combined mortality rate from Grade 3 and 4 IVH was 58.1%. ***(Table 22)***

Later ultrasound examinations detect cystic lesions (e.g. porencephalic cysts and periventricular leukomalacia) and post-haemorrhagic hydrocephalus. These are strong predictors of later abnormality. This study however did not specifically look at the time ultrasound scanning was performed but data was captured on the incidence of 'acquired periventricular cysts of newborn'. ***(Table 23)***

3.6.3 Eye Examinations

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 is being used for ROP screening in Malaysia are babies with birth weights of <1250 grams or gestation < 32 weeks. Other babies out of these BW and gestation criteria are also screened if significant risk is perceived by the doctors taking care of these babies. First screening is generally recommended at 4-6 weeks of life. This audit did not study the exact time screening was done of the survivors who satisfy the criteria for screening. However of these babies who survived the rate of ROP screening and the presence of ROP is as shown in ***Table 24.***

About 88% of extremely preterm and ELBW survivors had ROP screening. An overall total of 79 (1.4%) survivors developed Grade 3 or 4 ROP, 66 (7.1%) in babies with BW <1250 gm and 13 (0.3%) with BW 1250 gm and above.

3.6.4 Necrotising Enterocolitis

Necrotising Enterocolitis (NEC) is a disease of the gut which usually affects the large intestine (colon). It is associated with a 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 4.3% was recorded. Extremely low birth weight (ELBW) and extremely preterm infants had the highest incidence of NEC i.e. 9.0% in BW 501-1000g and 8.4% in 22-27 weeks gestation.. In these BW and gestation groups however mortality was higher among those babies who did not develop NEC. This was likely due to earlier demise of these very 'fragile' babies' even before NEC could set in***. (Table 25)***

3.6.5 Neonatal infections

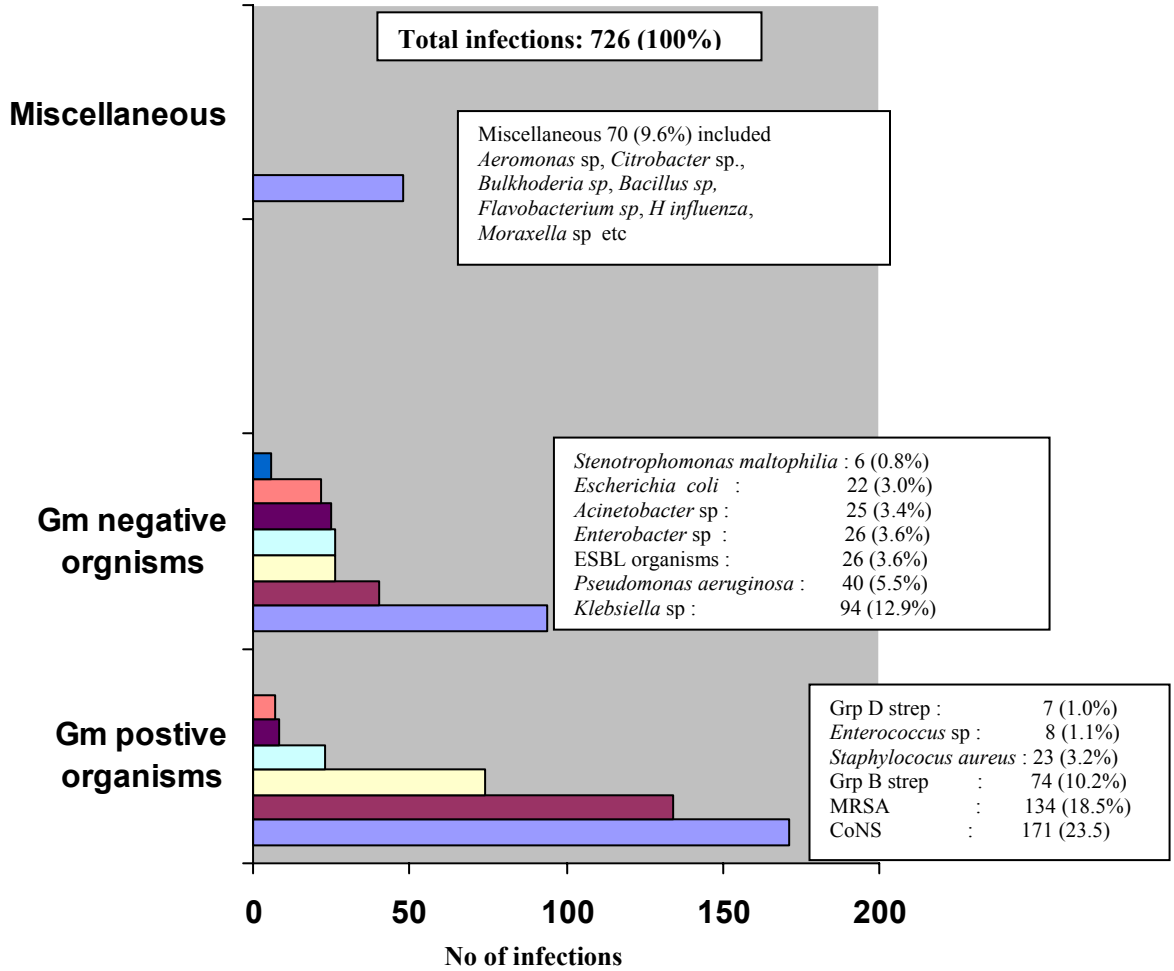
Systemic infection is a potentially serious complication in sick babies. This audit categorises infections into 1) Congenital intrauterine infections 2) Bacterial sepsis of newborn (i.e. culture proven bacterial infections) 3) Fungal sepsis 4) Clinical sepsis (not confirmed by culture or serology) and 5) Presumed sepsis (Antibiotics initially given in the presence of maternal risk factors but infection ruled out subsequently in the absence of clinical signs and laboratory findings.

The frequency of infections and the associated mortality rates are as shown in ***Table 26.*** 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. Also the number of episodes of each infection was not captured in this study. If a baby had 2 episodes of infections due to coagulase negative staphylococcus (CoNs) it will be recorded as 1 infection while an episode of infection caused by *Klebsiella* sp and an episode caused by CoNs will be recorded as 2 infections.

As for confirmed bacteraemic infections a total of 681 infants (9.3%) experienced 726 infections. Infection rate was highest among the extremely low birthweight babies with an incidence of 16.4 %.

Types of infecting organisms in bacterial blood-stream infections (BSI) are as shown in Fig 11.

Fig 11. Types of infecting organisms in confirmed bacterial sepsis, 2004



The most common was Coagulase-negative Staphylococcus (CoNS) which accounted for 171 (23.5%) of the 726 infections. Of the Gram-negative infections *Klebsiella* species was the most common accounting for 94 (12.9%) infections. There were 26 (3.6%) infections due to extended spectrum beta lactamase (ESBL) producing organisms. The specific ESBL organisms were not specified but many were likely to be Klebsiella sp too.

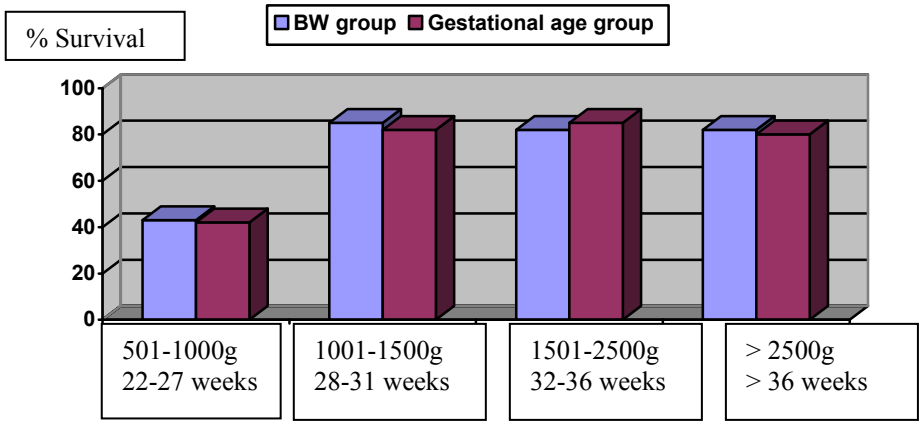
3.7 Outcome

The overall survival at discharge of this high risk group of babies was 5624 (out of 7350) ie 76.5%. ***(Table 27***) Survival is dependent on many factors including gestational age and birthweight. No babies of gestation 22 weeks and below and no babies of BW <500gms survived. Up to 31 weeks and up to 1500gms survival improved progressively with increasing gestation and BW. ***(Table 28)*** Babies who were 32 weeks and above and babies of BW > 1500gms were entered into the study only if they had required ventilatory support or had died, hence the survival were rather low in these more mature and bigger babies.

Nearly half (49.5%) of babies of 26 weeks' gestation survived and slightly more than half (53.1%) of babies with BW 801-900 grams survived***. (Table 27 and Table 28)***

Overall survival of BW groups and gestation groups are as shown in Fig 12 and survival of VLBW and very preterm babies are as shown in Fig 13 and Fig 14.

Fig 12. Survival according to birthweight and gestational age group, 2004



* Babies with gestation of 32 weeks and above and birthweight > 1500g were in the study only if they were ventilated or had died, hence survival was not as high as it otherwise would have been.

Fig 13. Survival according to BW group for VLBW babies (BW up to 1500g), 2004

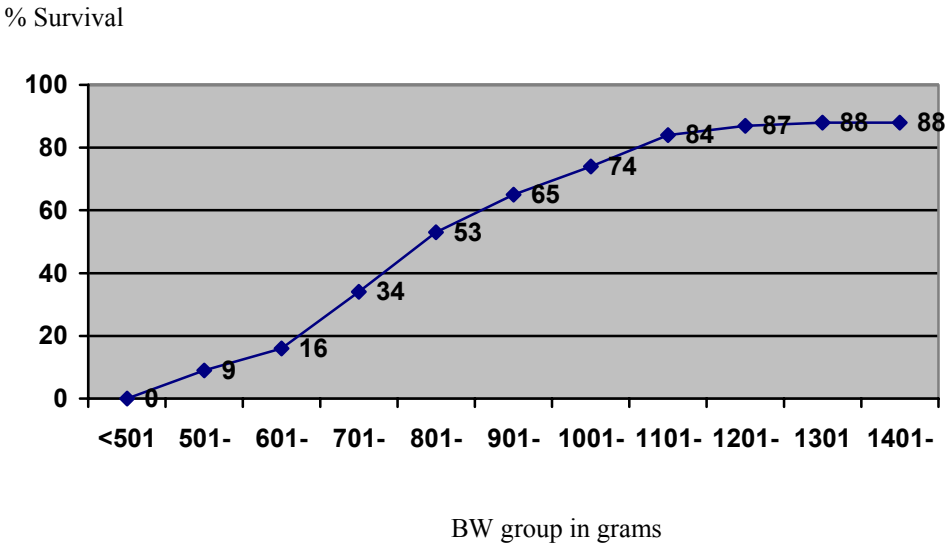
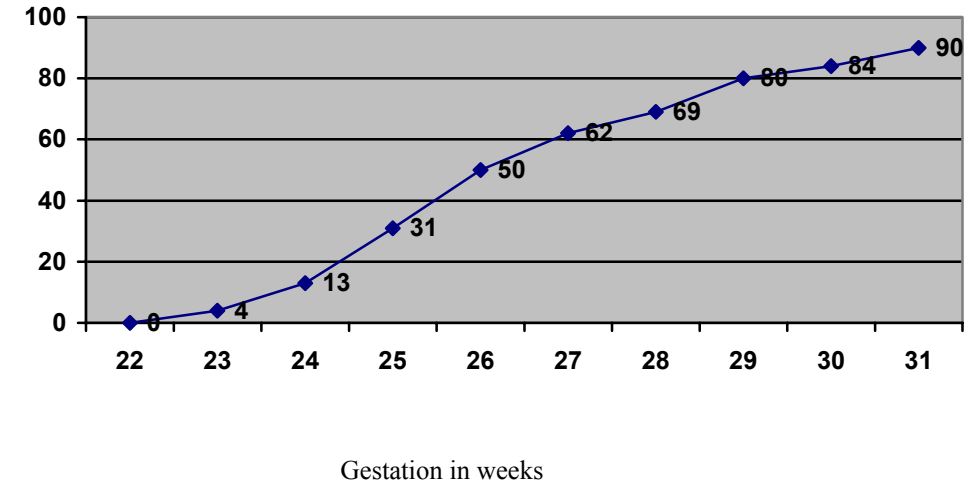


Fig 14. Survival according to gestation for very preterm babies (gestation <32 weeks) 2004



3.7.1 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 500gm and 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)

Fig 14 shows the number of total births and neonatal deaths in all the centres in the study. The perinatal, early neonatal and neonatal mortality rates were calculated to be 14.3 per 1000 TBs, 4.8 and 6.2 per 1000 LBs respectively.

Fig. 15. Total births and neonatal deaths and mortality rates, 2004

Total Births	196824
No Stillbirths	1884
No Live births	194940
Inborn deaths <7 days (early neonatal deaths)	934
Inborn deaths < 28 days (neonatal deaths)	1209
Perinatal mortality rate	14.3 per 1000 TBs
Early neonatal mortality rate	4.8 per 1000TBs
Neonatal mortality rate	6.2 per 1000 LBs

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

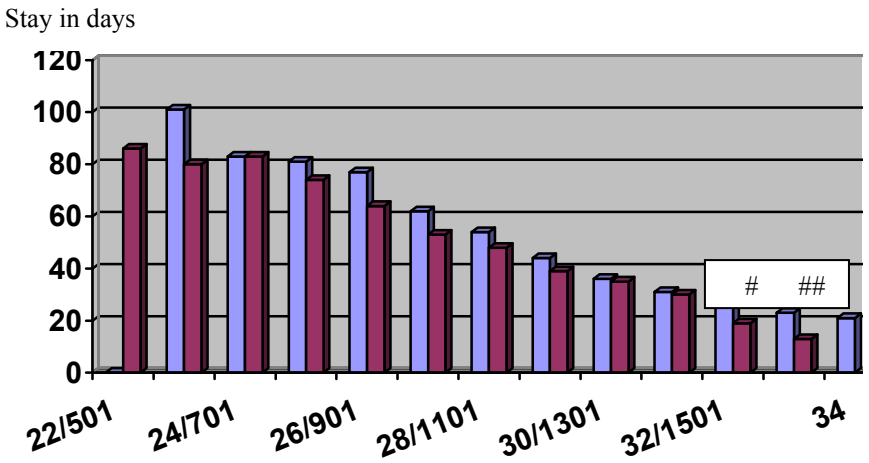
3.7.2 Discharge

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 birth weight and whether babies survived.

Of all the babies (1726) who died 642 (37.2%) died within 24 hours. For those who died after the 1st day mean duration of hospital stay were 15.0 +/- 26.2 days.
Of the survivors some stayed for < 24 hours (either discharged at own risk or had very mild illnesses). Of the other survivors the mean duration of hospital stay was 26.3 +/- 25.0 days. ***(Table 29 and Table 30)*** The duration of hospital stay for survivors decreased with increasing gestation and BWs. Fig 16.

