Australian & New Zealand Neonatal Network 1996 - 1997

Author:
Donoghue, Deborah

Publication details:
Report No. Neonatal Network Series no. 3

Publication Date:
1999

DOI:
https://doi.org/10.26190/unsworks/20

The AIHW National Perinatal Statistics Unit (NPSU) is a collaborative unit of the AIHW, and was established in 1979. It is located in the Faculty of Medicine, University of New South Wales at the Sydney Children's Hospital. The NPSU aims to improve the health of Australian mothers and babies by monitoring reproductive and perinatal health. The NPSU is also involved in epidemiological research, education and perinatal data development activities. The NPSU maintains national data collections on perinatal health, congenital malformations and assisted conception.

NPSU staff:

Director:	Associate Professor Paul Lancaster
Director Operations:	Dr Elizabeth Sullivan
Senior Research Officers:	Peter Day
	Tara Hurst
	Dr Jane Ford
	Emma Slaytor
Research Officer:	Dr Esther Shafir
Systems Officer:	Jishan Dean
Administrative Officer:	Emma Ong

Any enquiries or comments on this publication should be directed to:

Deborah Donoghue
Australian and New Zealand Neonatal Network
Building DO2
University of Sydney NSW 2006
AUSTRALIA

Fax:	(02) 9351 7742
Telephone:	(02) 9351 7745
E-mail:	npsu@unsw.edu.au
Web:	http://www.aihw.gov.au/npsu/

The AIHW National Perinatal Statistics Unit (NPSU) is a collaborative unit of the AIHW, and was established in 1979. It is located in the Faculty of Medicine, University of New South Wales at the Sydney Children's Hospital. The NPSU aims to improve the health of Australian mothers and babies by monitoring reproductive and perinatal health. The NPSU is also involved in epidemiological research, education and perinatal data development activities. The NPSU maintains national data collections on perinatal health, congenital malformations and assisted conception.

NPSU staff:

Director:	Associate Professor Paul Lancaster
Director Operations:	Dr Elizabeth Sullivan
Senior Research Officers:	Peter Day
	Tara Hurst
	Dr Jane Ford
	Emma Slaytor
Research Officer:	Dr Esther Shafir
Systems Officer:	Jishan Dean
Administrative Officer:	Emma Ong

Any enquiries or comments on this publication should be directed to:

Deborah Donoghue
Australian and New Zealand Neonatal Network
Building DO2
University of Sydney NSW 2006
AUSTRALIA

Fax:	(02) 9351 7742
Telephone:	(02) 9351 7745
E-mail:	npsu@unsw.edu.au
Web:	http://www.aihw.gov.au/npsu/

Australian Institute of Health and Welfare
National Perinatal Statistics Unit
Neonatal Network Series
Number 3

Australian & New Zealand Neonatal Network 1996 - 1997

Deborah Donoghue

Coordinators:

Brian Darlow
David Henderson-Smart
Paul Lancaster

AIHW National Perinatal Statistics Unit
Sydney, 1999
ISSN 1326-012X
AIHW Catalogue no. PER 11

Contents

Tables

Figures

Abbreviations

AIHW	Australian Institute of Health and Welfare
ANZNN	Australian and New Zealand Neonatal Network
NHMRC	National Health and Medical Research Council of Australia
NPSU	National Perinatal Statistics Unit
WHO	World Health Organisation
APH	Antepartum haemorrhage (a complication of pregnancy)–see definitions
BE	Base excess
BW	Birthweight (in grams)–see definitions
CPAP	Continuous positive airways pressure (a form of assisted ventilation)–see definitions
DOA	Date of admission
DOB	Date of birth
FiO_2	Fractional inspired oxygen level (measures amount of supplemental oxygen)–see definitions
GA	Gestational age (in completed weeks)–see definitions
HMD	Hyaline membrane disease (a respiratory disorder)
ICD.9.CM	International Classification of Diseases, 9th revision, clinical modification
IPPR	Intermittent positive pressure respiration (a form of assisted ventilation)–see definitions
IUGR	Intrauterine growth restriction (a complication of pregnancy)–see definitions
IVF	In vitro fertilisation
IVH	Intraventricular haemorrhage (a brain disorder)–see definitions
Mec Asp	Meconium aspiration syndrome (a respiratory disorder)–see definitions
n	Number
NEC	Necrotising enterocolitis (a gut disorder)–see definitions
NICU	Neonatal Intensive Care Unit
O_2	Oxygen
P_aO_2	Partial inspired oxygen (a method of measuring oxygenation)–see definitions
PIH	Hypertension in pregnancy (a complication of pregnancy)–see definitions
PMA	Post menstrual age (gestational age plus chronological age, in weeks)
PPH	Pulmonary hypertension (a respiratory disorder)–see definitions
PPROM	Preterm pre-labour rupture of membranes (a complication of pregnancy)–see definitions
PROM	Prolonged rupture of membranes (a complication of pregnancy)–see definitions
PTL	Preterm labour (a complication of pregnancy)–see definitions
PVL	Periventricular leukomalacia (a brain disorder)–see definitions
ROP	Retinopathy of prematurity (an eye disorder)–see definitions
S_aO_2	Oxygen saturation (a method of measuring oxygenation)
T_cPO_2	Transcutaneous partial pressure of oxygen (a method of measuring oxygenation)
TTN	Transient tachypnoea of the newborn (a respiratory disorder)–see definitions
PO	Post Office
ACT	Australian Capital Territory
NSW	New South Wales
NT	Northern Territory
NZ	New Zealand
Qld	Queensland
SA	South Australia
Tas	Tasmania
Vic	Victoria
WA	Western Australia

Acknowledgements

The Australian and New Zealand Neonatal Network is a truly collaborative effort, existing only with the cooperation, hard work and perseverance of many people. In particular, we would like to thank the people and organisations listed below for their invaluable help and assistance during the data collection, checking and running of the network and its audit:

New South Wales

John Hunter Hospital: Michelle Giles & Andrew Gill (Director).

King George V Hospital: Phil Beeby, Nick Evans (Director), Shelley Reid & Naomi Rynne.

Liverpool Health Service: Robert Guaran (Director), Catherine Medlin, Jacqui Stack & Sara Wilson.

Nepean Hospital: Lyn Downe (Director) & Mee Fong Chin.

Royal Alexandra Hospital for Children: Nadia Badawi, Peter Barr, Robert Halliday (Director), Sharon Laing & Julian Wojtulewicz.

Royal Hospital for Women: Howard Chilton (Director), Clare Forshaw & Kei Lui.

Royal North Shore Hospital: Jennifer Bowen (Director), Martin Kluckow, Garth Leslie (Director) & Pamela Ma.

Sydney Children's Hospital: Barry Duffy (Director) & Janelle Young.

Westmead Hospital: Jane Baird, Elizabeth John (Director), Kei Lui & Marilyn Rochefort.

Victoria

Mercy Hospital for Women: John Drew (Director), Linda Horton, Simon Fraser & Andrew Watkins (Director).

Monash Medical Centre: Kaye Bawden, Marie Hayes, Andrew Ramsden & Victor Yu (Director).

Royal Children's Hospital: Neil Campbell (Director), Marilyn Cocciardi, Peter Dargaville, Roslyn Dineen, Peter Loughnan, Peter McDougall & Mike Stewart.

Royal Women's Hospital: Ellen Bowman, Jennfer Carr, Ananda Dharmalingham, Robert Jankov & Neil Roy (Director).

Queensland

Kirwan Hospital for Women: Jenny Burdell, Katie Panaretto, Gurmeet Singh & John Whitehall (Director).

Mater Misericordiae Mother's Hospital: Vicki Flenady, Peter Gray, James King, Bronwyn Scott & David Tudehope (Director).

Royal Women's Hospital: Angela Barlow, David Cartwright (Director), Paul Colditz (Perinatal Research Centre), Tim Donovan, Karen Hose, Megan Robertson & Wilma Blake.

South Australia

Flinders Medical Centre: Joy Davis, Simon James & Peter Marshall (Director).

Women's & Children's Hospital: Elizabeth Gent, Eileen Hancock, Ross Haslam (Director), Andy McPhee & Ron Russo.

Western Australia

King Edward Memorial Hospital for Women: Annette Butler, Alfred Grauaug (Director), Ronald Hagan & Rolland Kohan.

Princess Margaret Hospital for Children: Marilyn Miller, Corrado Minutillo & Paddy Pemberton (Director).

Tasmania

Royal Hobart Hospital: Graham Bury (Director).

Australian Capital Territory

The Canberra Hospital: John Edwards & Graham Reynolds (Director).

Northern Territory

Royal Darwin Hospital: Ingrid Bucens (Director) & Epidemiology Branch, Territory Health Services.

New Zealand

Christchurch Women's Hospital: Louise Brass, Brian Darlow, Helen Liley (Director) & Nina Mogridge.

Dunedin Hospital: Roland Broadbent (Director).

Middlemore Hospital: Alan De Klerk (Director), Lindsay Mildenhall & Maisie Wong.

National Women's Hospital: Jane Harding, Celia van der Klift, David Knight (Director) & Nicole Shirley.

Waikato Hospital: David Bourchier (Director) & Phil Weston.

Wellington Women's Hospital: Keith Fisher, Vaughan Richardson (Director) & Roslyn Selby.

and

Centre for Perinatal Health Services Research, NSW: Barbara Bajuk, Clare Banks, Neill Jones, Glenda O'Leary, Amaro Roach, Lee Sutton & Susan Travis.

We also gratefully acknowledge the generous sponsorship from Abbott Australasia Pty Ltd. and Abbott Laboratories New Zealand who became our major sponsors during 1997. The ANZNN was established from seeding funding generously contributed by Glaxo Wellcome Australia Ltd. and Glaxo Wellcome New Zealand Ltd. At the ANZNN Advisory Committee Meeting in 1997, it was unanimously decided that each unit would contribute an annual sum for membership of the Australian & New Zealand Neonatal Network and for the annual individual unit report.

We thank the ANZNN Coordinators Brian Darlow, David Henderson-Smart and Paul Lancaster for their administrative guidance and for reviewing this report and making helpful comments.

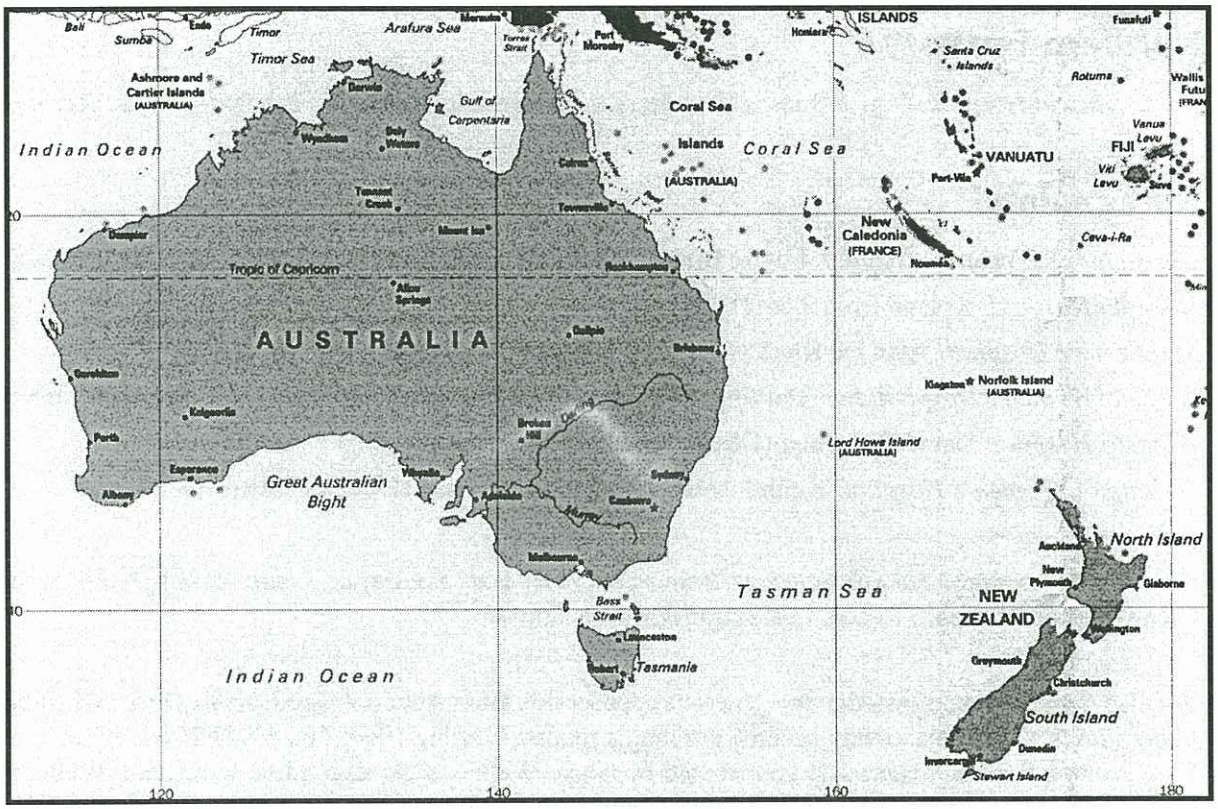
The AIHW National Perinatal Statistics Unit is an external unit of the Australian Institute of Health and Welfare and has been based at the University of New South Wales since November 1997.