Fig 16. Mean duration of hospital stay for survivors who stayed beyond 24 hours according to gestational age and BW group, 2004



Foot note
BW group 1501-2500g ## BW group 2501g and above

4. Tables

Table 1. Use of antenatal steroids according to gestational age group, 2004

Gestational age (weeks)	Babies in study	Antenatal steroid given	
	No.	No.	%
22	9	0	0
22-24	168	48	29
25-27	601	354	59
< 28	778	402	52
28-31	1744	1117	64
<32	**2522**	**1519**	**60**
32 -33	1107	700	63
<34	3629	2219	61
34 and above	3721	462	12
All gestation	**7350**	**2681**	**36**

Table 2. Inborn-outborn distribution according to the birthweight group, 2004

Birthweight group (grams)	Babies in study	Inborn		Outborn	
	No.	No.	%	No.	%
All cases	**7350**	**5819**	**79**	**1531**	**21**
BW up to 500	38	36	95	2	5
BW 501-1500	2753	2252	82	501	18
BW >1500	4559	3531	77	1028	23

Table 2a. Inborn-outborn distribution according to gestational age and birthweight group, 2004

Birthweight group (grams) and gestational age (weeks)	Babies in study	Inborn		Outborn	
	No.	No.	%	No.	%
All cases	**7350**	**5819**	**79**	**1531**	**21**
Up to 500	38	36	95	2	5
BW 501-1500	2753	2252	82	501	18
BW 501-1000	907	750	83	157	17
Gestation 22 -33	3620	2974	82	646	18
Gestation 22-31	2513	2048	81	465	19

Table 2b. Growth status at birth according to gestational age group, 2004

	Babies in study	SGA		AGA		LGA		For survivors mean weight on discharge +/- SD in grams	
	No.	No.	%	No.	%	No.	%		
All babies in study	7350	1277	17	5819	79	254	3	2315	735
Babies 22 -31 weeks gestation	2513	374	15	2083	83	56	2	1841	422
Babies 501-1500g	2753	762	28	1983	72	8	0	1813	414
Babies 32-36 weeks gestation	2328	539	23	1740	75	49	2	2041	478
Babies 37 weeks and above	2500	362	14	1989	80	149	6	3040	625

Table 3. Ventilatory support according to gestational age group, 2004

Gestational age (weeks)	Babies in study	Babies with ventilatory support		Babies with CPAP alone	
	No.	No.	%	No.	%
<22	9	1	11	0	0
22-27	769	567	74	66	12
28-31	1744	1416	81	232	16
32-36	2328	1967	84	508	26
37 and above	2500	2359	94	341	14
All cases	**7350**	**6310**	**86**	**1147**	**18**

Table 3a. Ventilatory support according to birthweight group, 2004

Birthweight group (grams)	Babies in study	Babies with ventilatory support		Babies with CPAP alone	
	No.	No.	%	No.	%
Up to 500	38	10	26	3	8
501-1000	907	686	76	90	10
1001-1500	1846	1315	71	230	12
1501-2500	2315	2121	92	493	21
2501 and above	2244	2178	97	331	15
All cases	**7350**	**6310**	**86**	**1147**	**16**

Table 4. Total NICU admissions according to centre (based on census returns), 2004

Centre No.	No. of babies admitted to NNU
All centres	**45557**
2	2923
3	941
4	1020
5	1251
6	2135
7	5074
8	3566
9	3486
10	1131
11	2182
12	2023
13	1602
14	887
15	1187
16	1266
17	1469
18	565
19	812
20	1993
21	1535
22	2477
23	2597
24	2543
25	892

Table 5. Bably distribution (babies admitted into study) according to centre, 2004

Centre No.	No. of babies registered in study
All centres	**7306**
2	452
3	363
4	250
5	402
6	341
7	669
8	402
9	343
10	146
11	82
12	251
13	261
14	163
15	204
16	376
17	312
18	71
19	270
20	227
21	139
22	370
23	709
24	312
25	191

Table 6. Ethnicity according to birthweight group, 2004

Ethnic groups	Babies in study	BW 501-1000		BW 1001-1500		BW 1501-2500		BW 2500 and above	
	No.	No.	%	No.	%	No.	%	No.	%
Malay	4731	561	12	1080	23	1527	32	1537	32
Chinese	778	99	13	217	28	253	33	206	26
Indian	643	112	17	180	28	189	29	154	24
Orang Asli	101	7	7	29	29	45	45	19	19
Bumiputra Sabah	296	39	13	102	34	80	27	74	25
Bumiputra Sarawak	327	41	13	117	36	87	27	80	24
Foreigner	439	41	9	113	26	122	28	161	37
Other Malaysian	35	7	20	6	17	10	29	12	34
Total	**7350**	**907**	**12**	**1844**	**25**	**2313**	**31**	**2243**	**31**

Table 7. Baby distribution and survival according to mother's marital status, 2004

Marital status	Babies in study	Babies who survived		Babies with gestation <32 weeks	Babies with gestation <32 weeks who survived	
	No.	No.	%	No.	No.	%
Overall	7350	5624	77	2522	1745	69
Married	7229	5534	77	2465	1705	69
Divorced	9	3	33	5	2	40
Widowed	3	2	67	0	0	0
Single	109	85	78	52	38	73

Table 8. Maternal age, mean birthweight, mean gestational age, duration of ventilatory support and duration of hospital stay according to birthweight group, 2004

	Babies in study		BW 501-1000		BW 1001-1500		BW 1501-2500		BW 2500 and above	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Mean maternal age +/- SD in years	30	7	29	6	29	7	30	7	31	6
Mean birth weight +/- SD in grams	2014	906	822	142	1293	141	1972	290	3161	463
Mean gestation +/- SD in weeks	34	5	27	3	31	3	34	3	39	2
For >=24hours of ventilatory support mean duration of ventilation +/- SD in days	8	12	16	21	9	12	5	9	6	11

Table 9. Multiplicity of births according to gestational age group, 2004

Gestational age (weeks)	Babies in study	Singletons		Twins		Triplets		Others	
	No.	No.	%	No.	%	No.	%	No.	%
<22	9	9	100	0	0	0	0	0	0
22-27	769	648	84	109	14	12	2	0	0
28-31	1744	1488	85	234	13	22	1	0	0
32-36	2328	2096	90	212	9	19	1	1	0
37 and above	2500	2455	98	44	2	1	0	0	0
Total	**7350**	**6696**		**599**		**54**		**1**	

Table 10. Mode of delivery according to gestational age group, 2004

Gestational age (weeks)	Babies in study	Spontaneous Vertex Delivery	Breech delivery	Forceps delivery	Ventouse	Elective LSCS	Emergency LSCS
<22	9	8	1	0	0	0	0
22-27	769	542	77	1	0	6	143
28-31	1744	934	88	2	0	26	694
32-36	2328	1086	67	9	17	83	1066
37 and above	2500	1391	52	35	101	147	774
Total	**7350**	**3961**	**285**	**47**	**118**	**262**	**2677**

Table 10a. Mode of delivery according to birthweight group, 2004

Birthweight group (grams)	Babies in study	Spontaneous Vertex Delivery	Breech delivery	Forceps delivery	Ventouse	Elective LSCS	Emergency LSCS
Up to 500	38	27	2	0	0	1	8
501-1000	907	555	84	1	0	15	252
1001-1500	1846	918	89	2	0	37	800
1501-2500	2315	1212	73	10	20	82	918
2501and above	2244	1249	37	34	98	127	699
Total	**7350**	**3961**	**285**	**47**	**118**	**262**	**2677**

Table 11. Mean CRIB score and mortality rate according to centre, 2004

Centre No	No of babies with BW < 1500 grams	Mean CRIB score (SD)		No of babies with BW < 1500 grams who died	%
All centres	**2620**	**4**	**4**	**806**	**31**
2	167	5	4	52	31
3	136	2	2	40	29
4	64	5	5	21	33
5	156	4	3	49	31
6	116	5	4	46	40
7	233	4	4	73	31
8	102	4	3	42	41
9	135	5	4	42	31
10	56	5	4	22	39
11	27	6	4	8	30
12	99	4	4	31	31
13	63	5	4	20	32
14	70	5	4	21	30
15	94	6	8	34	36
16	155	4	3	33	21
17	116	5	5	34	29
18	29	2	2	7	24
19	113	3	4	30	27
20	79	4	4	25	32
21	52	1	2	14	27
22	110	3	3	19	17
23	240	4	4	80	33
24	151	4	4	41	27
25	57	6	5	22	39

- *CRIB score not available for 133 babies with BW 501-1500gm*

Table 12. Ventilatory support mode according to gestational age group, 2004 (part 1)

Gestational age (weeks)	Babies with IMV or IMV + PTV or HPPV only *		Babies with CPAP or IMV or IMV +PTV or HPPV		Babies with HFOV		Babies with NO	
	No.	%	No.	%	No.	%	No.	%
< 22	1	100	1	100	0	0	0	0
22-27	285	50	549	97	34	6	1	0
28-31	637	45	1398	99	32	2	2	0
32-36	964	49	1939	99	25	1	5	0
37 and above	1675	71	2305	98	55	2	17	1
All cases	**3562**	**56**	**6192**	**98**	**146**	**2**	**25**	**0**

** Exclude those with CPAP/ HFOV/ NO/ others*

Table 12a. Ventilatory support mode according to birthweight group, 2004

Birthweight group (grams)	Babies with IMV or IMV + PTV or HFPPV only*		Babies with CPAP or IMV or IMV +PTV or HFPPV		Babies with HFOV		Babies with NO	
	No.	%	No.	%	No.	%	No.	%
Up to 500	6	60	10	100	0	0	0	0
501-1000	338	49	666	97	41	6	1	0
1001-1500	574	44	1296	99	21	2	2	0
1501-2500	1119	53	2094	99	27	1	3	0
2501 and above	1525	70	2126	98	57	3	19	1
All cases	**3562**	**56**	**6192**	**98**	**146**	**2**	**25**	**0**

** Exclude those with CPAP/ HFOV/ NO/ others*

Table 12b. Ventilatory support mode according to gestational age group, 2004 (part 2)

Gestational age (weeks)	Babies Admitted	CPAP		IMV		IMV + PTV	
	No.	No.	%	No.	%	No.	%
All babies	7350	2537	35	4383	60	615	8
<22	9	0	0	1	11	0	0
22-27	769	245	32	406	53	75	10
28-31	1744	739	42	1004	58	151	9
32-36	2328	959	41	1284	55	128	5
37 and above	2500	594	24	1688	68	261	10

Gestational age (weeks)	HFPPV		HFOV		Nitric Oxide		Others	
	No.	%	No.	%	No.	%	No.	%
All babies	80	1	146	2	25	0	50	1
< 22	0	0	0	0	0	0	0	0
22-27	8	1	34	4	1	0	4	1
28-31	24	1	32	2	2	0	14	1
32-36	25	1	25	1	5	0	15	1
37 and above	23	1	55	2	17	1	17	1

Table 13. Duration of ventilatory support (VS) according to gestational age group, 2004

Gestational age (weeks)	Babies in study	Babies with ventilatory support		Babies with VS < 24 hours		Babies with VS >= 24 hours		Mean duration of VS +/- SD *for >=24 hours	
	No.	No.	%	No.	%	No.	%		
<22	9	1	11	1	100	0	0		
22-27	769	567	74	88	16	479	84	17	19.8
28-31	1744	1416	81	183	13	1233	87	9	13.5
32-36	2328	1967	84	454	23	1513	77	5.6	8.9
37 and above	2500	2359	94	528	22	1831	78	5.8	10.2
All cases	**7350**	**6310**	**86**	**1254**	**20**	**5056**	**80**	**7.6**	**12.4**

Table 13a. Duration of ventilatory support (VS) according to birthweight group, 2004

Birthweight group (grams)	Babies in study	Babies with ventilatory support		Babies with VS < 24 hours		Babies with VS >= 24 hours		Mean duration of VS +/- SD *for >=24 hours	
	No.	No.	%	No.	%	No.	%		
Up to 500	38	10	26	2	5	8	21	6	5
501-1000	907	686	76	93	10	593	65	16	21
1001-1500	1846	1315	71	203	11	1112	60	9	12
1501-2500	2315	2121	92	482	21	1639	71	5	9
2501and above	2244	2178	97	474	21	1704	76	6	10
Total	**7350**	**6310**	**86**	**1254**	**17**	**5056**	**69**	**8**	**12**

Table 14. Respiratory distress syndrome (RDS) according to gestational age group, 2004

Gestational age (weeks)	Babies in study	Babies with RDS		Babies with RDS requiring VS		Babies with RDS who died	
	No.	No.	%	No.	%	No.	%
<22	9	4	44	0	0	4	100
22-27	769	564	73	491	87	296	52
28-31	1744	1279	73	1164	91	213	17
32-36	2328	1180	51	1101	93	85	7
37 and above	2500	111	4	111	100	9	8
All cases	**7350**	**3138**	**43**	**2867**	**91**	**607**	**19**

Table 14a. Respiratory distress syndrome (RDS) according to birthweight group, 2004

Birthweight group (grams)	Babies in study	Babies with RDS		Babies with RDS requiring VS		Babies with RDS who died	
	No.	No.	%	No.	%	No.	%
Up to 500	38	13	34	7	54	13	100
501-1000	907	674	74	591	88	354	53
1001-1500	1846	1195	65	1043	87	165	14
1501-2500	2315	1127	49	1097	97	67	6
2501 and above	2244	129	6	129	100	8	6
All cases	**7350**	**3138**	**43**	**2867**	**91**	**607**	**19**

Table 15. Congenital pneumonia according to gestational age group, 2004

Gestational age (weeks)	Babies in study	Babies with congenital pneumonia		Babies with congenital pneumonia requiring VS		Babies with congenital pneumonia who died	
	No.	No.	%	No.	%	No.	%
<22	9	0	0	0	0	0	0
22-27	769	24	3	23	96	6	25
28-31	1744	103	6	92	89	14	14
32-36	2328	322	14	304	94	22	7
37 and above	2500	521	21	520	100	56	11
All cases	**7350**	**970**	**13**	**939**	**97**	**98**	**10**

Table 15a. Congenital pneumonia according to birthweight group, 2004

Birthweight group (grams)	Babies in study	Babies with congenital pneumonia		Babies with congenital pneumonia requiring VS		Babies with congenital pneumonia who died	
	No.	No.	%	No.	%	No.	%
Up to 500	38	0	0	0	0	0	0
501-1000	907	30	3	30	100	9	30
1001-1500	1846	113	6	89	79	12	11
1501-2500	2315	311	13	304	98	29	9
2501and above	2244	516	23	516	100	48	9
All cases	**7350**	**970**	**13**	**939**	**97**	**98**	**10**

Table 16. Meconium aspiration syndrome (MAS) according to gestational age group, 2004

Gestational age (weeks)	Babies in study	Babies with MAS		Babies with MAS requiring VS		Babies with MAS who died	
	No.	No.	%	No.	%	No.	%
<22	9	0	0	0	0	0	0
22-27	769	0	0	0	0	0	0
28-31	1744	4	0	3	75	0	0
32-36	2328	33	1	31	94	6	18
37 and above	2500	515	21	510	99	85	17
All cases	**7350**	**552**	**8**	**544**	**99**	**91**	**16**

Table 16a. Meconium aspiration syndrome (MAS) according to birthweight group, 2004

Birthweight group (grams)	Babies in study	Babies with MAS		Babies with MAS requiring VS		Babies with MAS who died	
	No.	No.	%	No.	%	No.	%
Up to 500	38	0	0	0	0	0	0
501-1000	907	0	0	0	0	0	0
1001-1500	1846	7	0	6	86	0	0
1501-2500	2315	75	3	72	96	15	20
2501 and above	2244	470	21	466	99	76	16
All cases	**7350**	**552**	**8**	**544**	**99**	**91**	**16**

Table 17. Neonatal encephalopathy (NE) according to gestational age group, 2004

Gestational age (weeks)	Babies in study	Babies with NE		Babies with NE requiring VS		Babies with NE who died	
	No.	No.	%	No.	%	No.	%
<22	9	0	0	0	0	0	0
22-27	769	74	10	57	77	55	74
28-31	1744	124	7	111	90	48	39
32-36	2328	204	9	189	93	60	29
37 and above	2500	780	31	769	99	193	25
All cases	**7350**	**1182**	**16**	**1126**	**95**	**356**	**30**

Table 17a. Neonatal encephalopathy (NE) according to birthweight group, 2004

Birthweight group (grams)	Babies in study	Babies with NE		Babies with NE requiring VS		Babies with NE who died	
	No.	No.	%	No.	%	No.	%
Up to 500	38	1	3	0	0	1	100
501-1000	907	88	10	68	77	63	72
1001-1500	1846	116	6	103	89	39	34
1501-2500	2315	281	12	269	96	85	30
2501 and above	2244	696	31	686	99	168	24
All cases	**7350**	**1182**	**16**	**1126**	**95**	**356**	**30**

Table 18. Congenital anomalies (CA) according to gestational age group, 2004

Gestational age (weeks)	Babies in study	Babies with CA		Babies with CA requiring VS		Babies with CA who died	
	No.	No.	%	No.	%	No.	%
<22	9	0	0	0	0	0	0
22-27	769	17	2	4	24	13	76
28-31	1744	62	4	34	55	47	76
32-36	2328	158	7	99	63	109	69
37 and above	2500	215	9	134	62	143	67
All cases	**7350**	**452**	**6**	**271**	**60**	**312**	**69**

Table 18a. Congenital anomalies (CA) according to birthweight group, 2004

Birthweight group (grams)	Babies in study	Babies with CA		Babies with CA requiring VS		Babies with CA who died	
	No.	No.	%	No.	%	No.	%
Up to 500	38	0	0	0	0	0	0
501-1000	907	37	4	14	38	27	73
1001-1500	1846	95	5	42	44	72	76
1501-2500	2315	196	8	119	61	144	73
2501 and above	2244	124	6	96	77	69	56
All cases	**7350**	**452**	**6**	**271**	**60**	**312**	**69**

Table 19. Pneumothorax according to birthweight group, 2004

Birthweight group (grams)	Babies in study	Babies with VS		Babies with VS and pneumothorax		Babies with VS and pneumothorax who died	
	No.	No.	%	No.	%	No.	%
Up to 500	38	10	26	0	0	0	0
501-1000	907	686	76	44	5	32	73
1001-1500	1846	1315	71	58	3	34	59
1501-2500	2315	2121	92	64	3	21	33
2501 and above	2244	2178	97	115	5	41	36
All cases	**7350**	**6310**	**86**	**281**	**4**	**128**	**46**

Table 20. Use of surfactant in RDS according to birthweight group, 2004

Birthweight group (grams)	Babies in study	Babies with RDS		Babies with RDS requiring VS		Babies with RDS and VS given surfactant	
	No.	No.	%	No.	%	No.	%
Up to 500	38	13	34	7	54	5	71
501-1000	907	674	74	591	88	424	72
1001-1500	1846	1195	65	1043	87	645	62
1501-2500	2315	1127	49	1097	97	494	45
2501 and above	2244	129	6	129	100	46	36
All cases	**7350**	**3138**	**43**	**2867**	**91**	**1614**	**56**

Table 20a. Use of surfactant in non-RDS cases according to birthweight group, 2004

Birthweight group (grams)	Babies in study	Babies with VS and 'no RDS'		Babies with VS and 'no RDS' given surfactant	
	No.	No.	%	No.	%
Up to 500	38	3	8	1	33
501-1000	907	95	10	43	45
1001-1500	1846	272	15	49	18
1501-2500	2315	1024	44	53	5
2501 and above	2244	2049	91	97	5
All cases	**7350**	**3443**	**47**	**243**	**7**

Table 21. Chronic lung disease according to birthweight group, 2004

Birthweight group (grams)	Babies in study	Babies with chronic lung disease		Babies with chronic lung disease who died	
	No.	No.	%	No.	%
Up to 500	38	0	0	0	0
501-1000	907	100	11	17	17
1001-1500	1846	88	5	14	16
1501-2500	2315	21	1	5	24
2501 and above	2244	24	1	12	50
All cases	**7350**	**233**	**3**	**48**	**21**

Table 22. Cerebral ultrasound scanning (CUS) and intraventricular haemorrhage (IVH) according to birthweight group, 2004

Birthweight group (grams)	Babies in study	Babies with CUS		Babies with CUS who has Grade 1 IVH		Babies with CUS who has Grade 2 IVH	
	No.	No.	%	No.	%	No.	%
Up to 500	38	5	13	0	0	2	40
501-1000	907	522	58	70	13	106	20
1001-1500	1846	1133	61	92	8	97	9
501-1500	2753	1655	60	162	6	203	7

Birthweight group (grams)	Babies in study	Babies with CUS who has Grade 3 IVH		Babies with CUS who has Grade 4 IVH)		Babies with CUS who has Grade 3 or 4 IVH and died	
	No.	No.	%	No.	%	No.	%
Up to 500	38	2	40	1	20	2	67
501-1000	907	79	15	50	10	85	66
1001-1500	1846	44	4	18	2	26	42
501-1500	2753	123	4	68	2	111	58

Table 23. Acquired periventricular cysts of newborn according to birthweight group, 2004

Birthweight group (grams)	Babies in study	Babies with CUS		Babies with acquired periventricular cysts of newborn	
	No.	No.	%	No.	%
Up to 500	38	5	13	0	0
501-1000	907	522	58	10	2
1001-1500	1846	1133	61	7	1
501-1500	2753	1655	60	17	1

Table 24. Retinopathy of prematurity (ROP) according to gestational age group, 2004

Gestational age (weeks)	Babies in study	Babies who survived		Babies who survived and had ROP screening		Babies who survived and had ROP screening with Grade 1 ROP	
	No.	No.	%	No.	%	No.	%
<22	9	0	0	0	0	0	0
22-27	769	321	42	283	88	45	16
28 to 31	1744	1424	82	1123	79	69	6
32 and above	4828	3879	80	819	21	15	2
All cases	**7350**	**5624**	**77**	**2225**	**40**	**129**	**6**

Gestational age (weeks)	Babies in study	Babies who survived and had ROP screening With Grade 2 ROP		Babies who survived and had ROP screening with Grade 3 ROP		Babies who survived and had ROP screening with Grade 4 ROP	
	No.	No.	%	No.	%	No.	%
<22	9	0	0	0	0	0	0
22-27	769	38	13	27	10	6	2
28 to 31	1744	45	4	39	3	3	0
32 and above	4828	10	1	4	0	0	0
All cases	**7350**	**93**	**4**	**70**	**3**	**9**	**0**

Table 24a. Retinopathy of prematurity (ROP) according to birthweight group, 2004

Birthweight group (grams)	Babies in study	Babies who survived		Babies who survived and had ROP screening		Babies who survived and had ROP screening With Grade 1 ROP	
	No.	No.	%	No.	%	No.	%
<1000	821	312	38	274	88	44	16
1000-1249	795	614	77	535	87	52	10
<1250	1616	926	57	809	87	96	12
1250 and above	5734	4698	82	1416	30	33	2

Birthweight group (grams)	Babies in study	Babies who survived and had ROP screening with Grade 2 ROP		Babies who survived and had ROP screening with Grade 3 ROP		Babies who survived and had ROP screening With Grade 4 ROP	
	No.	No.	%	No.	%	No.	%
<1000	821	41	15	34	12	7	3
1000-1249	795	36	7	24	4	1	0
<1250	1616	77	10	58	7	8	1
1250 and above	5734	16	1	12	1	1	0

Table 25 Necrotising enterocolitis (NEC) according to birthweight group, 2004

Birthweight group (grams)	Babies in study	Babies with NEC		Babies with NEC who died		Babies without NEC		
	No.	No.	%	No.	%	No.	Died	%
Up to 500	38	1	3	1	100	37	37	100
501-1000	907	82	9	32	39	825	483	59
1001-1500	1846	133	7	24	18	1713	255	15
1501-2500	2315	78	3	18	23	2237	390	17
2501 and above	2244	25	1	8	32	2219	478	22
All cases	**7350**	**319**	**4**	**83**	**26**	**7031**	**1643**	**23**

Table 25a. Necrotising enterocolitis (NEC) according to gestational age group, 2004

Gestational age (weeks)	Babies in study	Babies with NEC		Babies with NEC who died		Babies without NEC		
	No.	No.	%	No.	%	No.	Died	%
<22	9	0	0	0	0	9	9	100
22-27	769	65	8	25	38	704	423	60
28-31	1744	129	7	35	27	1615	285	18
32-36	2328	96	4	14	15	2232	325	15
37 and above	2500	29	1	9	31	2471	601	24
All cases	**7350**	**319**	**4**	**83**	**26**	**7031**	**1643**	**23**

Table 26. Frequency of 'infections' and associated mortality rates, 2004

Total No. of Babies in Study	**7350**	
	No.	**%**
No. of Deaths in Study	1726	23.5
No. of Congenital Intrauterine Infections	23	0.3
No. of Deaths associated with Congenital Intrauterine Infections	9	39.1
No. of Bacterial Sepsis	681	9.3
No. of Deaths associated with Bacterial Sepsis	182	26.7
No. of Fungal Sepsis	72	1.0
No. of Deaths associated with Fungal Sepsis	26	36.1
No. of Clinical Sepsis	1290	17.5
No. of Deaths associated with Clinical Sepsis	311	24.1
No. of Presumed Sepsis	1526	20.7
No. of Deaths associated with Presumed Sepsis	195	12.8

Table 27. Survival according to gestational age, 2004

Gestation in complete weeks	No. of babies in study	No. Survived	%
All gestation	**7350**	**5624**	**77**
<22 weeks	9	0	0
22	25	0	0
23	47	2	4
24	96	12	13
25	122	38	31
26	218	108	50
27	261	161	62
28	373	259	69
29	349	278	80
30	496	416	84
31	526	471	90
32	589	519	88
33	518	453	87
34	471	403	86
35	354	291	82
36	396	323	82
37 and above	2500	1890	76

Table 28. Survival according to birthweight group, 2004

Birthweight group (grams)	No. of babies in study	No. Survived	%
All BWs	**7350**	**5624**	**77**
Up to 500	38	0	0
501-600	107	10	9
601-700	116	18	16
701-800	177	60	34
801-900	207	110	53
901-1000	300	194	65
1001-1100	284	209	74
1101-1200	332	278	84
1201-1300	373	324	87
1301-1400	419	370	88
1401-1500	438	386	88
1501-2500	2315	1907	82
2501 and above	2244	1758	78

Table 29. Duration of hospital stay according to gestational age, 2004

For Survivors

Gestation in complete weeks	Babies in study	No. who Survived	%	No. survivors with hospital stay < 24 hours	%	If survived, > 24 hours mean duration of stay +/- SD in days	
All gestation	**7350**	**624**	**77**	**88**	**2**	**6.3**	**25**
<22	9	0	0	0	0	0	0
22	25	0	0	0	0	0	0
23	47	2	4	0	0	100.5	27.6
24	96	12	13	0	0	83.3	42.4
25	122	38	31	3	8	80.8	34.2
26	218	108	50	5	5	77.2	45
27	261	161	62	3	2	62	35.3
28	373	259	69	4	2	53.6	26.5
29	349	278	80	3	1	44.3	30
30	496	416	84	6	1	36.1	17.6
31	526	471	90	5	1	30.5	17.2
32	589	519	88	5	1	28.4	20.7
33	518	453	87	7	2	22.8	15.6
34	471	403	86	11	3	20.7	19.9
35	354	291	82	4	1	18.3	14.6
36	396	323	82	4	1	17.3	14.6
37 and above	2500	1890	76	28	1	13.7	14.4

Table 29 a. Duration of hospital stay according to gestational age, 2004

For non-survivors

Gestation in complete weeks	Babies in study	No. who died	%	No. who died with hospital stay < 24 hours	%	If died after 24 hours mean duration of hospital stay +/- SD in days	
All gestation	**7350**	**1726**	**23**	**642**	**37**	**15**	**26.2**
<22	9	9	100	9	100		
22	25	25	100	21	84	2.8	1
23	47	45	96	36	80	11.4	13.6
24	96	84	88	37	44	6.1	8.3
25	122	84	69	45	54	12.3	15.6
26	218	110	50	42	38	12.4	14.5
27	261	100	38	29	29	14.5	23.7
28	373	114	31	35	31	20.1	25.4
29	349	71	20	15	21	17	25.3
30	496	80	16	27	34	23.8	51.3
31	526	55	10	15	27	18.6	23.2
32	589	70	12	28	40	12.5	15
33	518	65	13	26	40	15.2	23.4
34	471	68	14	28	41	15.6	21
35	354	63	18	23	37	15.1	20.4
36	396	73	18	31	42	19.5	36.1
37 and above	2500	610	24	195	32	13.9	27

Table 30. Duration of hospital stay according to birthweight group, 2004

For survivors

Birthweight group (grams)	Babies in study	No. who Survived	%	No. survivors with hospital stay < 24 hours	%	If survived, > 24 hours mean duration of stay +/- SD in days	
All BWs	**7350**	**5624**	**77**	**88**	**2**	**26.3**	**25**
Up to 500	38	0	0	0	0		
501-600	107	10	9	0	0	85.5	50.9
601-700	116	18	16	0	0	79.6	39
701-800	177	60	34	0	0	83	29.8
801-900	207	110	53	8	7	74.3	36.2
901-1000	300	194	65	7	4	63.6	30.7
1001-1100	284	209	74	2	1	52.9	29.1
1101-1200	332	278	84	5	2	48	26.1
1201-1300	373	324	87	5	2	39.1	16.8
1301-1400	419	370	88	2	1	34.8	21
1401-1500	438	386	88	5	1	30.4	12.9
1501-2500	2315	1907	82	28	1	18.9	16.3
2501 and above	2244	1758	78	26	1	13.1	13.9