This report can be obtained from:
Australian & New Zealand Neonatal Network
Queen Elizabeth II Research Institute (Bldg DO2)
University of Sydney NSW 2006 AUSTRALIA
Phone: 61 2 9351 7745
Fax: 61 2 9351 7742
Email: ddonoghu@mail.usyd.edu.au
or

Mail Order Sales:
AusInfo
GPO Box 84
Canberra ACT 2601 AUSTRALIA
Freecall: 132 447 (24-hr service, Australia only)
Fax: 61 2 6295 4888
Internet: http://www.ausinfo.gov.au
Email: brian.bolton@dofa.gov.au

Suggested citation:

Donoghue DA 1999. *Australian and New Zealand Neonatal Network 1996 and 1997.* Sydney: AIHW National Perinatal Statistics Unit: Neonatal Network Series No. 3.



In profile:

Australia is a country of approximately 18.5 million people and has about 250,000 live births per annum. As the smallest continent with an area of 7.5 million square kilometres we are 8 to 10 hours ahead of Greenwich Mean Time. New Zealand is a further two hours ahead of Australia and has a population of 3.6 million with 57,000 births annually and an area of 266,000 square kilometres.

Highlights

- All 29 level III Neonatal Intensive Care Units in Australia and New Zealand collaborate voluntarily to form the Australian & New Zealand Neonatal Network. Their aim is to improve the care of high-risk newborn infants and their families in the region through collaborative audit and research. The network's audit of high-risk infants has involved all units since 1995.

- During the period 1995 to 1997, there has been little change in the rate of survival or in the length of stay in hospital for survivors. However, the data in this report suggest small but significant improvements in the numbers of babies given antenatal corticosteroids and exogenous surfactant as recommended by the NHMRC Clinical Practice Guidelines for Care Around Preterm Birth. There has also been a decrease in significant IVH. Monitoring clinically significant outcomes over time to improve the care and outcomes of these babies is a major objective of the network.

- The audit's registration criteria include all liveborn babies who were admitted to a level III NICU who were born at less than 32 completed weeks' gestation; or born weighing less than 1500 grams; or received assisted ventilation for four or more consecutive hours; or received major surgery. During 1996 and 1997 12,287 infants met at least one of these criteria. In 1996 5,943 babies were born at less than 32 weeks' gestation and 5,181 were born weighing less than 1500 grams, 10,471 infants had assisted ventilation and 1,556 received major surgery.

- Antenatal corticosteroids, which are administered to the mother prior to a preterm birth to enhance fetal lung maturation, have been shown to be efficacious by systematic review and were recommended in the NHMRC Clinical Practice Guidelines for Care Around Preterm Birth. Steroids were given to the mothers of 82.4% babies who were born at less than 32 weeks' gestation in this cohort. Trend data for 1995 to 1997 shows a small but significant increase in its use.

- Births at less than 33 weeks' are recommended to occur in a perinatal centre with a level III NICU and 89.7% of those babies from this cohort were born in such a centre. After birth, 2,865 babies (17.3% of whom were less than 32 weeks' and 48.5% were born at term) were transferred to a NICU accompanied by a team with specialist training for the care of sick newborn.

- Of the 10,471 babies who received assisted ventilation 4,560 were born at less than 32 weeks' gestation. New treatments such as high-frequency ventilation were monitored and shown to be used to treat 258 babies in 1996, increasing to 309 in 1997. Nitric oxide was given to 253 babies.

- Exogenous surfactant is a treatment primarily for respiratory distress syndrome (RDS). Its efficacy was confirmed by systematic reviews and is recommended by NHMRC Clinical Practice Guidelines. In 1996 and 1997 exogenous surfactant was given to 85.2% of infants intubated for RDS.

- Babies undergoing neonatal surgery require very specialised care. In 1996 and 1997 there were 1,556 babies who had major surgery in our cohort. Half of these babies were born at term and nearly half of those were born in a perinatal centre.

- There has been a small but significant decrease in the incidence of the more severe grades (III and IV) of intraventricular haemorrhage (IVH) in infants born at less than 32 weeks from 1995 to 1997 (8.0% to 5.9%). No IVH was detected in 67.0% of the infants.

- Most of the babies in this very high-risk cohort survived to go home (90.9% for 1996; 91.3% for 1997). Survival is now above 90% after 27 weeks' gestation, although it dips again at term for these highly selected high-risk infants.

1 History and structure

1.1 History

In July 1993, the Directors of Australian level III Neonatal Intensive Care Units (NICUs) decided to establish a network to monitor and investigate the care of high risk newborn infants by pooling data on neonatal morbidity and mortality and providing quality assurance for this resource-consuming care. Such networking, collaboration and cooperation are hallmarks of perinatal care in the region.

The Health Care Committee of the National Health and Medical Research Council's Expert Panel on Perinatal Morbidity had recommended that, 'The Australian Institute of Health and Welfare National Perinatal Statistics Unit, in collaboration with the directors and staff of all neonatal intensive care units, should develop a national minimum data set and implement data collection to monitor mortality and morbidity of infants admitted to such units (Health Care Committee Expert Panel on Perinatal Morbidity, 1995)'.

The prospective data collection commenced for babies born from 1 January 1994. All level III units in Australia and New Zealand are contributing data for babies born from 1 January 1995.

1.2 Structure

The Australian and New Zealand Neonatal Network (ANZNN) was set up under the National Perinatal Statistics Unit, a collaborating unit of the Australian Institute of Health and Welfare (AIHW) now based at the University of New South Wales since October 1997. However, ANZNN has remained at the University of Sydney based at the Centre for Perinatal Health Services Research.

The structure of ANZNN comprises three Coordinators, an Advisory Committee and a researcher/manager with part-time assistants. The Coordinators include Associate Professor Paul Lancaster, Director of the AIHW National Perinatal Statistics Unit. Professor David Henderson-Smart, neonatologist at King George V Hospital and Professor of Perinatal Medicine, University of Sydney is the Director of the Centre for Perinatal Health Services Research. Associate Professor Brian Darlow is a neonatologist at Christchurch Women's Hospital and Christchurch School of Medicine, University of Otago, New Zealand.

The Advisory Committee is made up of the Directors (or their nominees) of each participating Australian and New Zealand NICU. The role of the Advisory Committee is to advise and direct the ANZNN, and to approve use of the data. This Committee meets once a year, in association with the Perinatal Society of Australia and New Zealand's annual congress, usually during March. These meetings were held in Adelaide, South Australia in 1996, in Fremantle, Western Australia in 1997, in Alice Springs, Northern Territory in 1998 and Melbourne, Victoria in 1999.

The full-time researcher/manager is currently funded by sponsorship from Abbott Australasia. Deborah Donoghue was appointed to that position in late 1994. Duties include managing the network's administrative and research activities as well as the audit database. During 1995 and 1996, Louise Brass was a part-time Research Nurse located in Christchurch (sponsored by Glaxo Wellcome NZ) to assist with local issues in establishing the network. With the advent of contributions from individual units and additional funding from Abbott, we have been able to expand to include part-time data entry personnel who in turn have been Kim Smith, Clare Banks and now Glenda O'Leary.

More information about these above organisations can be found at their websites:

Australian Institute of Health and Welfare:	www.aihw.gov.au
AIHW National Perinatal Statistics Unit:	www.aihw.gov.au/npsu
Centre for Perinatal Health Services Research:	www.usyd.edu.au/cphsr
Australian & New Zealand Neonatal Network:	www.usyd.edu.au/cphsr/anznn

2 Data set

2.1 Registration criteria

The Australian & New Zealand Neonatal Network's audit of high-risk infants admitted to a Neonatal Intensive Care Unit included all liveborn babies who were admitted to a hospital with a level III Neonatal Intensive Care Unit (NICU) at less than 28 days (and during their first hospitalisation), or who were transferred from a labour ward with the intention of admission to the unit and met the following criteria:

- < 32 completed weeks' gestation; or
- < 1500 grams birth weight; or
- received assisted ventilation (mechanical ventilation including intermittent positive pressure respiration or continuous positive airways pressure) for four or more consecutive hours; or
- received major surgery (i.e. a body cavity was opened).

Hospital of registration is the first NICU that the baby remained in for more than four hours. For the purpose of this report, babies transferred were considered to be in the hospital to which they were transferred from the time the transport team arrived to collect them.

In 1996 and 1997, 99% of the infants came from NICUs collecting all data items on the above cohort. One unit collected information only on those infants born at less than 32 week's gestation or weighing less than 1500 g at birth, due to previous commitments to another database.

2.2 Data set variables

The sixty variables and their definitions for the 1996 and 1997 audit are listed in Appendix 1.

As reported in previous years most units collected the complete data set and we continue to use the data available for the audit as long as it meets the agreed definitions. In a few instances, some units continue to record only abnormal results, such as grade III retinopathy of prematurity, while normal findings at eye examinations are not recorded.

2.3 Data collection

Data are collected in the hospitals by either the filling out the specific ANZNN forms or by incorporating the ANZNN data items into the local NICU audit. Data are transferred to the ANZNN database either on forms, or electronically. Confidentiality guidelines (Appendix 5) are strictly adhered to with identifying information removed and replaced by codes at the individual units.

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 minimise errors are continually refined. A data verification study was conducted in 1996 and reported in the 1995 annual report (Donoghue DA 1997).

3 Results

3.1 In general

A total of 12,287 babies who met the ANZNN audit criteria were born in the 1996 and 1997 calendar years and admitted to one of the twenty-nine level III Neonatal Intensive Care Units (NICUs) throughout Australia and New Zealand. Of these infants 2,964 in 1996 and 2,979 in 1997 were born at less than 32 weeks' gestation (Figure 1, Table 1 page 27) and 2,517 (1996) and 2,664 (1997) were born weighing less than 1500 grams (Table 2). Assisted ventilation was administered to 5,204 infants in 1996 and 5,267 in 1997 while 790 (1996) and 766 (1997) received major surgery (Table 3).

While these data generally represent the sickest babies they do not represent all babies admitted to a NICU, as many require other assistance and observation. In 1996 there were 253,834 livebirths registered in Australia and in 1997 there were 251,842 (Australian Bureau of Statistics 1998). For New Zealand the figures are 57,082 for 1996 and 57,310 in 1997 (Statistics New Zealand 1998). The ANZNN cohort represents only 1.96% (1996) and 2.0% (1997) of the total births for the two countries, up slightly from 1.8% in 1995.