Table 30a. Duration of hospital stay according to birthweight group, 2004

For non-survivors

Birthweight group (grams)	Babies in study	No. who died	%	No. who died with hospital stay < 24 hours	%	If died after 24 hours mean duration of hospital stay +/- SD in days	
All BWs	**7350**	**1726**	**23**	**642**	**37**	**15**	**26.2**
Up to 500	38	38	100	27	71	4.5	4.9
501-600	107	97	91	65	67	8.1	10
601-700	116	98	84	57	58	10.9	16.8
701-800	177	117	66	43	37	14.8	25.5
801-900	207	97	47	27	28	15.4	17.9
901-1000	300	106	35	20	19	15.3	19.6
1001-1100	284	75	26	17	23	14.1	15.6
1101-1200	332	54	16	18	33	27.5	59.4
1201-1300	373	49	13	18	37	21.3	31.8
1301-1400	419	49	12	17	35	15.5	19.8
1401-1500	438	52	12	20	38	18.4	30.6
1501-2500	2315	408	18	151	37	14.6	26.3
2501 and above	2244	486	22	162	33	14.4	26.7

5. Additional Tables

Table 31. Use of antenatal steroid according to centres, 2004 (Inborn)

Centre	Babies<32 weeks	Babies< 32 weeks given antenatal steroids		Inborn babies < 32 weeks gestation	Inborn babies < 32 weeks given antenatal steroid	
		No.	%	No.	No.	%
All centres	**2522**	**1519**	**60**	**2057**	**1379**	**67**
2	169	91	54	123	76	62
3	149	111	74	121	98	81
4	59	40	68	55	38	69
5	146	82	56	124	79	64
6	93	34	37	72	31	43
7	229	166	72	196	156	80
8	112	23	21	88	23	26
9	123	94	76	110	89	81
10	54	18	33	39	15	38
11	23	12	52	21	12	57
12	105	73	70	88	62	70
13	67	38	57	48	32	67
14	67	39	58	46	34	74
15	91	46	51	77	44	57
16	168	117	70	139	102	73
17	98	37	38	84	34	40
18	27	22	81	24	19	79
19	94	69	73	73	62	85
20	76	57	75	60	50	83
21	47	28	60	40	26	65
22	96	76	79	75	68	91
23	225	154	68	185	141	76
24	157	64	41	130	61	47
25	47	28	60	39	27	69

** 10 data for maternal steroid not available*

Table 31a. Use of antenatal steroid according to centres, 2004 (Outborn)

Centres	Babies <32 weeks gestation	Babies< 32 weeks gestation given antenatal steroids		Outborn babies < 32 weeks gestation	Outborn babies < 32 weeks gestation given antenatal steroid	
	No.	No.	%	No.	No.	%
All centres	**2522**	**1519**	**60**	**465**	**140**	**30**
2	169	91	54	46	15	33
3	149	111	74	28	13	46
4	59	40	68	4	2	50
5	146	82	56	22	3	14
6	93	34	37	21	3	14
7	229	166	72	33	10	30
8	112	23	21	24	0	0
9	123	94	76	13	5	38
10	54	18	33	15	3	20
11	23	12	52	2	0	0
12	105	73	70	17	11	65
13	67	38	57	19	6	32
14	67	39	58	21	5	24
15	91	46	51	14	2	14
16	168	117	70	29	15	52
17	98	37	38	14	3	21
18	27	22	81	3	3	100
19	94	69	73	21	7	33
20	76	57	75	16	7	44
21	47	28	60	7	2	29
22	96	76	79	21	8	38
23	225	154	68	40	13	33
24	157	64	41	27	3	11
25	47	28	60	8	1	13

** 10 data for maternal steroid not available*

Table 32. Use of surfactant in Respiratory Distress Syndrome (RDS) according to centres, 2004

Centres	Babies in study	Babies with RDS		Babies with RDS requiring VS		Babies with RDS and VS given surfactant	
	No.	No.	%	No.	%	No.	%
All centres	**7350**	**3138**	**43**	**2867**	**91**	**1614**	**56**
2	452	182	40	158	87	108	68
3	369	221	60	204	92	112	55
4	252	77	31	75	97	24	32
5	402	150	37	105	70	38	36
6	343	136	40	118	87	90	76
7	674	290	43	282	97	150	53
8	403	114	28	98	86	63	64
9	350	160	46	153	96	40	26
10	146	60	41	53	88	37	70
11	82	27	33	25	93	15	60
12	251	145	58	138	95	73	53
13	262	98	37	96	98	39	41
14	163	84	52	75	89	32	43
15	208	114	55	82	72	57	70
16	384	168	44	154	92	72	47
17	312	85	27	80	94	49	61
18	71	29	41	27	93	24	89
19	270	130	48	123	95	90	73
20	228	110	48	108	98	79	73
21	139	50	36	50	100	35	70
22	372	144	39	143	99	97	68
23	714	364	51	333	91	126	38
24	312	109	35	101	93	93	92
25	191	91	48	86	95	71	83

Table 33. Use of parenteral nutrition (PN) according to centres, 2004

Centres	Babies in study	Babies with BW 501-1500g		Babies with BW 501-1500g given PN		Babies with VS		Babies with VS given PN	
	No.	No.	%	No.	%	No.	%	No.	%
All centres	**7350**	**2753**	**37**	**1058**	**38**	**6310**	**86**	**1581**	**25**
2	452	180	40	86	48	361	80	111	31
3	369	140	38	69	49	336	91	86	26
4	252	72	29	32	44	233	92	44	19
5	402	180	45	40	22	256	64	42	16
6	343	132	38	30	23	278	81	62	22
7	674	237	35	82	35	622	92	110	18
8	403	106	26	59	56	365	91	133	36
9	350	145	41	34	23	293	84	43	15
10	146	59	40	2	3	117	80	1	1
11	82	27	33	16	59	72	88	32	44
12	251	114	45	33	29	215	86	39	18
13	262	67	26	41	61	250	95	97	39
14	163	70	43	26	37	141	87	31	22
15	208	95	46	18	19	151	73	29	19
16	384	154	40	97	63	338	88	112	33
17	312	119	38	46	39	268	86	73	27
18	71	30	42	12	40	53	75	19	36
19	270	118	44	58	49	225	83	66	29
20	228	84	37	44	52	206	90	59	29
21	139	53	38	25	47	117	84	32	27
22	372	110	30	54	49	337	91	67	20
23	714	250	35	73	29	649	91	84	13
24	312	153	49	26	17	247	79	37	15
25	191	58	30	55	95	180	94	172	96

Table 34. Pneumothorax according to centres, 2004

Centres	Babies in study	Babies with VS		Babies with VS and pneumothorax		Babies with VS and pneumothorax who died	
	No.	No.	%	No.	%	No.	%
All centres	**7350**	**6310**	**86**	**281**	**4**	**128**	**46**
2	452	361	80	27	7	12	44
3	369	336	91	7	2	2	29
4	252	233	92	7	3	3	43
5	402	256	64	8	3	3	38
6	343	278	81	12	4	6	50
7	674	622	92	16	3	5	31
8	403	365	91	17	5	8	47
9	350	293	84	26	9	11	42
10	146	117	80	4	3	2	50
11	82	72	88	1	1	0	0
12	251	215	86	12	6	6	50
13	262	250	95	7	3	1	14
14	163	141	87	4	3	2	50
15	208	151	73	17	11	11	65
16	384	338	88	21	6	8	38
17	312	268	86	11	4	6	55
18	71	53	75	1	2	0	0
19	270	225	83	9	4	2	22
20	228	206	90	6	3	1	17
21	139	117	84	1	1	0	0
22	372	337	91	10	3	5	50
23	714	649	91	34	5	18	53
24	312	247	79	15	6	11	73
25	191	180	94	8	4	5	63

Table 35. Chronic lung disease (CLD) according to centres, 2004

Centres	Babies in study	Babies with VS		Babies with VS and CLD		Babies with VS and CLD who died	
	No.	No.	%	No.	%	No.	%
All centres	**7350**	**6310**	**86**	**231**	**4**	**48**	**21**
2	452	361	80	11	3	1	9
3	369	336	91	4	1	2	50
4	252	233	92	3	1	1	33
5	402	256	64	7	3	0	0
6	343	278	81	10	4	2	20
7	674	622	92	15	2	2	13
8	403	365	91	10	3	5	50
9	350	293	84	18	6	7	39
10	146	117	80	0	0	0	0
11	82	72	88	5	7	0	0
12	251	215	86	7	3	1	14
13	262	250	95	2	1	0	0
14	163	141	87	7	5	1	14
15	208	151	73	10	7	4	40
16	384	338	88	20	6	3	15
17	312	268	86	6	2	0	0
18	71	53	75	0	0	0	0
19	270	225	83	45	20	7	16
20	228	206	90	4	2	1	25
21	139	117	84	0	0	0	0
22	372	337	91	6	2	1	17
23	714	649	91	23	4	6	26
24	312	247	79	9	4	2	22
25	191	180	94	9	5	2	22

Table 36. Cerebral ultrasound scanning (CUS) and intraventricular haemorrhage (IVH) (babies with birthweight 501-1500g) according to centres, 2004

Centres	Babies in study	Babies with CUS		Babies with CUS who has Grade 1 IVH		Babies with CUS who has Grade 2 IVH		Babies with CUS who has Grade 3 IVH		Babies with CUS who has Grade 4 IVH		Babies with Grade 3 or 4 IVH who died	
		No	%	No	%	No	%	No	%	No	%	No	%
All centres	**2753**	**1655**	**60**	**162**	**10**	**203**	**12**	**123**	**7**	**68**	**4**	**111**	**7**
2	180	141	78	11	8	6	4	5	4	3	2	7	5
3	140	119	85	17	14	10	8	7	6	9	8	10	8
4	72	40	56	6	15	5	13	0	0	1	3	0	0
5	180	32	18	0	0	4	13	2	6	4	13	2	6
6	132	70	53	12	17	14	20	3	4	3	4	6	9
7	237	145	61	11	8	25	17	8	6	4	3	10	7
8	106	58	55	2	3	2	3	4	7	1	2	4	7
9	145	119	82	5	4	11	9	13	11	5	4	13	11
10	59	11	19	0	0	1	9	1	9	0	0	0	0
11	27	20	74	1	5	0	0	0	0	0	0	0	0
12	114	72	63	5	7	14	19	10	14	6	8	7	10
13	67	34	51	4	12	4	12	3	9	2	6	1	3
14	70	30	43	0	0	1	3	1	3	2	7	2	7
15	95	53	56	4	8	6	11	5	9	2	4	6	11
16	154	106	69	31	29	23	22	7	7	4	4	4	4
17	119	90	76	16	18	26	29	11	12	3	3	4	4
18	30	23	77	2	9	1	4	1	4	0	0	0	0
19	118	81	69	3	4	10	12	3	4	1	1	2	2
20	84	61	73	2	3	5	8	5	8	3	5	6	10
21	53	35	66	4	11	2	6	1	3	0	0	1	3
22	110	94	85	5	5	6	6	6	6	4	4	5	5
23	250	58	23	2	3	3	5	6	10	5	9	9	16
24	153	118	77	17	14	22	19	20	17	3	3	9	8
25	58	45	78	2	4	2	4	1	2	3	7	3	7

Table 37. Retinopathy of prematurity (ROP) (babies < 32 weeks gestation) according to centres, 2004

Centres	Babies <32 weeks gestation	Babies who survived		Babies who survived and had ROP screening		Babies who survived and had ROP screening with Grade 3 ROP		Babies who survived and had ROP screening with Grade 4 ROP		Babies who survived and had ROP screening with Grade 3 or 4 ROP	
		No.	%	No.	%	No.	%	No.	%	No.	%
All centres	**2522**	**1745**	**69**	**1406**	**81**	**66**	**5**	**9**	**1**	**75**	**5**
2	169	113	67	97	86	2	2	0	0	2	2
3	149	106	71	92	87	0	0	0	0	0	0
4	59	40	68	25	63	5	20	0	0	5	20
5	146	100	68	64	64	1	2	0	0	1	2
6	93	57	61	32	56	2	6	0	0	2	6
7	229	159	69	126	79	13	10	1	1	14	11
8	112	66	59	40	61	4	10	0	0	4	10
9	123	82	67	78	95	0	0	0	0	0	0
10	54	30	56	20	67	1	5	0	0	1	5
11	23	15	65	14	93	0	0	0	0	0	0
12	105	74	70	68	92	3	4	0	0	3	4
13	67	48	72	43	90	3	7	0	0	3	7
14	67	48	72	35	73	3	9	0	0	3	9
15	91	57	63	37	65	0	0	1	3	1	3
16	168	133	79	90	68	6	7	0	0	6	7
17	98	67	68	55	82	1	2	0	0	1	2
18	27	20	74	18	90	0	0	0	0	0	0
19	94	70	74	69	99	0	0	0	0	0	0
20	76	52	68	47	90	3	6	0	0	3	6
21	47	37	79	34	92	0	0	0	0	0	0
22	96	80	83	77	96	5	6	3	4	8	10
23	225	146	65	116	79	6	5	0	0	6	5
24	157	118	75	105	89	8	8	1	1	9	9
25	47	27	57	24	89	0	0	3	13	3	13

Table 38. Retinopathy of prematurity (ROP) (babies with BW <1250g) according to centres, 2004

Centres	Babies with BW<1250gm	Babies who survived		Babies who survived and had ROP screening		Babies who survived and had ROP screening with Grade 3 ROP		Babies who survived and had ROP screening with Grade 4 ROP	
	No.	No.	%	No.	%	No.	%	No.	%
All centres	**1616**	**926**	**57**	**809**	**87**	**58**	**7**	**8**	**1**
2	92	54	59	50	93	2	4	0	0
3	88	51	58	39	76	0	0	0	0
4	37	19	51	12	63	5	42	0	0
5	88	45	51	38	84	1	3	0	0
6	71	35	49	28	80	2	7	0	0
7	159	94	59	90	96	11	12	1	1
8	60	26	43	23	88	4	17	0	0
9	78	42	54	42	100	0	0	0	0
10	32	11	34	6	55	1	17	0	0
11	16	8	50	8	100	0	0	0	0
12	61	36	59	33	92	3	9	0	0
13	45	27	60	23	85	3	13	0	0
14	43	24	56	18	75	3	17	0	0
15	55	27	49	17	63	0	0	1	6
16	108	79	73	69	87	6	9	0	0
17	70	40	57	32	80	0	0	0	0
18	17	10	59	9	90	0	0	0	0
19	67	43	64	42	98	0	0	0	0
20	46	26	57	22	85	2	9	0	0
21	32	20	63	15	75	0	0	0	0
22	58	42	72	39	93	3	8	2	5
23	157	84	54	73	87	4	5	0	0
24	100	65	65	63	97	8	13	1	2
25	36	18	50	18	100	0	0	3	17