In this report, babies are referred to as preterm if they are born at less than 37 completed weeks' gestation. and "term" if born at 37 weeks' gestation or more. Data in tables are by gestational age group (adapted from WHO groups and NSW Health role delineation guidelines) and by birthweight group. Data in figures are given by gestational age divisions (Figure 2) as gestation is considered to be documented well in these babies and more useful prior to the birth, being more accurate than birthweight estimation.

3.1.1 Neonatal care

Care for the newborn is provided at three levels. 'Level I' care is for normal healthy term babies, some of whom may require short-term observation during the first few hours of life. Level II or 'special care' refers to a nursery that generally deals with babies who are born at 32 to 36 weeks' gestation or weighing less than 2500 grams at birth. It includes the care for babies who require intravenous therapy or antibiotics, and/or those who are convalescing after intensive care, and/or those who need monitoring of their heart rate or breathing, and/or those who need short-term oxygen therapy.

Level III or intensive care refers to the needs of newborn infants who require more specialised care and treatment. It includes most babies born at less than 32 weeks' gestation or less than 1500 grams birthweight, and others that may require parenteral nutrition, and/or surgery, and/or cardiorespiratory monitoring for management of apnoea or seizures, and/or require assisted ventilation (IPPR or CPAP), and/or supplemental oxygen over 40% or long-term oxygen.

Hospitals with a level III NICU provide all of these levels of care and are referred to in this report as tertiary hospitals. In 1996/1997 there were 29 level III NICUs in Australia and New Zealand with 961 beds for babies in 1996 and 972 in 1997. It is important to note that some hospitals may have other beds for babies that do not come under the auspices of the NICU. Hospitals which do not have a NICU may also provide the level II and level I care needed for infants and are referred to as non-tertiary hospitals.

3.1.2 Numbers of babies

The number of babies who met the criteria for this audit of high-risk babies ranged from fifty to more than 400 per annum (Figure 3) for each registration NICU, reflecting both the size of the unit and the mix of patients. The registration NICU is designated as the first NICU in which the baby remains for more than four hours. For example, if a baby born in a hospital with a NICU is transferred to another NICU at two hours of age, say for surgery for a previously diagnosed malformation, the baby is assigned to the second hospital. Every effort has been made to follow babies from hospital to hospital to avoid duplication.

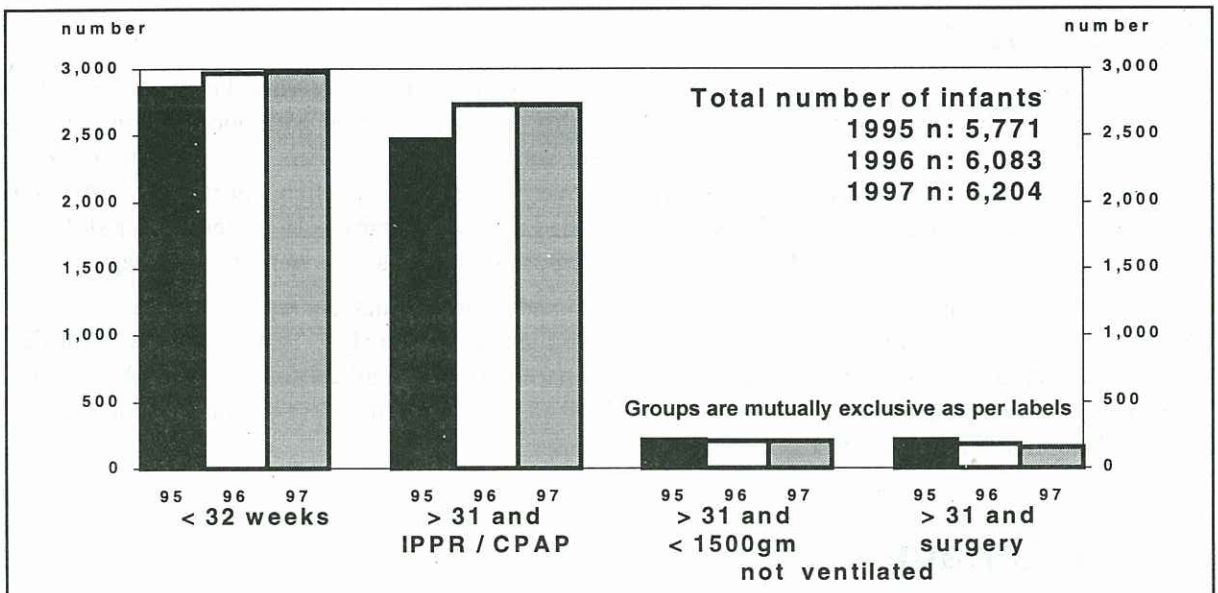


Figure 1: Number of babies in the ANZNN cohort by registration criteria, 1995-1997

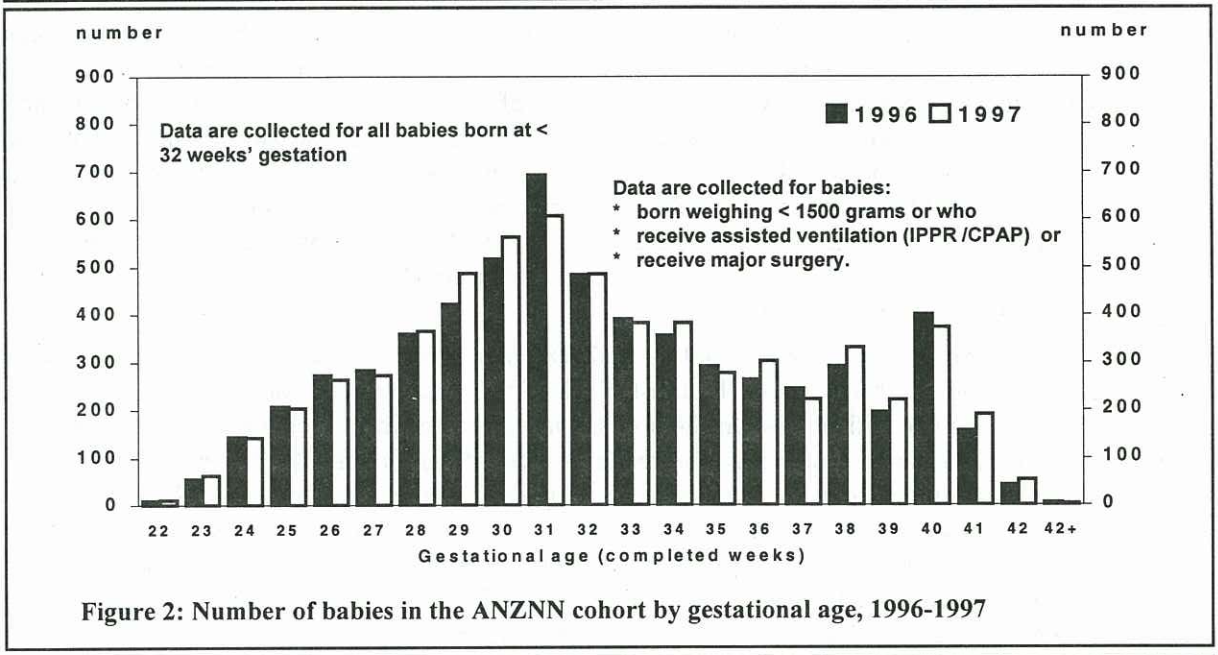


Figure 2: Number of babies in the ANZNN cohort by gestational age, 1996-1997

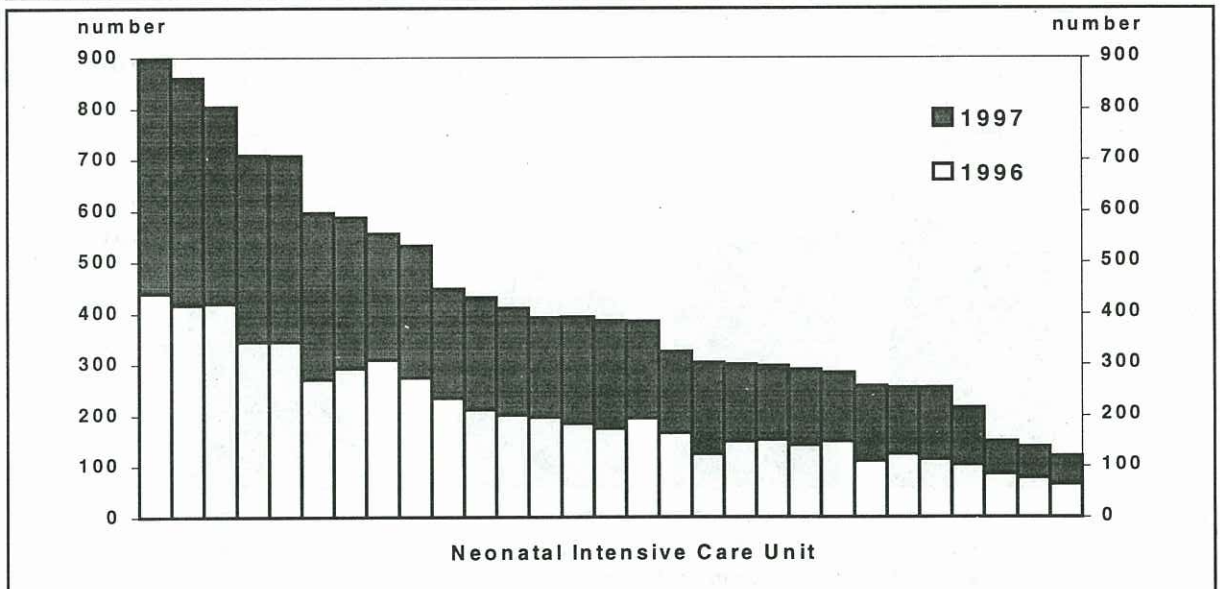


Figure 3: Number of babies in the ANZNN cohort by registration NICU, 1996-1997

3.2 Mother

Factors known to increase the risk of a preterm birth are recorded for each baby. For example, when maternal age is either lower or higher than the norm, this can be associated with poor outcome. In the group born at less than 32 weeks' gestation, 6.9% were born to teenage mothers (compared to 5.3% for Australia in 1996) and 18.1% were born to mothers over 34 years (Australian figures were 14.3% in 1996; Day, Sullivan & Lancaster 1999). Also, having had a previous baby born preterm is a risk factor for a future preterm birth and 957 (17.8%) babies were born to mothers who were in this category.

Maternal ethnicity is now known for 81.6% of infants and is predominantly reported to be Caucasian (80.4%). In 1997, 4.35% of infants registered to an Australian NICU were born to mothers who identified themselves as Aboriginal or Torres Strait Islander, compared to 3.1% of all confinements for Australia in 1996 (Day, Sullivan & Lancaster 1999). For New Zealand, 18.5% infants were as born to mothers who identified as Maori and 10.1% to Pacific Islander mothers.

3.3 Antenatal

3.3.1 Antenatal corticosteroids

Corticosteroids are administered to the mother at least 24 hours prior to a preterm birth to enhance fetal lung maturation. The first randomised controlled trial of its use was conducted in New Zealand in 1970 (Liggins & Howie 1972). Subsequently a systematic review of 34 such trials (the highest level of evidence, Crowley 1999) reported this treatment to be efficacious in helping to mature the baby's lungs and prevent death. The review also demonstrated protective effects on other systems, such as reducing the incidence of necrotising enterocolitis and intraventricular haemorrhage without known side effects to mother or baby. In 1996 it was recommended that maternal corticosteroids should be considered in order to improve neonatal outcomes before all births at less than 34 weeks' gestation (NHMRC Clinical Practice Guidelines for Care Around Preterm Birth, 1997).

This treatment was given to the mothers of 4,307 (82.4%) babies born at less than 32 weeks' gestation. Data were available for 97.9% of babies (Figure 4, Tables 4 to 7; treatment is 'complete' when 2 or more doses of steroids are given with at least one 24 hours or more before birth. 'Incomplete' is when steroids are given less than 24 hours before birth or more than a week after). Trend data for 1995 to 1997 shows a small but significant increase in the use of steroids (Figure 4; Mantel-Haenzel $\chi_2 = 27.8$, $p<0.001$) and these rates are higher than most published rates from around the world (Crowley 1999). The range of any usage of this treatment in babies who were born in their registration hospital at less than 34 weeks' gestation in 1997 varied from a lower interquartile range of 77.6% to 90.8% (median= 84.7%). This is increased from the data for babies born in 1995 where the median was 80.9%.