Table 39. Cephalhaematoma, Sub-aponeurotic haemorrhage, Erb's palsy and Birth Trauma according to centres, 2004

Centres	Babies in study	Babies with Cephalhaematoma		Babies with Sub-aponeurotic haemorrhage		Babies with Erb's palsy		Babies with birth trauma	
	No.	No.	%	No.	%	No.	%	No.	%
All centres	**7350**	**39**	**1**	**118**	**2**	**40**	**1**	**185**	**3**
2	452	4	1	9	2	3	1	15	3
3	369	1	0	2	1	1	0	4	1
4	252	3	1	5	2	1	0	9	4
5	402	2	0	2	0	1	0	3	1
6	343	0	0	9	3	2	1	11	3
7	674	1	0	7	1	4	1	11	2
8	403	3	1	19	5	1	0	22	5
9	350	3	1	3	1	2	1	7	2
10	146	2	1	0	0	0	0	2	1
11	82	2	2	4	5	0	0	6	7
12	251	3	1	1	0	1	0	5	2
13	262	2	1	3	1	0	0	5	2
14	163	3	2	3	2	1	1	6	4
15	208	2	1	1	0	1	0	4	2
16	384	1	0	7	2	5	1	13	3
17	312	0	0	6	2	2	1	7	2
18	71	0	0	1	1	1	1	2	3
19	270	2	1	3	1	0	0	5	2
20	228	1	0	2	1	0	0	3	1
21	139	0	0	0	0	0	0	0	0
22	372	2	1	9	2	2	1	11	3
23	714	0	0	8	1	5	1	13	2
24	312	2	1	10	3	5	2	15	5
25	191	0	0	4	2	2	1	6	3

Table 40. Necrotising enterocolitis (NEC) (babies with BW 501-1500g) according to centres, 2004

Centres	Babies with BW 501-1500g	No. who died		Babies with NEC		Babies with NEC who died	
	No.	No.	%	No.	%	No.	%
All centres	**2753**	**794**	**29**	**215**	**8**	**56**	**26**
2	180	52	29	29	16	4	14
3	140	40	29	15	11	4	27
4	72	21	29	6	8	0	0
5	180	51	28	7	4	0	0
6	132	49	37	8	6	3	38
7	237	69	29	18	8	8	44
8	106	43	41	11	10	1	9
9	145	41	28	16	11	3	19
10	59	22	37	5	8	4	80
11	27	7	26	3	11	1	33
12	114	34	30	9	8	7	78
13	67	22	33	0	0	0	10
14	70	19	27	1	1	1	0
15	95	34	36	7	7	2	29
16	154	29	19	23	15	4	17
17	119	33	28	12	10	3	25
18	30	7	23	3	10	0	0
19	118	29	25	4	3	2	50
20	84	26	31	6	7	1	17
21	53	13	25	5	9	1	20
22	110	17	15	1	1	0	0
23	250	75	30	9	4	3	33
24	153	38	25	11	7	2	18
25	58	23	40	6	10	2	33

Table 41. Confirmed bacterial sepsis according to centres, 2004

Centres	Babies in study	Babies who died		Babies with confirmed sepsis		Babies with confirmed bacterial sepsis who died	
	No.	No.	%	No.	%	No.	%
All centres	**7350**	**1726**	**23**	**681**	**9**	**179**	**26**
2	452	113	25	43	10	4	9
3	369	76	21	35	9	12	34
4	252	44	17	32	13	4	13
5	402	112	28	39	10	3	8
6	343	116	34	37	11	13	35
7	674	158	23	70	10	18	26
8	403	112	28	47	12	18	38
9	350	81	23	29	8	12	41
10	146	54	37	17	12	7	41
11	82	16	20	6	7	4	67
12	251	59	24	25	10	13	52
13	262	46	18	7	3	0	0
14	163	43	26	16	10	3	19
15	208	58	28	7	3	2	29
16	384	66	17	41	11	8	20
17	312	62	20	27	9	4	15
18	71	20	28	0	0	0	
19	270	54	20	19	7	3	16
20	228	54	24	24	11	6	25
21	139	29	21	16	12	4	25
22	372	65	17	31	8	3	10
23	714	142	20	53	7	14	26
24	312	84	27	25	8	6	24
25	191	62	32	35	18	18	51

Table 42. Confirmed bacterial sepsis in very low birthweight babies (BW 501-1500g) according to centres, 2004

Centres	Babies with BW 501-1000g	Babies with BW 501 -1000g with confirmed sepsis		Babies with BW 1001-1500g	Babies with BW 1001-1500g with confirmed sepsis	
	No.	No.	%	No.	No.	%
All centres	**907**	**149**	**16**	**1846**	**196**	**11**
2	48	5	10	132	12	9
3	45	10	22	95	10	11
4	20	3	15	52	10	19
5	49	12	24	131	16	12
6	45	3	7	87	10	11
7	94	17	18	143	20	14
8	39	6	15	67	12	18
9	42	4	10	103	13	13
10	21	4	19	38	4	11
11	8	0	0	19	2	11
12	35	8	23	79	10	13
13	27	1	4	40	2	5
14	30	9	30	40	1	3
15	39	2	5	56	1	2
16	59	14	24	95	10	11
17	33	3	9	86	8	9
18	11	0	0	19	0	0
19	29	3	10	89	6	7
20	26	6	23	58	9	16
21	12	2	17	41	3	7
22	28	3	11	82	9	11
23	89	21	24	161	13	8
24	53	5	9	100	7	7
25	25	8	32	33	8	24

Table 43. Fungal sepsis in very low birthweight babies (BW 501-1500g) according to centres, 2004

Centres	Babies with BW 501-1000g	Babies with BW 50 -1000g with fungal sepsis		Babies with BW 1001-1500g	Babies with BW 1001-1500g with fungal sepsis	
	No.	No.	%	No.	No.	%
All centres	**907**	**20**	**2**	**1846**	**23**	**1**
2	48	1	2	132	0	0
3	45	0	0	95	0	0
4	20	0	0	52	1	2
5	49	1	2	131	0	0
6	45	2	4	87	0	0
7	94	3	3	143	5	3
8	39	4	10	67	2	3
9	42	0	0	103	2	2
10	21	1	5	38	2	5
11	8	0	0	19	1	5
12	35	0	0	79	1	1
13	27	0	0	40	2	5
14	30	0	0	40	0	0
15	39	0	0	56	1	2
16	59	1	2	95	1	1
17	33	1	3	86	1	1
18	11	0	0	19	0	0
19	29	3	10	89	4	4
20	26	0	0	58	0	0
21	12	0	0	41	0	0
22	28	1	4	82	0	0
23	89	1	1	161	0	0
24	53	0	0	100	0	0
25	25	1	4	33	0	0

Table 44. Perinatal and neonatal death and mortality rate according to centres, 2004

Centres	No. Stillbirths	No. Live births	Total Births	Inborn Deaths < 7 days	Inborn deaths < 28 days	PMR per 1000 TBs	NMR per 1000 LBs
All centres	**1884**	**194940**	**196824**	**934**	**1209**	**14.32**	**6.20**
2	98	9960	10058	51	74	14.81	7.43
3	93	9072	9165	38	54	14.29	5.95
4	51	5973	6024	25	32	12.62	5.36
5	152	9981	10133	73	84	22.20	8.42
6	172	13712	13884	61	79	16.78	5.76
7	159	15117	15276	94	115	16.56	7.61
8	125	11155	11280	52	73	15.69	6.54
9	59	9988	10047	51	62	10.95	6.21
10	56	5439	5495	25	33	14.74	6.07
11	36	3954	3990	9	11	11.28	2.78
12	41	4916	4957	27	37	13.72	7.53
13	34	5333	5367	26	31	11.18	5.81
14	33	5400	5433	30	37	11.60	6.85
15	78	6632	6710	30	36	16.10	5.43
16	89	9973	10062	38	51	12.62	5.11
17	86	9116	9202	38	48	13.48	5.27
18	20	3151	3171	12	13	10.09	4.13
19	34	4920	4954	23	34	11.51	6.91
20	52	6352	6404	34	40	13.43	6.30
21	42	5319	5361	19	22	11.38	4.14
22	95	8610	8705	42	49	15.74	5.69
23	136	14751	14877	73	101	14.05	6.85
24	84	11076	11160	44	58	11.47	5.24
25	59	5040	5099	19	35	15.30	6.94

Table 45. Survival of extremely preterm (22-27 weeks' gestation) and very preterm (28-31 weeks' gestation) infants according to centres, 2004

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 preterm and Very preterm who survived	
	No.	No.	%	No.	No.	%	No.	No.	%
All centres	769	321	42	1744	1424	82	2513	1745	69
2	41	19	46	126	94	75	167	113	68
3	47	22	47	102	84	82	149	106	71
4	19	4	21	40	36	90	59	40	68
5	47	21	45	97	79	81	144	100	69
6	18	6	33	75	51	68	93	57	61
7	84	38	45	144	121	84	228	159	70
8	29	9	31	82	57	70	111	66	59
9	42	15	36	81	67	83	123	82	67
10	21	4	19	33	26	79	54	30	56
11	7	2	29	15	13	87	22	15	68
12	27	15	56	78	59	76	105	74	70
13	26	11	42	41	37	90	67	48	72
14	27	11	41	40	37	93	67	48	72
15	32	12	38	59	45	76	91	57	63
16	63	40	63	105	93	89	168	133	79
17	30	8	27	68	59	87	98	67	68
18	8	2	25	18	18	100	26	20	77
19	26	14	54	67	56	84	93	70	75
20	18	6	33	58	46	79	76	52	68
21	9	2	22	38	35	92	47	37	79
22	21	11	52	75	69	92	96	80	83
23	59	17	29	166	129	78	225	146	65
24	49	26	53	108	92	85	157	118	75
25	19	6	32	28	21	75	47	27	57

Table 46. Survival of extremely low birthweight (BW 501-1500gm) and very low birthweight (BW 1001-1500gm) infants according to centres, 2004

Centres	ELBW babies (BW 501-1000 gm)	ELBW who survived		VLBW babies (BW 1001-1500gm)	VLBW who survived		ELBW + VLBW	ELBW + VLBW who survived	
	No.	No.	%	No	No.	%	No.	No.	%
All centres	**907**	**392**	**43**	**1846**	**1567**	**85**	**2753**	**1959**	**71**
2	48	23	48	132	105	80	180	128	71
3	45	17	38	95	83	87	140	100	71
4	20	6	30	52	45	87	72	51	71
5	49	17	35	131	112	85	180	129	72
6	45	19	42	87	64	74	132	83	63
7	94	44	47	143	124	87	237	168	71
8	39	10	26	67	53	79	106	63	59
9	42	18	43	103	86	83	145	104	72
10	21	6	29	38	31	82	59	37	63
11	8	3	38	19	17	89	27	20	74
12	35	18	51	79	62	78	114	80	70
13	27	11	41	40	34	85	67	45	67
14	30	15	50	40	36	90	70	51	73
15	39	15	38	56	46	82	95	61	64
16	59	36	61	95	89	94	154	125	81
17	33	12	36	86	74	86	119	86	72
18	11	4	36	19	19	100	30	23	77
19	29	13	45	89	76	85	118	89	75
20	26	10	38	58	48	83	84	58	69
21	12	4	33	41	36	88	53	40	75
22	28	16	57	82	77	94	110	93	85
23	89	39	44	161	136	84	250	175	70
24	53	27	51	100	88	88	153	115	75
25	25	9	36	33	26	79	58	35	60

Table 47. Survival of cases with ventilatory support (VS) according to centres, 2004

Centres	Babies in study	Babies who survived		Babies with ventilatory support		Babies with VS who survived	
	No.	No.	%	No.	%	No.	%
All centres	**7350**	**5624**	**77**	**6310**	**86**	**5018**	**80**
2	452	339	75	361	80	281	78
3	369	293	79	336	91	274	82
4	252	208	83	233	92	201	86
5	402	290	72	256	64	212	83
6	343	227	66	278	81	188	68
7	674	516	77	622	92	499	80
8	403	291	72	365	91	278	76
9	350	269	77	293	84	233	80
10	146	92	63	117	80	76	65
11	82	66	80	72	88	57	79
12	251	192	76	215	86	171	80
13	262	216	82	250	95	212	85
14	163	120	74	141	87	105	74
15	208	150	72	151	73	111	74
16	384	318	83	338	88	285	84
17	312	250	80	268	86	214	80
18	71	51	72	53	75	45	85
19	270	216	80	225	83	190	84
20	228	174	76	206	90	168	82
21	139	110	79	117	84	98	84
22	372	307	83	337	91	286	85
23	714	572	80	649	91	532	82
24	312	228	73	247	79	180	73
25	191	129	68	180	94	122	68

Table 48. Duration of hospital stay (BW 501-750g) according to centres, 2004

Centres	Babies in study	No. Survived		Survivors with hospital stay < 24 hours		If survived > 24 hours mean duration of stay +/- SD in days		No. who died		No. who died with hospital stay < 24 hours		If died after 24 hours mean duration of hospital stay +/- SD in days	
	No.	No.	%	No.	%			No.	%	No.	%		
All centres	**299**	**48**	**16**	**0**	**0**	**83.1**	**34.8**	**251**	**84**	**144**	**57**	**9.3**	**12.5**
2	13	1	8	0	0	81		12	92	5	42	6	9.4
3	13	0	0	0	0	0	0	13	100	9	69	10.3	8.5
4	9	0	0	0	0	0	0	9	100	4	44	17.4	21.3
5	18	3	17	0	0	96.7	17.8	15	83	11	73	4	2.2
6	10	2	20	0	0	112.5	2.1	8	80	2	25	4.5	2.4
7	32	6	19	0	0	78.8	33.6	26	81	17	65	9.3	13.1
8	14	0	0	0	0	0	0	14	100	9	64	5	5.8
9	13	3	23	0	0	58	46.4	10	77	3	30	6.9	9.4
10	7	0	0	0	0	0	0	7	100	3	43	20.8	32.3
11	3	1	33	0	0	69		2	67	0	0	3	0
12	7	2	29	0	0	15	17	5	71	2	40	26.7	35.2
13	12	3	25	0	0	88	18.2	9	75	7	78	4.5	0.7
14	10	4	40	0	0	65	23.5	6	60	3	50	12	12.2
15	16	2	13	0	0	46.5	47.4	14	88	11	79	6	6.9
16	25	7	28	0	0	106.1	40	18	72	10	56	9	7.1
17	9	1	11	0	0	42		8	89	6	75	3.5	2.1
18	5	0	0	0	0	0	0	5	100	5	100	0	0
19	10	0	0	0	0	0	0	10	100	3	30	11.1	12.2
20	5	0	0	0	0	0	0	5	100	3	60	1.5	0.7
21	3	0	0	0	0	0	0	3	100	2	67	4	
22	5	1	20	0	0	89		4	80	1	25	11	17.3
23	26	6	23	0	0	85.7	22.6	20	77	16	80	10	9.1
24	26	5	19	0	0	101	21	21	81	10	48	11.1	9
25	8	1	13	0	0	136		7	88	2	29	7.2	6.9

Table 49. Duration of hospital stay (BW 751-1000g) according to centres, 2004

Centres	Babies in study	No. Survived		Survivors with hospital stay < 24 hours		If survived> 24 hours mean duration of stay +/- SD		No who died		No. who died with hospital stay < 24 hours		If died after 24 hours mean duration of hospital stay +/- SD	
	No.	No.	%	No.	%			No.	%	No.	%		
All centres	**608**	**344**	**57**	**15**	**4**	**69.1**	**33.5**	**264**	**43**	**68**	**26**	**16.3**	**22.5**
2	35	22	63	0	0	73	40.5	13	37	3	23	12.6	12.2
3	32	17	53	0	0	36.8	21.4	15	47	4	27	13.8	8.6
4	11	6	55	2	33	66.8	12.3	5	45	1	20	8.5	7.9
5	31	14	45	0	0	65.4	28.2	17	55	11	65	14.8	19.8
6	35	17	49	3	18	63.9	21.5	18	51	3	17	15.7	15.5
7	62	38	61	0	0	66.3	33.1	24	39	3	13	8.3	7.5
8	25	10	40	0	0	76.8	24.1	15	60	5	33	13.6	26.9
9	29	15	52	0	0	75.1	11.1	14	48	6	43	38.5	43.7
10	14	6	43	2	33	62.8	31.4	8	57	1	13	10.7	11.4
11	5	2	40	0	0	84	9.9	3	60	0	0	17	13.1
12	28	16	57	0	0	68.3	22.6	12	43	3	25	19.3	16.6
13	15	8	53	0	0	54.1	21.5	7	47	2	29	4.6	5.9
14	20	11	55	1	9	74.8	19.7	9	45	5	56	20.3	16.3
15	23	13	57	6	46	78.7	31.6	10	43	2	20	28.9	31
16	34	29	85	0	0	58.6	35.4	5	15	1	20	21.8	32.2
17	24	11	46	0	0	89.2	63.5	13	54	3	23	9.1	11.3
18	6	4	67	0	0	69.8	9.5	2	33	1	50	7	
19	19	13	68	0	0	106.5	33.4	6	32	2	33	7.5	5.3
20	21	10	48	1	10	64.6	30.8	11	52	3	27	12.8	8.4
21	9	4	44	0	0	43.5	21.4	5	56	1	20	11	13.4
22	23	15	65	0	0	73.1	18.7	8	35	1	13	36.7	52.7
23	63	33	52	0	0	64	32.4	30	48	5	17	14.6	14.9
24	27	22	81	0	0	81.5	39.8	5	19	1	20	46	71.5
25	17	8	47	0	0	84.8	37.7	9	53	1	11	17.9	8.9

Table 50. Duration of hospital stay (BW 1001-1250g) according to centres, 2004

Centres	Babies in study	No. Survived		Survivors with hospital stay < 24 hours		If survived > 24 hours mean duration of stay +/- SD in days		No. who died		No. who died with hospital stay < 24 hours		If died after 24 hours mean duration of hospital stay +/- SD in days	
	No.	No.	%	No.	%			No.	%	No.	%		
All centres	**747**	**599**	**80**	**9**	**2**	**48.2**	**26.2**	**148**	**20**	**40**	**27**	**19.2**	**37.7**
2	53	40	75	0	0	46.3	19.9	13	25	4	31	13.1	13.7
3	43	35	81	0	0	38	20.2	8	19	0	0	5.1	4.8
4	20	16	80	4	25	32	18.6	4	20	1	25	8.3	9.3
5	48	37	77	0	0	46.7	16.7	11	23	4	36	8.4	6.3
6	31	20	65	2	10	48.4	13.4	11	35	2	18	10.7	10.8
7	64	53	83	0	0	52.6	30.5	11	17	5	45	17.3	13.5
8	23	17	74	0	0	58.9	25.6	6	26	1	17	10.4	5.9
9	37	28	76	0	0	52.6	18	9	24	6	67	11	9.5
10	11	6	55	2	33	45.8	13	5	45	1	20	33	24.6
11	9	7	78	0	0	46.9	2.3	2	22	0	0	42.5	20.5
12	28	20	71	0	0	48.3	26.6	8	29	1	13	20.3	17
13	19	17	89	0	0	35	15.5	2	11	1	50	2	
14	11	9	82	0	0	40.1	10	2	18	0	0	12	0
15	21	17	81	1	6	39.4	18.8	4	19	1	25	26.7	18.6
16	46	44	96	0	0	50.3	25.7	2	4	0	0	3.5	0.7
17	37	29	78	0	0	43.1	18.3	8	22	1	13	24.9	39.1
18	7	7	100	0	0	42.3	9.7	0	0	0	0	0	0
19	40	33	83	0	0	73.8	44.9	7	18	2	29	84.4	148.6
20	21	17	81	0	0	45.9	16.4	4	19	1	25	40	60.7
21	20	17	85	0	0	41.6	16.3	3	15	1	33	33	36.8
22	29	27	93	0	0	66.6	58.4	2	7	0	0	6	4.2
23	74	56	76	0	0	40.2	12.2	18	24	5	28	14.2	21
24	44	38	86	0	0	46.8	12.3	6	14	3	50	12.7	9.1
25	11	9	82	0	0	48.6	12.8	2	18	0	0	30.5	13.4

Table 51. Duration of hospital stay (BW1251-1500g) according to centres, 2004

Centres	Babies in study	No. Survived		Survivors with hospital stay < 24 hours		If survived > 24 hours mean duration of stay +/- SD in days		No. who died		No. who died with hospital stay < 24 hours		If died after 24 hours mean duration of hospital stay +/- SD in days	
	No.	No.	%	No.	%			No.	%	No.	%		
All centres	**1099**	**968**	**88**	**10**	**1**	**33.9**	**17.4**	**131**	**12**	**50**	**38**	**18. 2**	**27.7**
2	79	65	82	0	0	33.6	11.1	14	18	6	43	8.5	6.1
3	52	48	92	0	0	27.5	14.2	4	8	1	25	11.3	11.4
4	32	29	91	3	10	33.5	17.4	3	9	1	33	20.5	9.2
5	83	75	90	2	3	32.9	14.3	8	10	5	63	12.7	11.7
6	56	44	79	3	7	29	12.8	12	21	4	33	22.4	44.6
7	79	71	90	0	0	32.6	11.7	8	10	3	38	18.8	15
8	44	36	82	0	0	36.8	13.3	8	18	4	50	11.8	5.3
9	66	58	88	0	0	35.6	14.9	8	12	2	25	66.7	49.8
10	27	25	93	1	4	36.1	17.1	2	7	2	100		
11	10	10	100	0	0	32.5	7.9	0	0	0	0	0	0
12	51	42	82	0	0	38.8	49.4	9	18	4	44	9.2	9.2
13	21	17	81	0	0	27.5	17.1	4	19	1	25	11	6.6
14	29	27	93	0	0	32.7	13.4	2	7	1	50	4	
15	35	29	83	1	3	36.6	18.9	6	17	3	50	22.7	22
16	49	45	92	0	0	30	11.8	4	8	0	0	5.8	6.2
17	49	45	92	0	0	33.5	11.7	4	8	0	0	12.3	5.6
18	12	12	100	0	0	34.3	14.8	0	0	0	0	0	0
19	49	43	88	0	0	39.3	16.2	6	12	5	83	8	
20	37	31	84	0	0	30.6	11.7	6	16	2	33	8.3	7.4
21	21	19	90	0	0	28.1	11.3	2	10	1	50	11	
22	53	50	94	0	0	38.8	15.3	3	6	1	33	50	65.1
23	87	80	92	0	0	35	15.3	7	8	0	0	11	12.1
24	56	50	89	0	0	35.1	16.4	6	11	2	33	2.8	1
25	22	17	77	0	0	39.9	13.8	5	23	2	40	37.7	45.7

Appendix I

Monthly Birth Census

Hospital:

Month:

Year:

Total Births: **Live births:** **Stillbirths:**

Births 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
SVD				
Breech				
Forceps				
Ventouse				
LSCS Elective				
LSCS Emergency				
TOTAL				

*** CRF to be filled for each case*

Births versus Ethnic Group

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

*** CRF to be filled for each case*

Remarks:……

……

……

Name of Site Coordinator:

Chop: Date:

NATIONAL NEONATAL REGISTRY

Centre Name: _____

Date of Admission (dd/mm/yy): ☐☐/☐☐/☐☐ **Time of Admission:** ☐☐ : ☐☐ am/pm/hrs

☐ New Case ☐ Re-Admitted ☐ Referral from _____

Office use: ☐☐ / ☐☐☐

Centre: ☐☐☐

SECTION 1 : PATIENT PARTICULARS

1. Name: _____ **2. RN:** _____

3. Mother's I/C Number: New IC: _____ *Passport:* _____

4. Date of Birth (dd/mm/yy) : ☐☐/☐☐/☐☐ **5. Time of Birth:** ☐☐ : ☐☐ am / pm / hrs

6. Ethnic group: ☐ Malay ☐ Indian ☐ Bumiputra Sabah, specify: _____ ☐ Foreigner
☐ Chinese ☐ Orang Asli ☐ Bumiputra Sarawak, specify: _____ ☐ Other Malaysian

7. Maternal Age: _____ **8. GPA :** G _____ P _____ A _____

9. Marital Status: ☐ Married ☐ Divorced ☐ Widowed ☐ Single

SECTION 2 : BIRTH HISTORY

Drugs Used In Labour

10. Antenatal Steroid: ☐ Yes → **a. No of Doses:** ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ >4
b. Interval from 1st Dose to Delivery: ☐ <12 hrs ☐ >=12 hrs
☐ No

11. Intrapartum Antibiotic: ☐ Yes ☐ No

12. Birth Weight (grams): _____ **13. Gestation (weeks):** _____

14. Growth Status: ☐ SGA ☐ AGA ☐ LGA

15. Gender: ☐ Male ☐ Female ☐ Indeterminate

16. Baby Status: ☐ Inborn ☐ Outborn ☐ Referral centre if relevant, specify: _____

17. Place of Birth: ☐ University Hospital ☐ District Hospital with Specialist ☐ Home
☐ General Hospital ☐ District Hospital without Specialist ☐ Others, specify: _____
☐ Private Hospital ☐ Private Maternity Home _____

18. Multiplicity: ☐ Singleton ☐ Twin ☐ Triplet ☐ Others, specify: _____

19. Mode of Delivery: ☐ SVD ☐ Breech ☐ Forceps ☐ Ventouse ☐ LSCS → ☐ Elective ☐ Emergency

SECTION 3 : NEONATAL EVENT

20. CRIB Score for birth weight < 1,500 g: *(Please refer to Appendix 2)* ☐ Score : _____ ☐ NA

21. Ventilatory Support: ☐ Yes → ☐ CPAP ☐ IMV ☐ IMV + PTV ☐ Others, specify: _____
☐ No ☐ HFPPV ☐ HFOV ☐ Nitric Oxide _____

22. Total Duration of Ventilatory Support: ☐ <24 hrs ☐ >=24hrs: _____ (in completed days)

23. Antibiotics: (Check all that apply) ☐ Yes → ☐ Penicillin ☐ 3rd Cephalosporin ☐ Carbapenem
☐ No ☐ Aminoglycoside ☐ 4th Cephalosporin ☐ Others, specify: _____
☐ 2nd Cephalosporin ☐ Vancomycin _____

24. Surfactant: ☐ Yes ☐ No **25. Post Natal Steroid for CLD:** ☐ Yes ☐ No

26. Parenteral Nutrition: ☐ Yes ☐ No

27. Enteral Nutrition: ☐ Yes → ☐ Formula ☐ Breastfeeding / Breastmilk
☐ No ☐ Fortified EBM ☐ Others, specify: _____

28. ROP screening: ☐ Yes ☐ No

29. Ultrasound Brain: ☐ Yes ☐ No

SECTION 4 : OUTCOME

30. Date of Discharge (dd/mm/yy) : ☐☐/☐☐/☐☐ **31. Weight (grams) on Discharge or Death:** _____

32. Total Duration of hospital stay (Neonatal / Paeds Care): ☐ <24 hrs ☐ >=24hrs: _____ (in completed days)

33. Outcome: ☐ Alive ☐ Dead

34. If Child Alive: **Place of Discharge :** ☐ Home ☐ Other Non Paeds Ward ☐ Other Hospitals ☐ Social welfare home

35. If Child Died: **Place of Death :** ☐ Labour Room/OT ☐ In Transit
☐ Neonatal Unit ☐ Others, specify: _____

version 1

SECTION 5 : PROBLEMS / DIAGNOSES

Code	Diagnoses	Yes?
	Growth and Maturity	
P05.1	Small for gestational age (weight <10th centile for gestational age based on Lubchenco charts)	
P07.0	Extremely low birth weight baby (999 gm or less)	
P07.1	Other low birth weight baby (BW 1000-2499 gm)	
P07.2	Extreme immaturity (<28 weeks)	
P07.3	Prematurity (28 completed weeks to < 37 weeks)	
P08.0	Exceptionally large baby (4.5 kg and above)	
P08.2	Post-term infant (42 weeks and above)	
	Respiratory	
P22.0	Respiratory distress syndrome or hyaline membrane disease	
P23	Congenital pneumonia, Specify organism _____	
P24.0	Meconium aspiration syndrome	
P22.1	Transient tachypnoea newborn	
P25.0	Interstitial emphysema	
P25.1	Pneumothorax	
P26	Pulmonary haemorrhage	
P27.1	Bronchopulmonary dysplasia	
P28.4	Apnoea of prematurity	
P28.1	Atelectasis, other and unspecified	
	Infections	
P35	Congenital viral diseases, State specific virus _____	
P36	Bacterial sepsis of newborn, State specific bacteria	
	Group B Streptococcus	
	MRSA	
	MRSE	
	ESBL organisms	
P36.8	Due to other organisms other than the above. Specify bacteria: _____	
B49	Fungal sepsis, specify:	
P36.9	Bacterial sepsis (unspecified) / Clinical sepsis	
	Presumed sepsis (presence of risk factors)	
	Central Nervous System	
P21.0	Severe birth asphyxia (Apgar 1 min= 0-3)	
P21.1	Mild and moderate birth asphyxia (Apgar 1 min = 4-7)	
P91.0	Neonatal cerebral ischaemia (HIE)	
P96.1	Neonatal withdrawal symptoms from maternal use of drugs of addiction	
P91.1	Acquired periventricular cysts of newborn	
P52.0	☐ Right Grade 1 I V H ☐ Left Grade 1 I V H	
P52.1	☐ Right Grade 2 I V H ☐ Left Grade 2 I V H	
P52.2	☐ Right Grade 3 I V H ☐ Left Grade 3 I V H	
P52.4	☐ Right Grade 4 I V H ☐ Left Grade 4 I V H	
P52.3	Unspecified intraventricular haemorrhage (no cranial ultrasound)	
	Birth trauma	
P12.0	Cephalhaematoma	
P12.2	Subaponeurotic haemorrhage	
P14.0	Erb's paralysis	
	Renal	
N13.3	Hydronephrosis, other and unspecified	
N13.7	Vesicoureteric reflux	
	Renal failure, unspecified (due to any cause)	