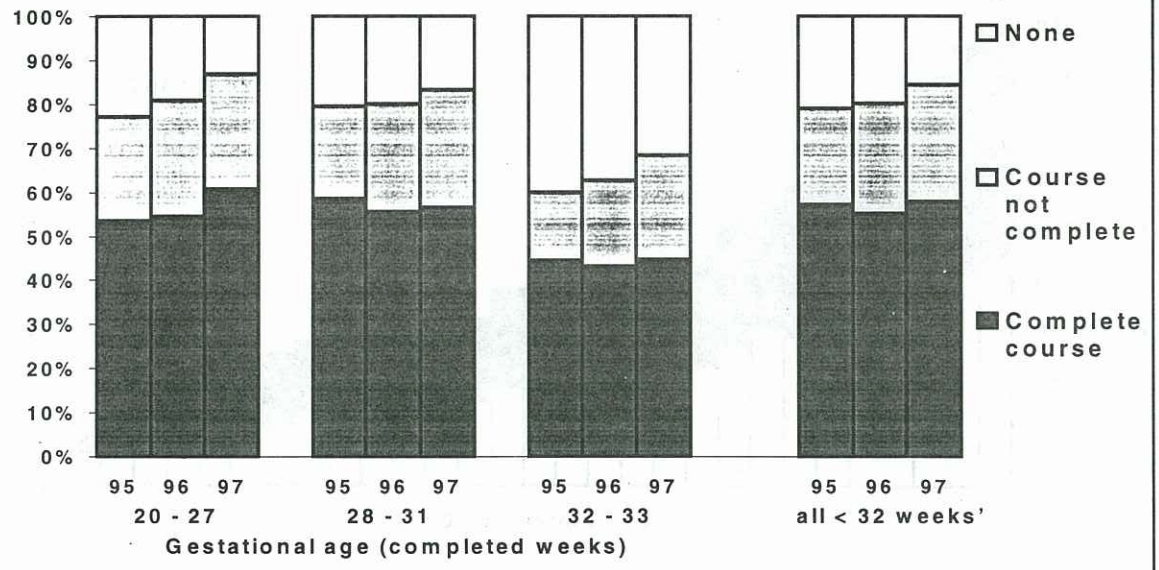


Figure 4: Antenatal corticosteroid use by gestational age, 1995-1997

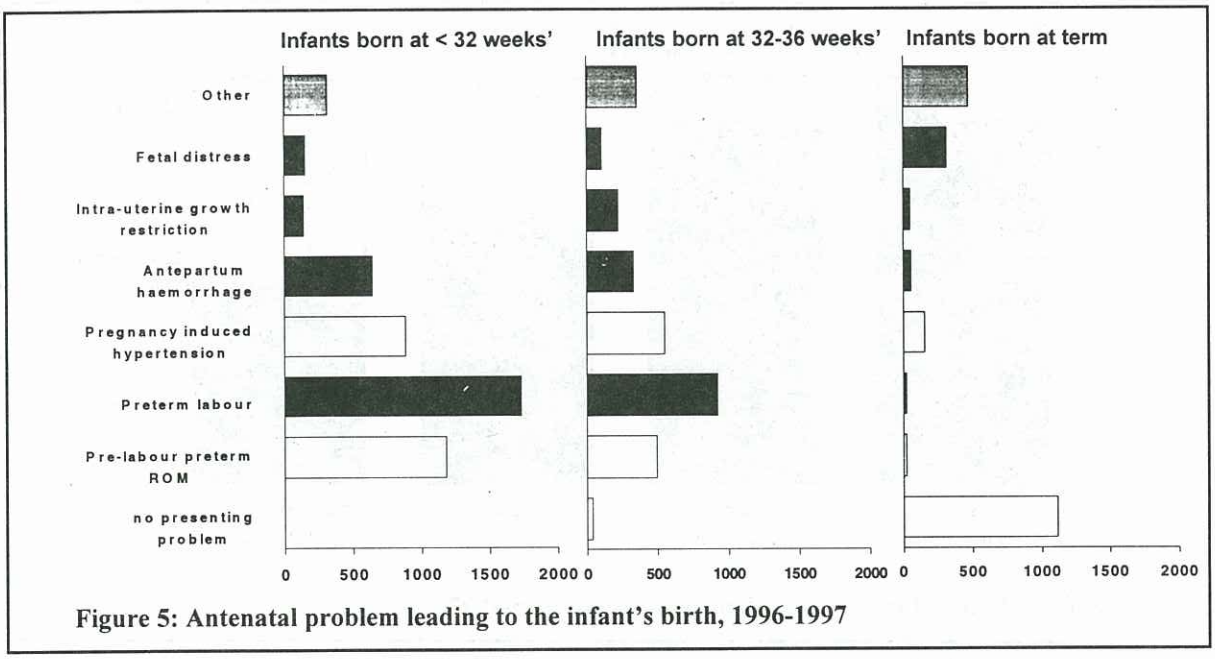


Figure 5: Antenatal problem leading to the infant's birth, 1996-1997

3.3.2 Antenatal problem leading to the birth of the baby

Data were collected on the presenting obstetric problem that led to the mother's last hospitalisation, and thus the baby's birth and subsequent admission to a NICU. Not unexpectedly, preterm labour represented a third of the presenting obstetric problems for those babies born at less than 32 weeks' gestation. Pre-labour, preterm rupture of the membranes (ROM) made up another quarter of these infants (Figure 5, left bar chart). Data are presented for the number of babies (not confinements) and were recorded in 85.3% of cases.

In the group born at 32 to 36 weeks gestation, the presenting problem was distributed more evenly over the given range of complications, however preterm labour still represented a third of these problems. For babies born at term, half had no antenatal problem that could be identified and another quarter were listed as "other". In a few instances, mothers were admitted with 'preterm' antenatal problems and the infant was subsequently born at 'term'. In 1997, antenatal detection of a malformation was introduced as another possible antenatal problem and 69 (1.3%) infants were identified in this way.

3.4 Baby

3.4.1 Multiple births

A quarter (25.9%, n: 766 for 1996; 27.0% n: 805 for 1997) of babies born at less than 32 weeks' gestation were from a multiple birth with 269 infants (4.5%) from higher order births (triplets and quadruplets). This declined to 19.4% for the babies born at 32 to 36 weeks' gestation. For those born at term, 2.3% were from a multiple birth (Tables 8 to 11), a similar proportion to that seen for the entire Australian population in 1996 (2.8%; Australian Bureau of Statistics 1997).

3.4.2 Gender

There were 3,447 (56.7%) males among the babies in this cohort in 1996 and 3,331 (56.0%) in 1997. In this two year period a total of 5,240 babies were female (43.6%), 12 babies were noted to have ambiguous gender during the neonatal period and data were unknown for 4 babies. For those born at less than 32 weeks' gestation 3,184 babies were male (53.6%, a similar proportion to that reported in 1994 and 1995). All of these figures are in excess of the proportion of males (51.4% for 1996 and 51.3% for 1997) among all births in Australia (Australian Bureau of Statistics, 1998).

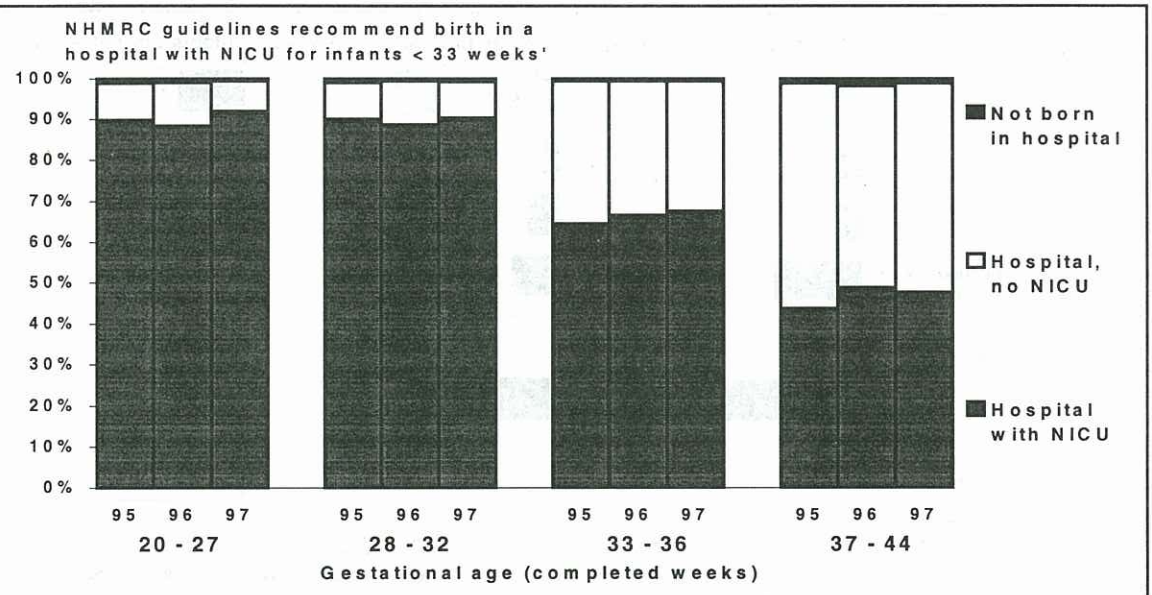


Figure 6: Place of birth by gestational age group, 1995-1997

3.4.3 Place of birth

Babies are usually cared for in the hospital in which they are born. However, some babies may need to be transferred to a hospital with a level III NICU. When this can be anticipated, both the mother and baby may be transferred prior to the birth (in-utero) or the mother can 'book in' at that hospital. The NHMRC Clinical Practice Guidelines for Care Around Preterm Birth (1997) recommend that, wherever possible, births at less than 33 weeks' should occur in a perinatal centre with a NICU. For babies born at less than 33 weeks' gestation in our cohort, 6,198 (89.7%) were born in such a centre. Overall, 75.1% of the babies who required treatment in a NICU were born in a perinatal centre (Figure 6, Tables 12 to 15).

After birth, 2,865 babies were transferred to a level III NICU accompanied by a retrieval team with specialist training for the care of sick newborn (Figure 7, Tables 16 to 19). Nearly half (48.5%) of these babies were born at term, and 17.4% were less than 32 weeks' gestation. An additional 361 infants were transferred by a non-specialist team such as an ordinary ambulance and 59.6% of these babies were term. The reason for an infant's transfer after birth may include a precipitous preterm birth in a hospital without a NICU or no bed was available in the hospital of birth. The reason could also include a pre-planned birth in a hospital with a NICU to ensure a managed transfer to a specialised children's unit, or the unexpected need for intensive care treatment in a term baby, such as for meconium aspiration syndrome.

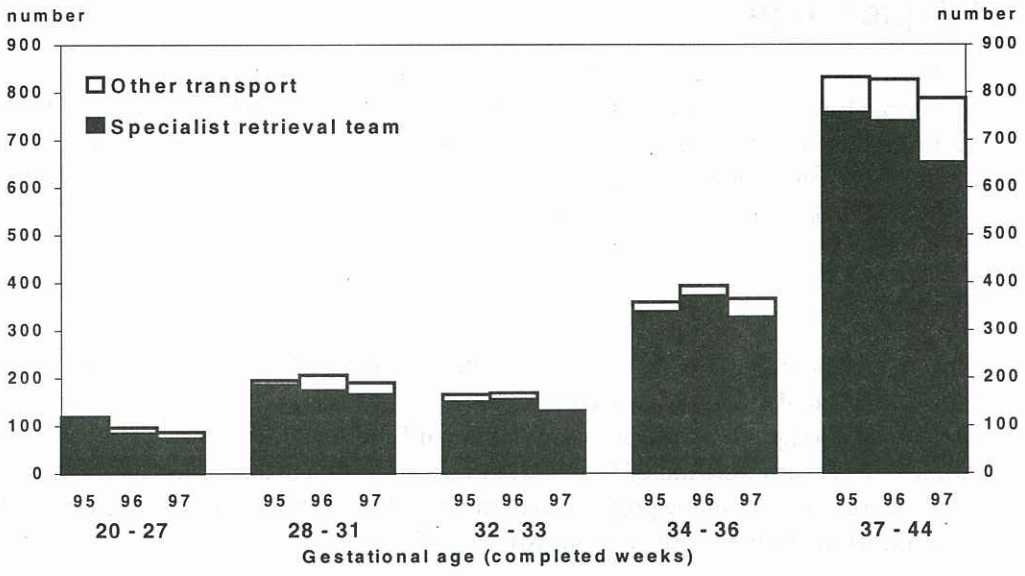


Figure 7: Method of transport to level III neonatal intensive care by gestational age group, 1995-1997

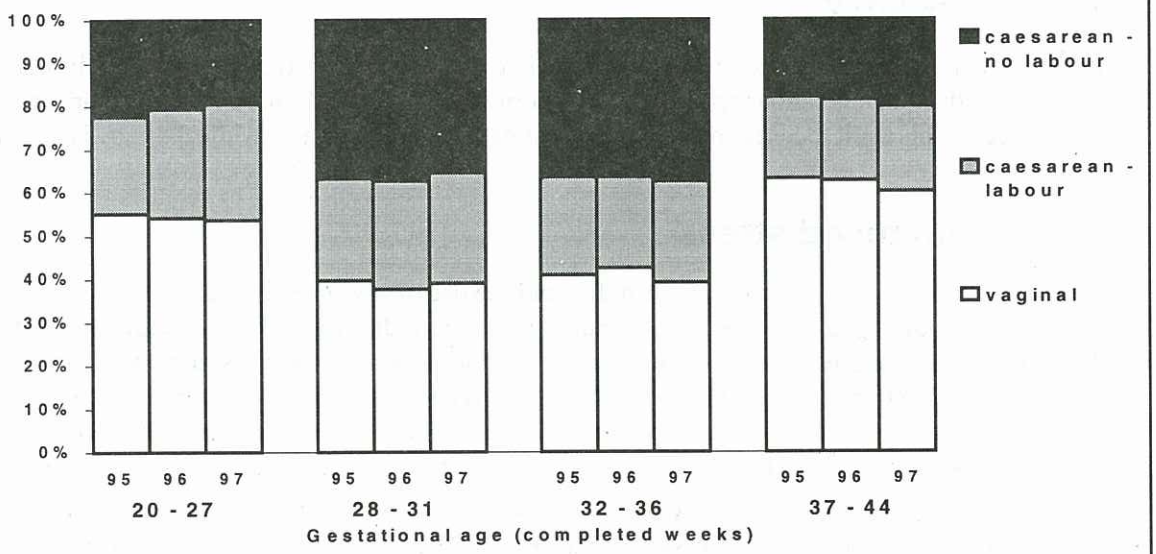


Figure 8: Method of birth by gestational age group, 1995-1997

3.5 Birth

3.5.1 Method of birth

The method of birth of these babies varied with gestational age (Figure 8, Tables 20, 21) and birthweight group (Tables 22, 23). Overall, more than half (51.9% in 1996; 54.3% in 1997) of these infants were born by caesarean section, again varying with gestational age group. Of the caesarean sections, 56.8% occurred before the onset of labour and this proportion was similar for all age groups. For term babies in this high-risk group, 35.3% were born via a caesarean section. The overall rate of caesarean section for all confinements in Australia in 1996 was 19.5% with just over half of these occurring prior to the onset of labour (Day, Sullivan & Lancaster 1999). Data were available for 94.8% of the ANZNN infants.

The manner of presentation of these babies at birth was predominantly cephalic (62.1%) while 19.8% were breech, 3.3% were transverse or other and 14.8% were 'unknown'. This information was collected for 97.3% of infants. For infants born at less than 32 weeks' gestation 1,674 (56.2%) infants presented as cephalic, 820 (27.5%) were breech and 4.2% were transverse or other. This is similar to the ANZNN data presented for 1995. However, it was very different to that reported for the all Australian confinements in 1996 where 95.2% of babies had a cephalic presentation and 4.2% were breech (Day, Sullivan & Lancaster 1999). This is probably due to the predominance of term babies in the latter data.

3.5.2 Condition at birth

The Apgar score is a clinical indicator (scored from 0 to 10) used to denote a baby's condition at birth. In 1996, a low Apgar score (i.e. less than 4) at one minute of age was only seen in a small proportion of all babies born in Australia (2.8%, Day, Sullivan & Lancaster 1999). In the ANZNN cohort, there were 661 (22.3%) in 1996 and 574 (19.5%) in 1997, babies born at less than 32 weeks' gestation with such a low Apgar score at 1 minute (data available for 98.8% of babies). For the term group, 614 (22.5%) babies had an Apgar score of less than 4 at 1 minute. This suggests that an increased need for assistance at birth can occur at any gestation, and that all staff attending a birth should be skilled in resuscitation.

For the babies born at less than 32 weeks' gestation in this cohort, 1,700 (60.6%) in 1996 and 1,614 (54.6%) in 1997 were assisted by endotracheal intubation to aid resuscitation while in the labour ward (data were not available for 3.0% of babies). The NHMRC's Clinical Practice Guidelines for Care Around Preterm Birth (1997) recommend that births occurring at less than 32 weeks' gestation should ideally be attended by a member of the NICU paediatric staff, and those of less than 34 weeks' should have someone in attendance with up-to-date skills in endotracheal intubation.

3.6 Morbidity

There is a high rate of morbidity associated with babies admitted to a level III NICU, principally associated with preterm birth or complications arising in babies born at term such as the need for respiratory assistance or major surgery.This audit focuses on outcome measures that are identifiable while the baby is in hospital.

3.6.1 Respiratory distress

Respiratory distress is a major cause of morbidity and the use of resources in these babies. Overall, half (50.7%) of the babies had a diagnosis of hyaline membrane disease (HMD, or respiratory distress syndrome). As expected, the proportion of babies with other main causes of respiratory failure changed with gestational age (Figure 9). There were 1,494 (12.7%) babies classified as 'none' which means that they did not require mechanical respiratory support. From 1997, 'other' has been refined to include neonatal encephalopathy (2.9%) and peri-surgical (1%). Data were available for 97.6% of babies.

The respiratory support provided for these babies takes many forms. The two major categories of assisted ventilation are intermittent positive pressure respiration (IPPR) and continuous positive airways pressure (CPAP). Both require specialised nursing, medical and paramedical care and utilise a large component of available resources. The duration of these treatments increases, on average, with decreasing gestational age (Tables 24 to 27; 28 to 31). In Australia and New Zealand 10,471 babies received assisted ventilation for more than 4 hours in a Level III NICU during 1996 and 1997. Of these infants, 4,560 were born at less than 32 weeks' gestation (Figure 10). Total duration of IPPR was 72,544 days and CPAP was delivered for 53,852 days, a combined total of 126,396 ventilator 'days' (please see Appendix 1, for definition of a ventilator day). Pulmonary airleak requiring either transient or continuous drainage was seen in 616 babies, of whom half (n:300) were in the group born at less than 32 weeks' gestation.

In accordance with our objectives (Appendix 4) new forms of respiratory therapy have been monitored since January 1996. High-frequency ventilation (mechanical ventilation given at 8 - 15 breaths per second, in contrast to conventional ventilation which gives about one breath per second) was used in the treatment of 258 babies in 1996, increasing to 309 in 1997. The use of this therapy has been reviewed (Henderson-Smart, Bhuta, Cools & Offringa, 1999).

Nitric Oxide, introduced in 1995, is a gas inhaled in very tiny amounts to dilate the pulmonary blood vessels and is used mostly in the treatment of pulmonary hypertension (Barrington & Finer, 1999; Finer & Barrington, 1999). In 1996, 121 babies received this therapy and another 132 in 1997. Concomitantly, the use of extracorporeal membrane oxygenation (ECMO) is decreasing, with only 10 babies receiving this treatment in 1996 and 6 in 1997. ECMO involves very specialised care as very sick babies assisted in oxygenating their lungs with a heart-lung machine and is offered in only three sites in the region.

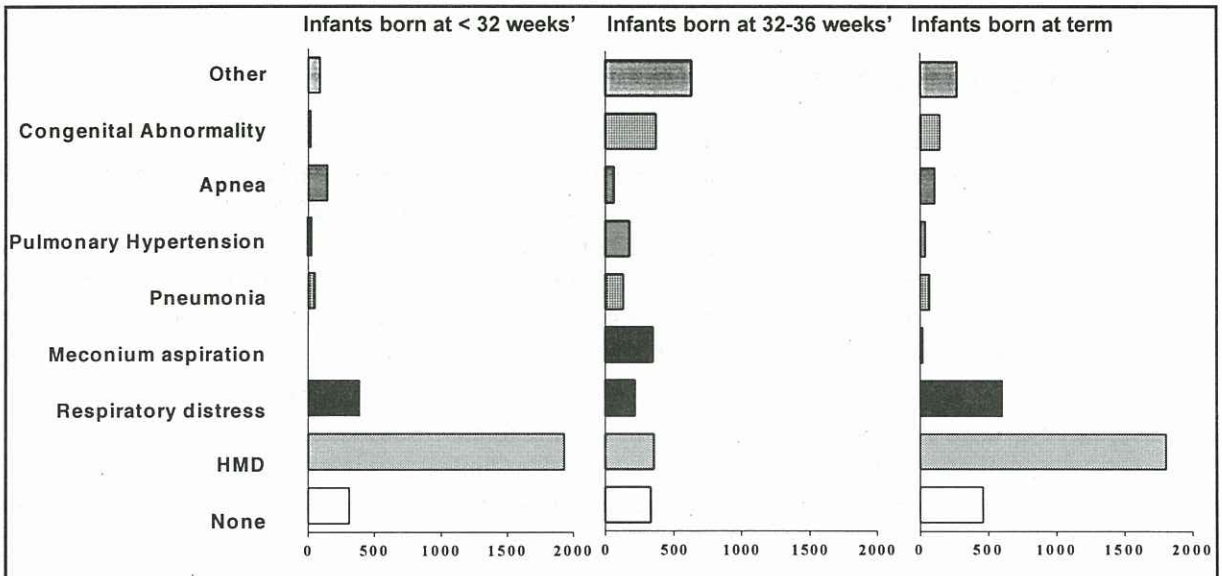


Figure 9: Main respiratory diagnosis by gestational age group, 1996-1997

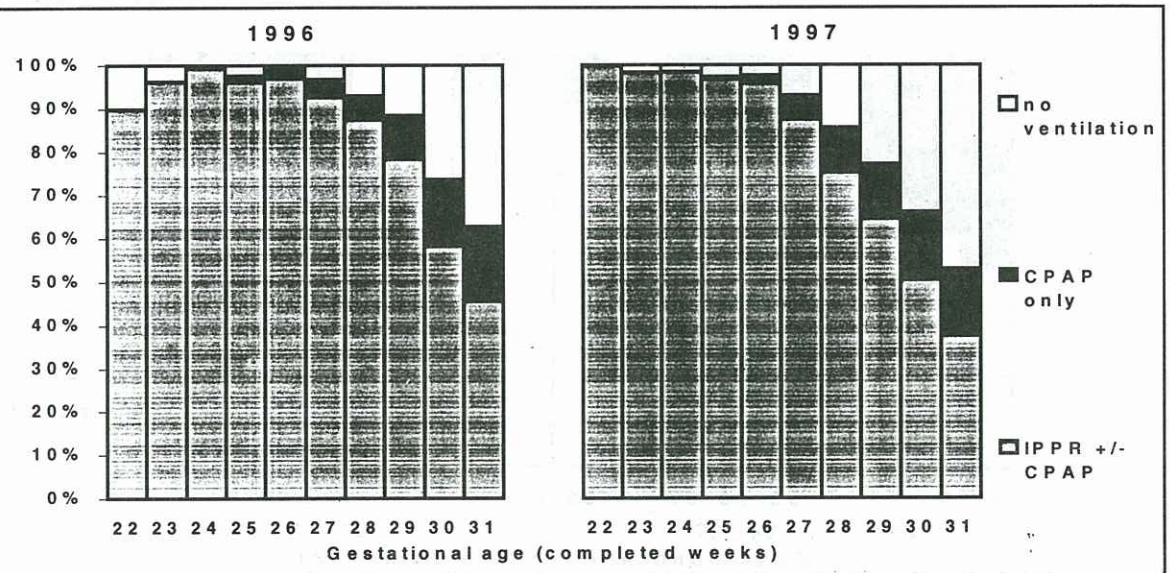


Figure 10: Proportion of babies receiving assistance with breathing (IPPR and/or CPAP) by gestational age group for infants born at < 32 weeks', 1996-1997.