Code	Diagnoses	Yes?
	Haematology	
P53	Haemorrhagic disease of newborn	
P55.0	RH isoimmunisation	
P55.1	ABO isoimmunisation	
P56	Hydrops fetalis due to isoimmunisation	
P60	Disseminated intravascular coagulation	
P61.1	Polycythaemia neonatorum	
P61.2	Anaemia of prematurity	
	Cardiovascular	
Q25.0	Patent ductus arteriosus	
Q21.0	Ventricular septal defect	
Q20.3	Transposition of Great Vessels (TGA)	
Q21.3	Tetralogy of Fallot	
	Other cardiac defect, Specify _____	
P29.1	Neonatal cardiac dysarrrhythmia	
P29.3	Persistent foetal circulation (Persistent Pulmonary Hypertension)	
	Gastrointestinal	
P58.2	Jaundice due to infection	
P58.3	Jaundice due to polycythaemia	
P58.8	Jaundice due to G6PD deficiency/other specified excessive haemolysis	
P59.0	Jaundice associated with prematurity	
P59.9	Physiological jaundice	
P59.3	Breastmilk jaundice / neonatal jaundice from breastmilk inhibitor State maximum level of total serum bilirubin < 340 umol/L >= 340 umol/L	
P57.9	Kernicterus, specify cause: _____	
P77	Necrotising enterocolitis	
K21	Gastro-oesophageal reflux disease	
K40	Inguinal hernia	
K42	Umbilical hernia	
P78.2	Neonatal haematemesis and melaena due to swallowed maternal blood	
	Miscellaneous	
H35.1	Retinopathy of prematurity Right Eye ↓ ☐ Stage 1 ☐ Stage 2 ☐ Stage 3 ☐ Stage 4 Left Eye ↓ ☐ Stage 1 ☐ Stage 2 ☐ Stage 3 ☐ Stage 4	
P70.0	Syndrome of infant of mother with gestational diabetes	
P70.1	Syndrome of Infant of mother with preexisting diabetes	
P70.4	Transitory neonatal hypoglycaemia	
P83.2	Hydrops (not due to haemolytic disease)	
	Congenital anomalies	
Q03	Congenital hydrocephalus	
Q05	Spina bifida	
Q90	Down syndrome	
Q91	Edward and Patau syndrome	
Q89.9	Congenital malformation, unspecified	

Other Diagnoses:

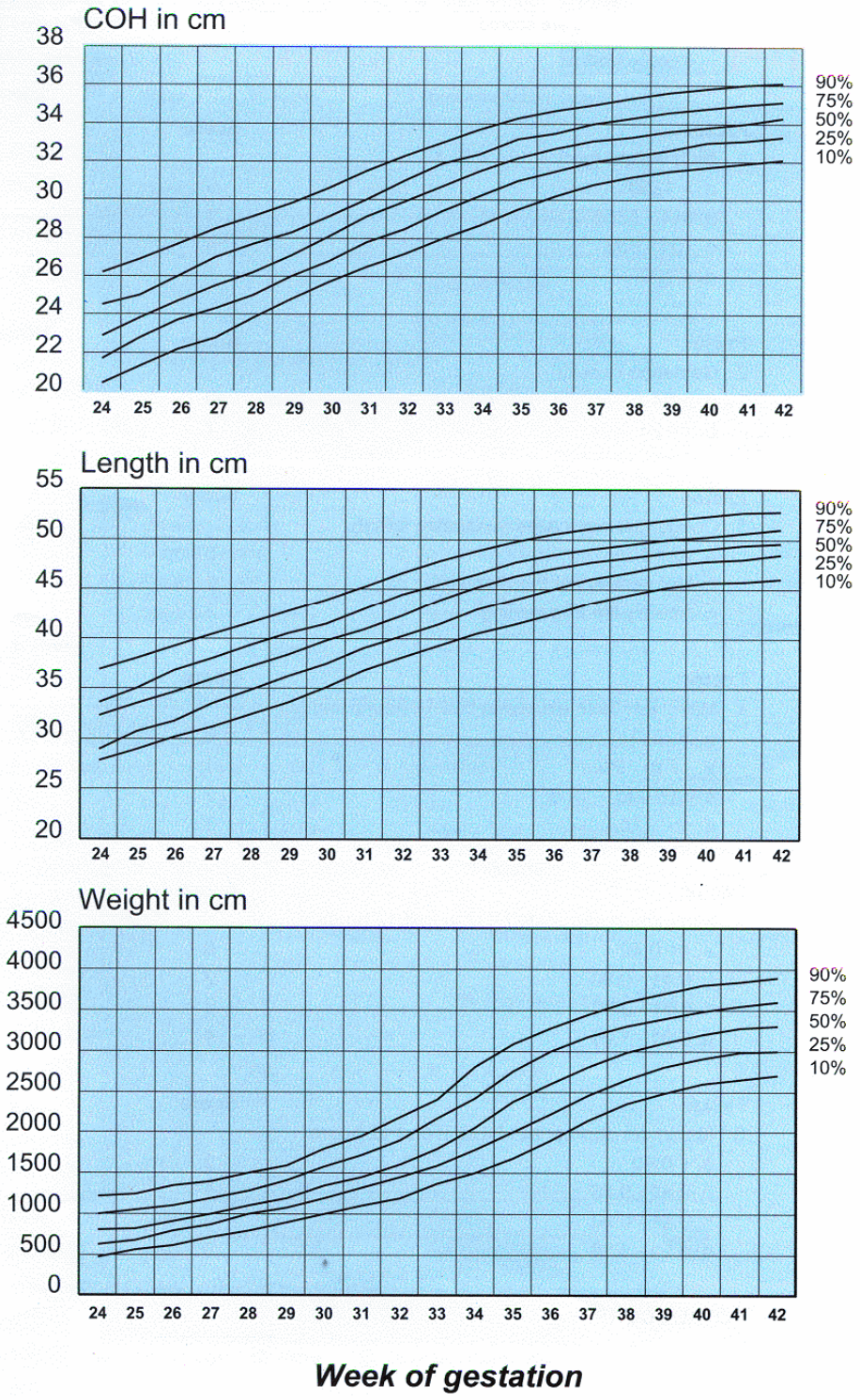
Name: _____

Signature: _____

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

Intrauterine growth charts (both sexes) APPENDIX 1

Lubchenco et al Pediatrics 1966 37: 403



CRIB Score (APPENDIX 2)

CRIB Score

It stands for 'clinical risk index for babies' score. It is a tool for assessing initial neonatal risk and comparing performance of neonatal intensive care units. It is based on routine date recorded within 12 hours of birth. Six variables that are independently associated with hospital deaths are scored.

Factor	Score
1. Birth weight (gm)	
a. > 1350	0
b. 851 - 1350	1
c. 701 - 850	4
d. < 700	7

Factor	Score
2. Gestation (week)	
a. > 24	0
b. <= 24	1

Factor	Score
3. Congenital anomalies (excluding lethal)	
a. None	0
b. Not acutely life threatening	1
c. Acutely life threatening	3

Factor	Score
4. Maximum base excess in first 12 hours (mmol/l)	
a. > - 7.0	0
b. - 7 to - 9.9	1
c. - 10.0 to - 14.9	2
d. <= - 15.0	3

Factor	Score
5. Minimum appropriate FiO2 in first 12 hours	
a. <= 0.40	0
b. 0.41 - 0.60	2
c. 0.61 - 0.90	3
d. 0.91 - 1.00	4

Factor	Score
6. Maximum appropriate FiO2 in first 12 hours	
a. < 0.40	0
b. 0.41 - 0.80	1
c. 0.81 - 0.90	3
d. 0.91 - 1.00	5

TOTAL SCORE: _____

Appendix III

INSTRUCTION MANUAL 2004

Neonatal Registry (User Requirement Specifications)

This registry aims to standardise and formalize neonatal data collection to provide information that will help to identify the strengths and weaknesses of respective neonatal units in the country and to enable steps to be taken to improve on areas of deficiency.

Objectives of the Neonatal Registry

8. Determine the frequency and distribution of critically ill neonates in Malaysia. These are useful measures of the health burden arising of neonatal critical illness and its care in the country.
9. To study the mortality and some morbidity outcomes of babies admitted to Neonatal Units (NNUs) in participating hospitals.
10. To calculate the perinatal, neonatal, and stillbirth mortality rates of inborn babies.
11. To compare outcomes between various centres.
12. To develop indicators for standard of care in various areas e.g. Expected survival rate of infants ventilated for RDS.
13. To study in further detail outcome of very low birth weight babies.
14. Stimulate and facilitate research on neonatal critical illness and its management.

Methodology

Inclusion criteria

A. All babies admitted to a NNU who
   1. Have a gestation of <32 weeks (i.e. up to 31 weeks + 6 days).
   2. Have a birth weight of 1500 grams and below
   3. Are ventilated.

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

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

Data Collection Technique

The Case Report Forms (CRF) consists of 4 pages. The first page has 4 sections. Section 1 consists of Patient Particulars, Section 2 consists of Birth History, Section 3 consists of Neonatal Events and Section 4 consists of Outcome.

The second page, which has Section 5, has a list of diagnoses and problems (adapted from WHO ICD 10 Codes). The third page has the growth chart (Appendix 1) and the last page is the scoring sheet for CRIB scores (Appendix 2). Babies discharged /transferred out to non-paediatric wards in the same hospital or to other hospitals will have one set of CRF completed and readmission of the same babies into the NNU will require a new set of CRF.

A baby who is 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.

A first time admission to the NNU concerned will be considered as a new case (even if it has been previously admitted else where) while a subsequent admission to the same NNU will be considered as a readmission. This will be accordingly indicated on the 1st page of the CRF. Section 2 (Birth History) will not be required again for a readmission while for Section 3 (Neonatal Event) only events occurring during the said admission need to be recorded.
For Section 4 (Outcome) only information pertaining to the respective admission and for Section 5 only Diagnoses and Problems that are encountered or still being encountered during this said admission need to be entered in the data sheet.

Hard copy CRFs will be prepared. The original copy of the CRF is to be sent to DTRU within 2 weeks of discharge to the Neonatal Registry Unit for data processing. When computer facilities are available at the participating site, data can be entered directly into the database software.

Confidentiality

1. Patient Data
   All data are confidential. The data collection center requires the Hospital RN of the patient to facilitate communication between the data center and the participating Paediatricians should any data clarification be required.

2. Hospital Identification
   A code will be given to each participating site. This code will only be known by the individual site. It will not be disclosed in any report or publication. The code will be randomly assigned and all individual hospital data will be anonymous. Comparisons of hospital will only use codes and not the hospital names.

DATA DEFINITION AND DATA STANDARDS

Centre Name: Name of participating hospital
Date of Admission (dd/mm/yy): Date of first admission to the participating site
Time of Admission: Time entered as 24 hrs clock or am/pm (delete as relevant)
New case or
Readmitted
Referral from: state the referring hospital

SECTION 1 - PATIENT PARTICULARS

1. ***Name of patient*:**
2. ***RN:*** RN at participating hospital. If the baby dies in Labour room and has no RN, then use the mother's RN.
3. ***Mother's I/C number*:** New IC / Passport No.
4. ***Date of Birth: dd/mm/yy***
5. ***Time of Birth*:** Time entered as 24 hrs clock or am/pm (delete as relevant)
6. ***Ethnic group*:** Malay/Chinese/Indian/Orang Asli/Bumiputra Sabah/Bumiputra Sarawak/Foreigner/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*:** G__P__A (of current pregnancy before delivery of this child)
9. ***Marital status*:** married/divorced/widowed/single

SECTION 2 – BIRTH HISTORY

10. ***Antenatal Steroid**:* If "yes" a) State number of doses given and b) Interval of 1st dose to delivery – to tick <12hrs or >12hrs

11. ***Intrapartum Antibiotics:*** Includes both oral and parenteral antibiotics given in the intrapartum period. Antibiotics mean antibacterial treatment

12. ***Birth weight (grams):*** Baby's body weight in grams to the nearest 1 gram

13. ***Gestation (weeks):*** If 1st trimester gestational assessment was done by ultrasound this is the most reliable gestational assessment. If no ultrasound was done and the mother is sure of her dates, these should be taken as correct unless there is a strong reason to suspect otherwise. If the dates are unsure or there is a strong reason to suspect inaccuracy in the dates then the results of the neonatal gestational assessment by the new Ballard score should be used.

14. ***Growth status:*** based on Lubchenco charts. SGA<10th centile; AGA 10-90th centile; LGA >90the centile. (Appendix 1)

15. ***Gender:*** Indicate Male, Female or Indeterminate

16. ***Baby 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)
    Outborn: Born in another place (includes BBA) and transferred after birth to the NNU of the participating site. Include those born in the hospital compound.
    To specify the referring center if relevant.

17. ***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 pertain to availability of specialist post even if this post is not filled.

18. ***Multiplicity:*** To indicate as singleton, twin, triplet or others ie quadruplets, etc.

19. ***Mode of delivery:*** Tick as relevant. Rarely more than 1 may apply. If LSCS, indicate if its elective or emergency.

20. ***CRIB score*****:** Apply scoring sheet (Appendix 2) for all babies 1500 gm and below, add up the scores and state the total score. Indicate NA if unable to score

SECTION 3 – NEONATAL EVENTS

21. ***Ventilatory support:*** If given to tick what type of support was given.
    1. CPAP -- (Any continuous positive airway pressure administered to the baby by any means)
    2. IMV – Intermittent Mandatory Ventilation given via a mechanical ventilator. Excluded manual hand bagging during resuscitation at birth.
    3. IMV+PTV – Patient – triggered ventilation is inclusive of synchronized mandatory ventilation (SIMV) and other Assist-Control modes
    4. HFPPV – High frequency positive pressure ventilation of rate >120/min
    5. HFOV – High frequency oscillatory ventilation as delivered by an oscillator.
    6. Nitric Oxide – Gas used as a pulmonary vasodilator and administered via a ventilator
    7. 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.

22. ***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.

23. ***Antibiotics*****:** May choose more than one answer. Indicate as relevant. Penicillin is meant only for Penicillin, and not other 'penicillin' group of drugs

24. ***Surfactant:*** Indicate whether given or not.

25. ***Post Natal Steroid for Chronic Lung Disease (CLD)*:** Indicate given or not. Steroids given for other purposes e.g. hypotension and laryngeal oedema will not be included.

26. ***Parenteral Nutrition*:** Nutrition given intravenously. Parenteral nutrition must include amino acids with or without fats; hence plain dextrose saline infusion is not parenteral nutrition.