Exogenous surfactant is a treatment primarily for HMD. Its efficacy was confirmed by systematic reviews of randomised controlled trials in 1996 (Soll 1999) and this treatment is recommended (NHMRC Clinical Practice Guidelines for Care Around Preterm Birth 1997). In 1996 and 1997, 5,049 babies were intubated for four or more hours and had a main respiratory diagnosis of HMD, and surfactant was given to 4,302 (85.2%) of these babies. An additional 248 babies were treated with surfactant but extubated before 4 hours and 602 had a respiratory diagnosis other than HMD (Tables 32 to 35). The variation in range of use of exogenous surfactant in babies who had HMD among the level III NICUs in 1997 was small (interquartile range 79.6% - 92.9%, median=85.8%) and similar to that reported in 1995 (median= 84%)

Supplemental oxygen requirements also increase with decreasing gestational age (Tables 24 to 27). A total of 433 infants were known to be treated with supplemental oxygen after they were discharged from hospital with the majority (267, 61.7%) of these infants born at less than 28 weeks' gestation. Chronic lung disease is defined here as babies born at less than 32 weeks' gestation who require respiratory support (supplemental oxygen and/or assisted ventilation) at 36 weeks post menstrual age (gestational age plus age after birth). There were 1,050 (babies who met this definition (Tables 28 to 31). A total of 194,032 'days' of supplemental oxygen was administered while in hospital to the 10,312 babies in this cohort who received this therapy.

3.6.2 Neonatal surgery

Surgery in the newborn is a specialised field, carried out in only a limited number of centres such as children's hospitals, or perinatal centres in general hospitals with substantial paediatric departments. Newborn infants undergoing major surgery often need specialist care to stabilise their condition both before, during and after the operation. Some other procedures such as laser treatment for retinopathy of prematurity (section 3.6.4) are conducted at perinatal centres. The babies in this cohort include only those who were admitted to a NICU as part of their first time in hospital. Many other babies undergo surgery during their first weeks of life but they either go home first, or are admitted to paediatric units such as for cardiac surgery.

In 1996 and 1997 there were 1,556 babies who had major surgery in our cohort, of whom half (n: 820; 52.7%) were born at term. Nearly half of these term babies 364 (44.4%) were born in a perinatal centre. This may be due to the antenatal diagnosis of a problem allowing for a birth to be planned to be close to expert care. Major congenital malformations were detected in 738 (90.0%) of the term babies receiving surgery, but this contributed to their death in only 27 cases. Assisted mechanical ventilation (IPPR) was received by 520 (63.4%) babies. Discharge data are known for 89.8% of the survivors. These infants were in hospital for a median of 19 days (interquartile range 12 to 27 days), nearly a week longer than the total group of term babies admitted to a NICU (Tables 52, 54).

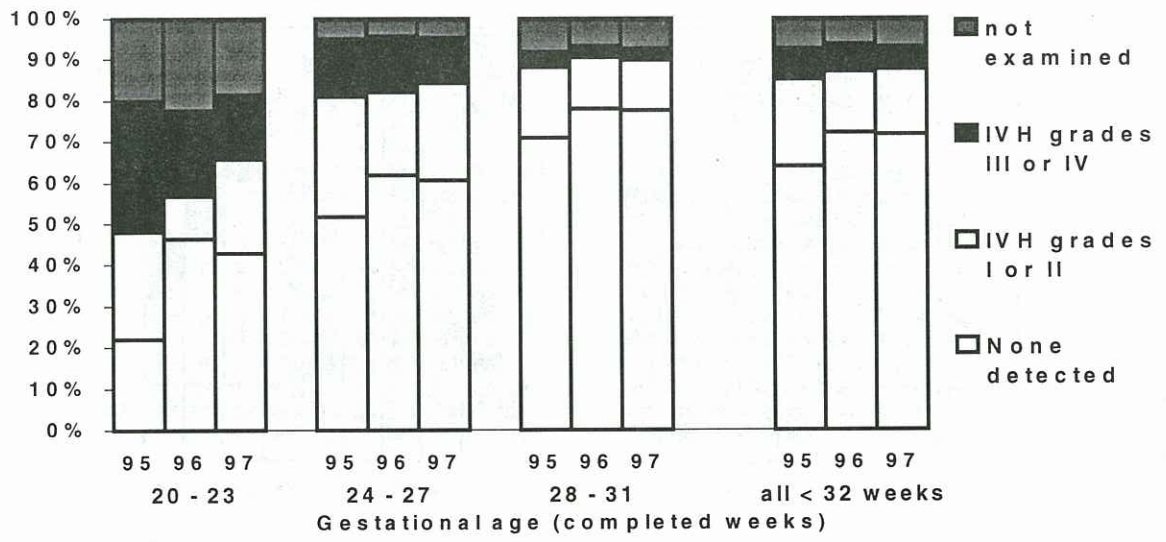


Figure 11: Incidence of intraventricular haemorrhage by gestational age group, 1995-1997

3.6.3 Cerebral ultrasound

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). The initial ultrasound is generally done during the first week of life to detect signs of IVH. For infants born at less than 32 weeks' gestation 3,604 (67.0%) did not have an IVH detected. IVHs are graded according to an internationally recognised method (Papile LA et al. 1978) with grades III and IV of concern as they are markers of possible later disability. Significant haemorrhage was detected in 204 (8.0%) of the babies examined in 1995, 190 (7.0%) for 1996 and 159 (5.9%) in 1997 (Figure 11, Tables 36 to 39). This reduction in significant IVH is statistically significant (Mantel-Haenzel $\chi_2 = 8.19$, $p<0.004$) and is reflected in the range of percentage of babies with an IVH of grades III and IV in each level III NICU. For infants born at less than 32 weeks' gestation and alive after the first day of life, the interquartile range was from 2.7% to 7.7% (median = 4.3%; in 1995 median = 7.4%). A quarter (29.8%) of the 376 (6.5%) babies who did not have an ultrasound had died before their second day of life.

A later ultrasound is done at 4 to 6 weeks of age to detect cystic lesions and ventricular dilatation. The timing of this ultrasound was not always recorded in the dataset and thus is only reported here for 2,430 (45.8%) of infants of less than 32 weeks' gestation. No abnormality on ultrasound were noted for 2,191 (90.2%) of these babies. Hydrocephalus was an uncommon event in this group (n:61; 2.5%), porencephalic cysts were noted in 58 babies (2.4%) and periventricular leukomalacia was seen in 99 (4.1%) babies.

3.6.4 Eye examinations

There is a recommendation that unless there is local data to the contrary, infants born at less than 32 weeks' or less than 1500 g should be screened with eye examinations for retinopathy of prematurity (ROP; NHMRC Clinical Practice Guidelines for Care Around Preterm Birth, 1997). This is carried out to monitor the vascularisation of the eye which, when disrupted, can result in ROP. There is an international staging of ROP (International Committee for the Classification of Retinopathy of Prematurity, 1984). If a baby's eye reaches Stages III plus or IV, treatment with a laser or cryotherapy may be necessary.

For the 3,000 babies born at less than 32 weeks' gestation who were still in their registration hospital on day 42 of life, 1,757 (65.6%) were known to have no ROP (Tables 40 to 43). A further 212 babies (7.1%) were recorded as not having an examination. Data were not available for 109 (3.6%) infants.

Overall, significant eye disease (Stage III or IV) was seen in a total of 194 of babies (includes all infants known to have this disease). Treatment was reported to have been given to 93 (47.9%) of these babies. This level of retinopathy of prematurity was not seen in babies born at more than 32 weeks' or more than 1500 grams birthweight, although this may reflect the examination criteria.

3.6.5 Necrotising enterocolitis

Necrotising enterocolitis (NEC) is a disease of the gut, usually affecting the large intestine or colon, and an important cause of death and morbidity in preterm infants and occasionally in term infants. Its cause is unknown, although studies have associated it with a variety of factors including very low gestational age and ischaemic events. There were 165 cases of proven NEC reported in this cohort in 1996 and 118 in 1997. For those babies born at less than 32 weeks' gestation, 142 in 1996 and 88 in 1997 were diagnosed with definite NEC. This shows the reported variable occurrence of this disease, with rates of 7.8 % for 1996 and 3.0% for 1997, but an overall occurrence of 3.9%, similar that seen in 1995 (4.0%).

3.6.6 Neonatal infection

Neonatal infection is recorded as the number of separate episodes of proven systemic infection from any site (such as blood (septicaemia), cerebrospinal fluid (meningitis), urine (urinary tract infection) or lung (pneumonia; see Isaacs et al 1995)). In 1996 and 1997 a total of 9,590 (79.7%) babies in this high-risk cohort had no infection noted. In 1997, the variation between units of the percentage of infants known to have at least 1 infection was large (interquartile range 15.7% to 37.0%, median: 24.8%). For babies born at less than 32 weeks' 1,739 (29.2%) had at least one infection during their hospitalisation.

3.7 Outcome

3.7.1 Survival

Overall, the majority of the babies in this very high-risk cohort survived to go home (90.9% in 1996; 91.3% in 1997). Such survival is dependent on many factors including gestational age at birth and birthweight. Another important factor is the presence of a major congenital malformation, especially one that contributes to the baby's death (lethal congenital malformation). Consequently, our data are presented as survival to discharge home by week of gestational age (Figure 12; Tables 44, 45) and by birthweight group (Figure 13; Tables 46, 47), denoting babies known to have a lethal congenital malformation. To give a comprehensive picture for these babies, data are provided as survival to 7 days, to 28 days (neonatal death) and to discharge to home. There has been little change in survival rates in the past 3 years, except at the lower gestations where numbers are very small (Figure 12). When death occurred it was more likely to be during the first week of life (633 of 1,105 babies (57.3%) for 1996-1997). The data in this report are different to that usually reported for State or national populations as they represent only those babies admitted to a level III Neonatal Intensive Care Unit. The data do not include babies who were stillborn, who died in labour ward or who died in hospitals without level III facilities.