27. ***Enteral Nutrition:*** Is any form of feeding given through the gastrointestinal tract. May choose more than one option.

28. ***ROP screening:*** Indicate whether procedure was done or not

29. ***Ultrasound Brain:*** Indicate whether procedure was done or not

SECTION 4 - OUTCOME

30. ***Date of discharge****:* Enter the exact date

31. ***Weight (grams) on Discharge or Death:*** Weight on Death is the last weight taken when the baby is alive. Enter the exact weight in grams.

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

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

34. ***If Child Alive, place of discharge*:** Home, Other Non-Paed Ward, Other Hospitals, or Social welfare home.

35. ***If Child Died, place of death:*** Labour Room/OT, In Transit, and NNU. To specify if 'others' e.g. (General ward and General ICU)

SECTION 5: DIAGNOSES

36*. Tick all diagnoses or problems) that pertain to the baby during this admission on the list in the Diagnoses Record. (List in CRF is adapted from WHO ICD 10 Codes). Other diagnoses or problems not given in the list can be referred to Appendix 3 or 'WHO 1992 ICD-10; Volume 1 document' and to be written in the space provided under *Other Diagnoses

Adapted ICD 10 Codes (for common neonatal disorders): Data Standards and Definition

Pathological Groups	**Details and Definitions (in parenthesis)**	**Codes**
Growth and Maturity	Small for gestational age (weight <10th centile for gestational age based on Lubchenko charts)	P05.1
	Extremely low birth weight baby (999 gm or less)	P07.0
	Other low birth weight baby (BW 1000-2499 gm)	P07.1
	Extreme immaturity (<28 weeks)	P07.2
	Prematurity (28 completed weeks to < 37 weeks)	P07.3
	Exceptionally large baby (4.5 kg and above)	P08.0
	Post-term infant (42 completed weeks and above)	P08.2
Respiratory		
Respiratory distress of newborn	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)	P22.0
	Transient tachypnoea of newborn	P22.1
	Other respiratory distress of newborn	P22.8
	Respiratory distress of newborn, unspecified	P22.9
Congenital pneumonia	(Defined as pneumonia-acquired prepartum, intrapartum or at birth. Diagnosed with or without cultures)	
	Chlamydia	P23.1
	Group B Streptococcus	P23.3
(for organism like E. coli, Pseudomonas and Staph, refer ICD10 pg 778)	Due to other organisms (besides those specified in ICD10, pg 778)	P23.8
	Unspecified (organism unknown despite cultures)	P23.9
Meconium aspiration syndrome	Occurs when born via thick meconium-stained liquor with clinical picture of respiratory distress and subsequent Chest X-Ray changes consistent with meconium aspiration	P24.0
	Interstitial emphysema (for other forms of air-leak, refer to ICD 10 pg 778-779)	P25.0
	Pneumothorax	P25.1
	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)	P26
Other respiratory disease	Bronchopulmonary dysplasia [1](Infants with all of the following characteristics: (1) a respiratory disorder that began with acute lung injury (whether primary or induced by assisted ventilation as in the case of those resulting from treatment of apnoea) during the first 2	P27.1

	wk of life, (2) ≥28 days of postnatal age, and (3) significant clinical (tachypnoea, retractions, etc), radiological (hyperinflation with obvious cystic areas with "fibrotic"strands), and blood gas tension abnormalities (PaO2 < 60 torr or PaCO2 > 45 torr while inhaling ambient air at sea level)	
	Apnoea of prematurity (coded as 'Other apnoea of newborn' besides sleep apnoea) defined as episodic apnoea lasting more than 20 seconds with/without cyanosis or bradycardia, which are responsive to methylxanthines) in premature babies	P28.4
	Atelectasis, other and unspecified. Codes for atelectasis occurring in newborns who present with increasing respiratory distress not due to infection, and has evidence of generalised haziness of atelectasis in CXR with no evidence of pneumonia (haematological or CRP)	P28.1
	Respiratory failure of the newborn	P28.5
Infections		
Congenital viral diseases	*State virus if known e.g. Rubella, CMV, herpes, and varicella or state unspecified*	P35
Bacterial sepsis of newborn	*Clinical evidence of sepsis plus culture-proven infection e.g. positive blood, urine, or CSF culture or positive bacterial antigen test. Include congenital pneumonia if blood culture was positive. State bacteria if known or state unspecified/presumed*	P36
	Group B Streptococcus	P36.0
	Other unspecified streptococcus	P36.1
	Staphylococcus aureus	P36.2
	Other unspecified staphylococcus	P36.3
	Escherichia coli	P36.4
	Anaerobes	P36.5
	Due to other organisms.	P36.8
	A few specific organisms of special importance in NICU are listed in CRF	Code not necessary
Presumed sepsis (ICD codes are different for specific risks)	In the presence of risk factors for infection for example maternal pyrexia or preterm prelabour rupture of membranes but subsequent clinical picture and investigations showed absence of infection	Code not necessary
Bacterial sepsis, unspecified / Clinical sepsis2	One of the following clinical signs or symptoms with no other recognised cause: Fever (>38oC), hypothermia (<37oC), apnoea, bradycardia *and all of the following*: a. Blood culture not done or no organism or antigen detected in blood b. No apparent infection at another site c. Physician institutes appropriate antimicrobial therapy for sepsis	P36.9

Other infectious or parasitic diseases	*Includes congenital toxoplasmosis, tuberculosis, listeriosis, malaria and neonatal candidiasis. Specify accordingly*	P37
Other infections	Omphalitis	P38
	Conjunctivitis/dacryocystitis	P39.1
	Neonatal urinary tract infection	P39.3
	Neonatal skin infection	P39.4
Fungal sepsis	State organisms	B 49
Central Nervous System		
Birth asphyxia	Not to be used for low Apgar score without mention of asphyxia or other respiratory problems	P21
	Severe birth asphyxia Pulse <100 /min at birth and falling or steady, respiration absent or gasping, colour poor, tone absent (Apgar 1 min= 0-3)	P21.0
	Mild and moderate Normal respiration not established within one minute, but heart rate 100 or above, some muscle tone present, some response to stimulation (Apgar 1 min= 4-7)	P21.1
	Birth asphyxia, unspecified	P21.9
Intraventricular haemorrhage[3]	Intraventricular haemorrhage, grade 1 (P52.0), 2 (P52.1), 3 (P52.2), intracerebral haemorrhage (P52.4)(grade 4) Intraventricular haemorrhage includes clinically diagnosed IVH with or without ultrasound confirmation. If **no ultrasound was done**, code as Unspecified intraventricular haemorrhage of foetus and newborn, P52.3. Definition of the grades: Grade I Isolated germinal matrix haemorrhage Grade II Intraventricular haemorrhage with normal ventricular size Grade III Intraventricular haemorrhage with acute ventricular dilation Grade IV Intraventricular haemorrhage with parenchymal haemorrhage)	P52.3 P52.0, P52.1, P52.2, P52.4
Neonatal convulsions	Excludes benign neonatal convulsions (familial)(G40.3).	P90
Neonatal hypoxic ischaemic injury	Neonatal cerebral ischaemia or neonatal encephalopathy as defined by 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 level of consciousness, and often seizures	P91.0
	Acquired periventricular cysts of newborn	P91.1
	Neonatal cerebral leukomalacia	P91.2
	Neonatal cerebral irritability	P91.3

Neonatal withdrawal	Symptoms and signs of withdrawal from maternal use of drugs of addiction	P96.1
Birth trauma	Cephalhaematoma	P12.0
	Chignon/caput succadaneum	P12.1
	Subaponeurotic haemorrhage	P12.2
	Skull fracture	P13.0
	Erb's paralysis	P14.0
	Birth injury to face (includes facial congestion)	P15.4
Haematology	Haemorrhagic disease of newborn	P53
	Other neonatal gastrointestinal haemorrhage (includes stress gastritis)	P54.3
	Rh isoimmunisation	P55.0
	ABO isoimmunisation	P55.1
	Hydrops Fetalis due to Isoimmunisation	P56
	Hydrops fetalis due to other unspecified haemolytic disease	P56.9
	Kernicterus due to isoimmunization	P57.0
	Disseminated intravascular coagulation	P60
	Polycythaemia neonatorum (haematocrit above 65%)	P61.1
	Anaemia of prematurity (defined as Hb <8 gm% in a growing premie)	P61.2
Cardiovascular	Patent ductus arteriosus (diagnosed clinically, i.e. murmur present or wide pulse pressure, or by echocardiography)	Q25.0
	VSD	Q21.0
(other cardiac abnormalities, refer ICD10 codes Q20-28)	AVSD	Q21.2
	Neonatal cardiac failure	P29.0
	Neonatal cardiac dysrhythmia	P29.1
	Neonatal hypertension	P29.2
	Persistent foetal circulation (Persistent Pulmonary Hypertension of newborn as diagnosed clinically when infant remains hypoxic on high ventilation settings i.e. PaO2 < 40mmHg in 100% O2 and PIP >40 cm H2O in the absence of cyanotic heart disease. Diagnosis can also be made when suprasystemic pulmonary arterial pressure is found on echocardiography.)	P29.3
	Transposition of Great Vessels (TGA)	Q20.3
	Tetralogy of Fallot	Q21.3
Gastrointestinal		
	Kernicterus (unspecified)	P57.9
Jaundice (refers to both conjugated and unconjugated hyperbilirubinaemia)	Jaundice due to bruising	P58.0
	Jaundice due to infection	P58.2

	Due to polycythaemia (defined as haematocrit above 65%) Polycythaemia without jaundice should be coded as P61.1	P58.3
	Due to G6PD deficiency/other specified excessive haemolysis	P58.8
	Jaundice due to RH and ABO isoimmunisation to tick P58.8 (for jaundice) and P55.0 (RH) and P55.1 (ABO) accordingly	
	Jaundice associated with prematurity	P59.0
	Breastmilk jaundice/Neonatal jaundice from breastmilk inhibitor	P59.3
	Unspecified (intense/prolonged physiological jaundice)	P59.9
	Other causes includes biliary atresia, galactosaemia etc (to look for specific codes in ICD 10)	
	Kernicterus (specify cause)	P57.9
Necrotising enterocolitis (NEC)	NEC4 (present when at least stage I based on Bells criteria is seen)	P77
* for other feeding problems, refer ICD10, pg 793	Gastro-oesophageal reflux disease (clinical diagnosis with or without confirmatory radiological or pH study)	K21
	Inguinal hernia	K40
	Umbilical hernia	K42
	Neonatal haematemesis and maleana due to swallowed maternal blood	P78.2
Renal	Hydronephrosis, other and unspecified	N13.3
	Vesicoureteric reflux	N13.7
	Renal failure (due to any cause). ICD 10 codes differently for different aetiology)	Code not necessary
Miscellaneous	Retinopathy of prematurity 5 (regardless of stage based on the following stages: Stage 1 : Demarcation Line Stage 2 : Ridge Stage 3 : Ridge with Extraretinal Fibrovascular Proliferation Stage 4 : Retinal Detachment	H35.1
	Kernicterus, other specified causes (excludes isoimmunization, Crigler-Najjar syndrome);	P57.8
	Syndrome of infant of mother with gestational diabetes	P70.0
	Syndrome of Infant of Diabetic mother (maternal DM (preexisting) affecting foetus/newborn (with hypoglycaemia).	P70.1
	Transitory neonatal hypoglycaemia (Two consecutive blood glucose below 2.6 mmol/l (lab method or sticks method).	P70.4
	Other neonatal hypocalcaemia (excludes hypoPTH, cow's milk cause)	P71.1

	Hypothermia (Skin temperature on admission below 36.0 degrees centigrade (or rectal temperature below 36.5 degrees centigrade)	P80
	Sclerema neonatorum	P83.0
	Hydrops not due to haemolytic disease	P83.2
	Congenital hypertonia	P94.1
	Congenital hypotonia	P94.2
	Congenital renal failure	P96.0
	Neonatal drug withdrawal in infant of dependent mother	P96.1
Congenital malformations, deformations and chromosomal abnormalities (Q00-Q99)	*Please refer to WHO 1992 ICD10 Vol 1 pg 795-851 for diagnosis and details not listed below*	
	Anencephaly	Q00.0
	Encephalocoele	Q01
	Microcephaly	Q02
	Congenital hydrocephalus	Q03
	Spina bifida	Q05
	Down syndrome	Q90
	Edward and Patau syndrome	Q91
	Congenital malformation unspecified	Q89.9

*This list has a few more diagnoses/problems than that listed on the Discharge CRF but it is far from exhaustive and the rest of the diagnoses/problems can be looked up in the WHO 1992 ICD 10 Index (Volume 1). The **most appropriate** diagnoses/problems and codes for these 'Others' not already listed in the form are to be written onto the list in Section 10: 54 of the Discharge Record*

References

1. O'Brodovich HM, Mellins RB. Bronchopulmonary dysplasia – unresolved neonatal acute lung injury. Am Rev Respir Dis 1985; 132: 694-709.
2. National Nosocomial Infection Surveillance 1986-1994; Gaynes et al Pediatrics 1996; 98: 357-361)
3. Papile LA. Periventricular-intraventricular hemorrhage. Neonatal –Perinatal Medicine:Diseases of the Fetus and Infant. (Fifth Edition) 719-28.
4. Bell MJ, Ternberg JL, Feigin RD, et al. Neonatal Necrotizing Enterocolitis – Therapeutic Decisions Based upon Clinical Staging. Ann Surg 1978; 187: 1-7.
5. The Committee for the Classification of Retinopathy of Prematurity: An International Classification of Retinopathy of Prematurity. Arch Ophthalmol 1984; 102: 1130-1134.

Appendix IV

I. Papers written and or presented.

1. Outcome of critically ill term babies. A Padma, NL Lim and NNR. Paper presented at 13th Annual Perinatal Congress in March 2006
2. Mortality and morbidity outcomes according to socio-economic status of various states. Hans van Rostenberge, NL Lim and NNR. Paper presented at 13th Annual Perinatal Congress in March 2006
3. Bacteraemic blood stream infections in Neonatal Intensive Care Units (NICUs) in a developing country. NL Lim and NNR. Paper presented at the Paediatric Academic Societies Meeting in San Francisco, USA in May 2006

II. Other papers that are being written and that will be presented at the 4th NNR forum in June 2006.

4. Outcome of extremely low birthweight babies. Irene Cheah and NNR.
5. Inborn vs outborn infants. Jimmy Lee and NNR.
6. Congenital anomalies among sick babies in NICUs. MK Thong and NNR.
7. Chronic lung disease scenario in NICUs. NL Lim and NNR

ABBREVIATIONS

BPD	Bronchopulmonary Dysplasia
CA	Congenital Abnormalities
CLD	Chronic Lung Disease
CPAP	Continuous Positive Airway Pressure
CRC	Clinical Research Centre MOH
CRF	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
SVD	Spontaneous Vertex Delivery
VLBW	Very Low Birth Weight
VS	Ventilatory Support