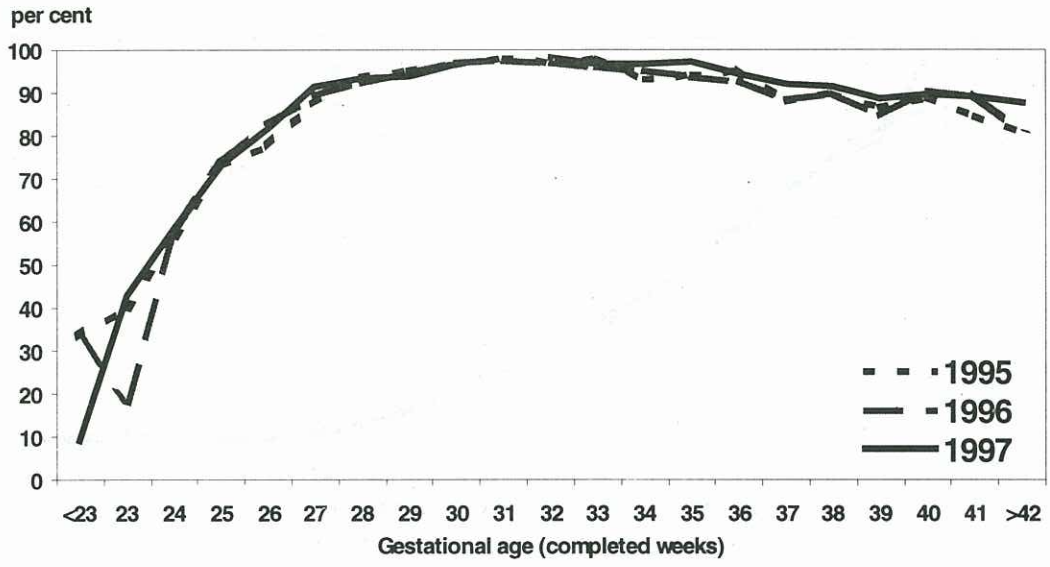


Figure 12: Survival to discharge from hospital by gestational age group, 1995-1997

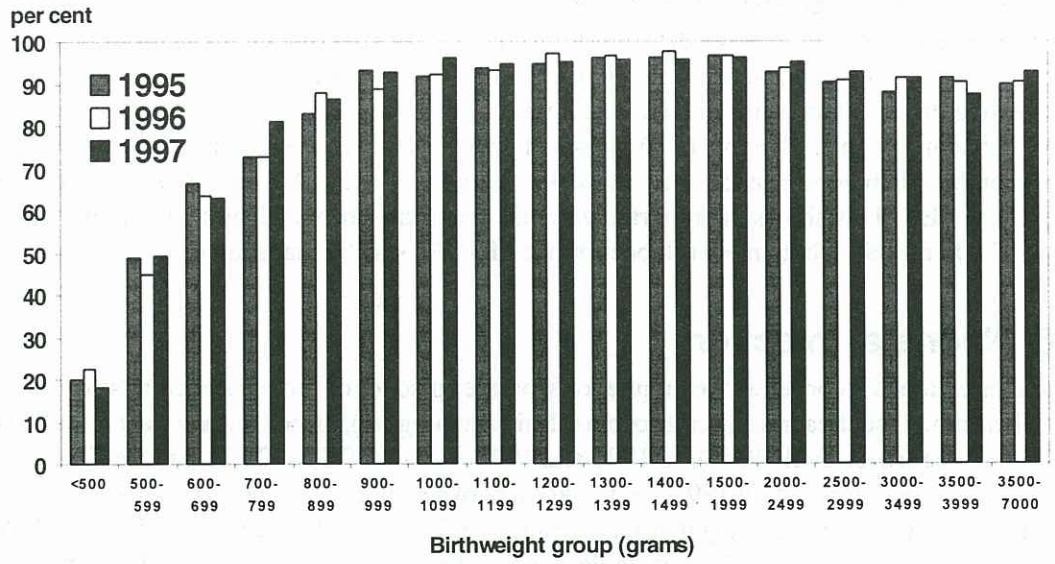


Figure 13: Survival to discharge from hospital by birthweight group, 1995-1997

3.7.2 Discharge from registration NICU

After their care in newborn intensive care, babies go to a level II nursery in either the same hospital or another hospital. In this series, nearly half the babies (46.3%) were transferred to nurseries in other hospitals (Level I or II care) prior to their discharge to home (Tables 48 to 51). In some cases (15.9% of those transferred) babies went to other hospitals with a NICU for surgery, or because that hospital was closer to home or occasionally, because their birth hospital did not have a level III care bed available.

3.7.3 Going home

The total length of time spent in hospital is related to many factors (especially maturity at birth) and there is wide variation in an individual's length of stay (Tables 52 to 55). However, surviving extremely preterm babies are usually discharged home around their due date (term equivalent age, Figure 14) and preterm babies usually go home a little before term. Term babies who receive intensive care for respiratory support or surgery tend to stay in hospital for about two weeks (Figure 14). The average length of stay of all Australian babies in 1996 was 5 days (Day, Sullivan & Lancaster 1999). Over the period 1995 to 1997, there has been little change in the median length of stay of survivors (Figure 14). These data are available for the 9,871 babies (89.3% of survivors) where we have the date of discharge to home.

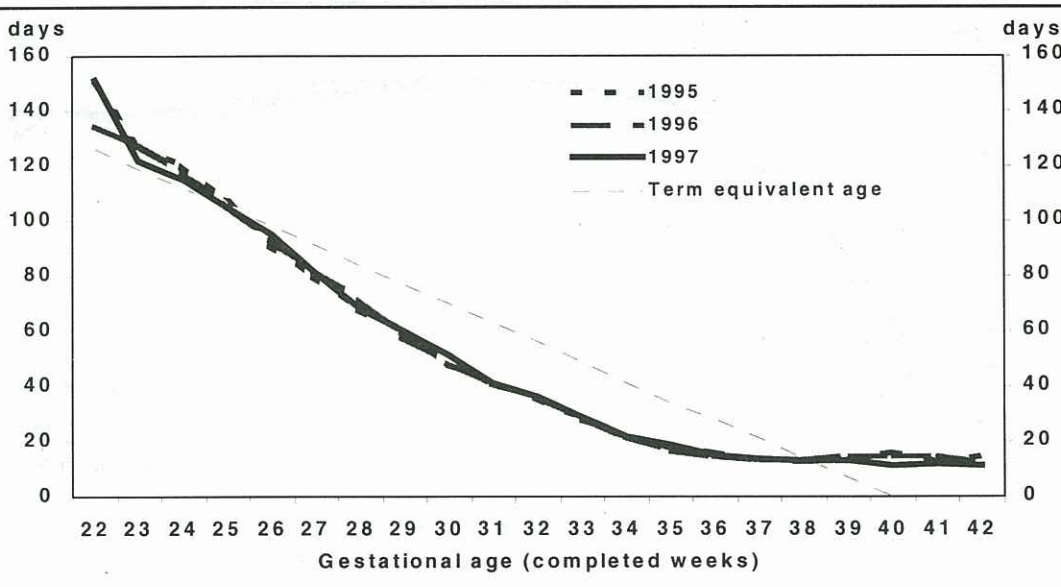


Figure 14: Median number of days to discharge to home by gestational age, 1995-1997

4 References

Australian Bureau of Statistics 1997, *Births Australia 1996,* Canberra: ABS Catalogue No. 3301.0, Government Printing Service.

Australian Bureau of Statistics 1998, *Births 1997*, Canberra: ABS Catalogue No. 3301.0, Government Printing Service.

Barrington KJ & Finer NN 1999. *Inhaled nitric oxide in preterm newborn infants with respiratory failure.* (Cochrane Review) In: The Cochrane Library Issue 1, 1999. Oxford: Update Software.

Crowley P. 1998. *Corticosteroids prior to preterm delivery.* (Cochrane Review) In: The Cochrane Library Issue 1, 1999. Oxford: Update Software.

Day P, Sullivan EA & Lancaster P 1999. *Australia's Mothers & Babies, 1996,* AIHW Cat. No. PER 4. Sydney: Australian Institute of Health and Welfare National Perinatal Statistics Unit (Perinatal Statistics Series No.7).

Donoghue DA 1997. *Australian and New Zealand Neonatal Network, 1995*. Sydney: AIHW National Perinatal Statistics Unit: Neonatal Network Series No. 2.

Finer NN & Barrington KJ 1999. *Nitric oxide for respiratory failure in infants born at or near term.* (Cochrane Review) In: The Cochrane Library Issue 1, 1999. Oxford: Update Software.

Henderson-Smart DJ, Bhuta T, Cools F, Offringa M 1999. *Elective high frequency oscillatory ventilation versus conventional ventilation for acute pulmonary dysfunction in preterm infants* (Cochrane Review) In: The Cochrane Library Issue 1, 1999. Oxford: Update Software.

ICD.9.CM *1990. International Classification of Diseases, 9th revision, Clinical Modification, Ann Arbour: Edwards Brothers Inc.*

Isaacs D, Barfield CP, Grimwood K, McPhee AJ, Minutillo C & Tudehope DI 1995. *Systemic bacterial and fungal infections in infants in Australian neonatal units.* Australian Study Group for Neonatal Infections. Med J Aust 162:198-201.

Liggins GC & Howie RN 1972, *A controlled trial of antepartum glucocorticosteroid treatment for prevention of the respiratory distress syndrome in premature infants*, Paediatrics, 50:515-525.

Health Care Committee Expert Panel on Perinatal Morbidity 1995, *Perinatal Morbidity,* Canberra: Australian Government Publishing Service.

NHMRC Clinical Practice Guidelines for Care Around Preterm Birth 1997. Canberra: Australian Government Publishing Service.

Soll, RF, 1999 *Prophylactic natural surfactant extract for preventing mortality and morbidity in preterm infants* (Cochrane Review) In: The Cochrane Library Issue 1, 1999. Oxford: Update Software.

Statistics New Zealand Te Tari Tatau 1996 *Demographic Trends 1996.* Wellington.

5 Tables

Table 1: Number of infants in each gestational age group, 1996 and 1997

Gestational age (completed weeks)	Number in 1996	Cumulative per cent 1996	Number in 1997	Cumulative per cent 1997
21	2	0.03	—	—
22	10	0.2	11	0.18
23	55	1.1	63	1.2
24	143	3.5	142	3.5
25	206	6.8	204	6.8
26	273	11.3	263	11.0
27	283	16.0	274	15.4
28	359	21.9	365	21.3
29	423	28.8	487	29.2
30	517	37.3	563	38.2
31	693	48.7	607	48.0
(All infants < 32 weeks')	*(2,964)*		*(2,979)*	
32	485	56.7	485	55.8
33	391	63.1	383	62.0
34	356	69.0	383	68.2
35	292	73.8	278	72.7
36	263	78.1	302	77.5
37	244	82.1	222	81.1
38	291	86.9	331	86.4
39	195	90.1	221	90.0
40	400	96.7	373	96.0
41	156	99.2	190	99.1
42	42	99.9	54	99.9
43	3	100.0	2	100.0
44	1	100.0	1	100.0
All infants	**6,083**		**6,204**	

Notes

1. ANZNN cohort includes all infants born at less than 32 weeks' completed gestation. Those above this gestation must be born at less than 1500 grams birthweight, or must require assisted ventilation or major surgery.
2. For one unit only, data was collected only for those infants born weighing less than 1500 grams.

Table 2: Number of infants in each birthweight group, 1996 and 1997

Birthweight group (grams)	Number in 1996	Cumulative per cent 1996	Number in 1997	Cumulative per cent 1997
250-499	31	0.51	28	0.45
500-599	89	2.0	97	2.0
600-699	158	4.6	194	5.1
700-799	211	8.0	234	8.9
800-899	259	12.3	224	12.5
900-999	271	16.8	251	16.6
1000-1099	257	21.0	272	20.9
1100-1199	288	25.7	318	26.1
1200-1299	318	30.9	340	31.6
1300-1399	332	36.4	332	36.9
1400-1499	357	42.3	374	42.9
(All infants < 1500g)	*(2,517)*		*(2,664)*	
1500-1999	1,126	60.8	1,069	60.2
2000-2499	712	72.5	737	72.1
2500-2999	633	82.9	595	81.6
3000-3499	523	91.5	594	91.2
3500-3999	337	97.0	358	97.0
4000 and over	181	100.0	187	100.0
All infants	**6,083**		**6,204**	

Note: ANZNN cohort includes all infants born at less than 1500 grams. Those above this gestation must be born at less than 32 week's gestation, or must require assisted ventilation or major surgery.

Table 3: Number and proportion of infants meeting each of the registration criteria, 1996 - 1997

Registration criteria	1996	1997	All infants
Born at < 32 completed weeks' gestation	2,964	2,979	5,943
Born at < 1500 gram birthweight	2,517	2,664	5,181
Receiving assisted ventilation or 4 hours or more	5,204	5,267	10,471
Receiving major surgery	790	766	1,556

Nots

1. These groups are not mutually exclusive.
2. Total number of infants is 12,287

Table 4: Antenatal corticosteroid use by gestational age group, infants < 34 weeks' gestation, 1996

Antenatal steroid use	20-23	24-27	28-31	32-33	Infants < 34 weeks'
			Number		
None	23	142	351	277	793
Incomplete course	10	178	354	117	659
Course completed	17	457	978	322	1,774
Course completed >7 day	—	40	78	28	146
Unknown	1	11	64	40	116
Data not available	16	77	167	92	352
All infants	**67**	**905**	**1,992**	**876**	**3,837**
			Per cent		
None	46.0	17.4	19.9	37.2	23.5
Incomplete course	20.0	21.8	20.1	15.7	19.5
Course completed	34.0	55.9	55.5	43.3	52.6
Course completed >7 day	—	4.9	4.4	3.8	4.3
All infants	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**

Notes

1. Corticosteroids given antenatally via any route to the mother at a time likely to enhance fetal lung maturation is considered complete when more than one dose of corticosteroids given, and first dose was given more than 24 hours and less than 8 days before baby's birth.
2. 'Unknown' and 'not available' data are excluded from per cent calculations.

Table 5: Antenatal corticosteroid use by gestational age group, infants < 34 weeks' gestation, 1997

Antenatal steroid use	20-23	24-27	28-31	32-33	Infants < 34 weeks'
			Number		
None	15	91	297	235	638
Incomplete course	15	179	377	138	709
Course completed	23	475	1,005	333	1,836
Course completed >7 day	—	22	99	39	160
Unknown	21	116	244	96	504
Data not available	—	—	—	27	27
All infants	**74**	**883**	**2,022**	**868**	**3,848**
			Per cent		
None	28.3	11.8	16.7	31.5	19.1
Incomplete course	28.3	23.2	21.2	18.5	21.2
Course completed	43.4	62.0	56.5	44.7	54.9
Course completed >7 day	—	2.8	5.6	5.2	4.8
All infants	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**

Notes:

1. Corticosteroids given antenatally via any route to the mother at a time likely to enhance fetal lung maturation is considered complete when more than one dose of corticosteroids given, and first dose was given more than 24 hours and less than 8 days before baby's birth.
2. 'Unknown' and 'not available' data are excluded from per cent calculations.

Table 6: Antenatal corticosteroid use by birthweight group, infants < 2500 g, 1996

Antenatal steroid use	250-499	500-749	750-999	1000-1249	1250-1499	1500-1999	2000-2499	Infants < 2500 g
				Number				
None	7	52	105	127	188	312	406	1,197
Incomplete course	7	67	123	112	125	176	66	676
Course completed	14	159	327	366	385	443	125	1,819
Course completed >7 day	1	6	32	26	38	43	18	164
Unknown	—	5	14	14	34	48	20	135
Data not available	2	44	54	57	80	104	77	418
All infants	**31**	**333**	**655**	**702**	**850**	**1,126**	**712**	**4,409**
				Per cent				
None	24.1	18.3	17.9	20.1	25.5	32.0	66.0	31.0
Incomplete course	24.1	23.6	21.0	17.8	17.0	18.1	10.7	17.5
Course completed	48.3	56.0	55.7	58.0	52.3	45.5	20.3	47.2
Course completed >7 day	3.5	2.1	5.4	4.1	5.2	4.4	2.9	4.3
All infants	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**

Notes

1. Corticosteroids given antenatally via any route to the mother at a time likely to enhance fetal lung maturation is considered complete when more than one dose of corticosteroids given, and first dose was given more than 24 hours and less than 8 days before baby's birth.
2. 'Unknown' and 'not available' data are excluded from per cent calculations.

Table 7: Antenatal corticosteroid use by birthweight group, infants < 2500 g, 1997

Antenatal steroid use	250-499	500-749	750-999	1000-1249	1250-1499	1500-1999	2000-2499	Infants < 2500 g
				Number				
None	1	53	73	110	163	251	380	1,031
Incomplete course	3	70	125	144	133	188	53	716
Course completed	14	228	307	398	407	434	124	1,912
Course completed >7 day	—	10	21	31	43	51	32	188
Unknown	10	52	61	103	104	119	104	553
Data not available	—	—	—	—	—	26	44	70
All infants	**28**	**413**	**587**	**786**	**850**	**1069**	**737**	**4,410**
				Per cent				
None	5.6	14.7	13.9	16.1	21.8	27.2	64.5	26.8
Incomplete course	16.7	19.3	23.8	21.0	17.8	20.3	9.0	18.6
Course completed	77.8	63.2	58.4	58.4	54.6	47.0	21.1	49.7
Course completed >7 day	—	2.8	4.0	4.6	5.8	5.5	5.4	4.9
All infants	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**

Notes

1. Corticosteroids given antenatally via any route to the mother at a time likely to enhance fetal lung maturation is considered complete when more than one dose of corticosteroids given, and first dose was given more than 24 hours and less than 8 days before baby's birth.
2. 'Unknown' and 'not available' data are excluded from per cent calculations.

Table 8: Plurality by gestational age group, all infants, 1996

Plurality	20-23	24-27	28-31	32-33	34-36	37-44	All infants
			Number				
Singleton	54	667	1,476	662	780	1,301	4,940
Twins	11	209	426	184	111	30	971
Triplets	2	25	78	22	19	1	147
Quadruplets	—	2	12	8	—	—	22
Unknown	—	2	—	—	1	—	3
All infants	**67**	**905**	**1,992**	**876**	**911**	**1,332**	**6,083**
			Per cent				
Singleton	80.6	73.8	74.1	75.6	85.7	97.6	81.2
Twins	16.4	23.2	21.4	21.0	12.2	2.3	16.0
Triplets	3.0	2.8	3.9	2.5	2.1	0.1	2.4
Quadruplets	—	0.2	0.6	0.9	—	—	0.4
All infants	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**

Note: 'Unknown' and 'not available' data are excluded from per cent calculations.

Table 9: Plurality by gestational age group, all infants, 1997

Plurality	20-23	24-27	28-31	32-33	34-36	37-44	All infants
			Number				
Singleton	59	691	1,424	640	831	1,363	5,008
Twins	9	166	480	190	113	29	987
Triplets	6	18	100	33	18	2	177
Quadruplets	—	8	18	5	—	—	31
Unknown	—	—	—	—	1	—	1
All infants	**74**	**883**	**2,022**	**868**	**963**	**1,394**	**6,204**
			Per cent				
Singleton	79.7	78.2	70.4	73.7	86.4	97.8	80.7
Twins	12.2	18.8	23.7	21.9	11.8	2.1	15.9
Triplets	8.1	2.1	5.0	3.8	1.8	0.1	2.9
Quadruplets	—	0.9	0.9	0.6	—	—	0.5
All infants	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**

Note: 'Unknown' and 'not available' data are excluded from per cent calculations.

Table 10: Plurality by birthweight group, all infants, 1996

Plurality	250-499	500-749	750-999	1000-1249	1250-1499	1500-1999	2000-2499	2500-2999	3000-3499	3500-3999	4000+	All infants
						Number						
Singleton	23	255	468	527	603	839	613	582	512	337	181	4,940
Twins	8	70	149	142	213	241	92	46	10	—	—	971
Triplets	—	7	33	27	26	43	6	4	1	—	—	147
Quadruplets	—	—	4	6	8	3	1	—	—	—	—	22
Unknown	—	1	1	—	—	—	—	1	—	—	—	3
All infants	**31**	**333**	**655**	**702**	**850**	**1,126**	**712**	**633**	**523**	**337**	**181**	**6,083**
						Per cent						
Singleton	74.2	76.8	71.6	75.1	70.9	74.5	86.1	92.1	97.9	100.0	100.0	81.2
Twins	25.8	21.1	22.8	20.2	25.1	21.4	12.9	7.3	1.9	—	—	16.0
Triplets	—	2.1	5.1	3.8	3.1	3.8	0.8	0.6	0.2	—	—	2.4
Quadruplets	—	—	0.6	0.9	0.9	0.3	0.1	—	—	—	—	0.4
All infants	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**

Note: 'Unknown' and 'not available' data are excluded from per cent calculations.

Table 11: Plurality by birthweight group, all infants, 1997

Plurality	250-499	500-749	750-999	1000-1249	1250-1499	1500-1999	2000-2499	2500-2999	3000-3499	3500-3999	4000+	All infants
						Number						
Singleton	19	315	439	560	582	783	626	557	584	357	186	5,008
Twins	7	73	127	179	210	243	100	36	10	1	1	987
Triplets	2	20	16	42	51	34	10	2	—	—	—	177
Quadruplets	—	5	5	5	7	9	—	—	—	—	—	31
Unknown	—	—	—	—	—	—	1	—	—	—	—	1
All infants	**28**	**413**	**587**	**786**	**850**	**1069**	**737**	**595**	**594**	**358**	**187**	**6,204**
						Per cent						
Singleton	67.9	76.3	74.8	71.2	68.5	73.3	85.1	93.6	98.3	99.7	99.5	80.7
Twins	25.0	17.7	21.6	22.8	24.7	22.7	13.6	6.1	1.7	0.3	0.5	15.9
Triplets	7.1	4.8	2.7	5.4	6.0	3.2	1.3	0.3	—	—	—	2.9
Quadruplets	—	1.2	0.9	0.6	0.8	0.8	—	—	—	—	—	0.5
All infants	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**

Note: 'Unknown' and 'not available' data are excluded from per cent calculations.

Table 12: Level of hospital of birth by gestational age group, all infants, 1996

Level of hospital	20-23	24-27	28-31	32-33	34-36	37-44	All infants
			Number				
Not born in a hospital	1	7	14	3	4	22	51
Hospital, no NICU	7	97	198	148	334	625	1,409
Hospital with a NICU	59	800	1,777	710	551	614	4,511
Unknown	—	1	3	13	21	67	105
Data not available	—	—	—	2	1	4	7
All infants	**67**	**905**	**1,992**	**876**	**911**	**1,332**	**6,083**
			Per cent				
Not born in a hospital	1.5	0.8	0.7	0.3	0.4	1.7	0.9
Hospital, no NICU	10.4	10.7	10.0	17.2	37.6	49.6	23.6
Hospital with a NICU	88.1	88.5	89.3	82.5	62.0	48.7	75.5
All infants	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**

Note: 'Unknown' and 'not available' data are excluded from per cent calculations.

Table13: Level of hospital of birth by gestational age group, all infants, 1997

Level of hospital	20-23	24-27	28-31	32-33	34-36	37-44	All infants
			Number				
Not born in a hospital	2	3	20	—	8	14	47
Hospital, no NICU	3	69	170	131	348	714	1,435
Hospital with a NICU	69	811	1,832	737	607	663	4,719
Unknown	—	—	—	—	—	3	3
Data not available	—	—	—	—	—	—	—
All infants	**74**	**883**	**2,022**	**868**	**963**	**1,394**	**6,204**
			Per cent				
Not born in a hospital	2.7	0.4	1.0	—	0.8	1.0	0.8
Hospital, no NICU	4.1	7.8	8.4	15.1	36.1	51.3	23.1
Hospital with a NICU	93.2	91.8	90.6	84.9	63.1	47.7	76.1
All infants	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**

Note: 'Unknown' and 'not available' data are excluded from per cent calculations.

Table 14: Level of hospital of birth by birthweight group, all infants, 1996

Level of hospital	250-499	500-749	750-999	1000-1249	1250-1499	1500-1999	2000-2499	2500-2999	3000-3499	3500-3999	4000+	All infants
						Number						
Not born in a hospital	—	3	3	9	5	3	4	4	7	6	7	51
Hospital, no NICU	3	23	67	70	88	168	223	282	238	162	85	1,409
Hospital with a NICU	28	307	584	622	753	944	467	331	251	147	77	4,511
Unknown	—	—	1	1	4	9	18	16	25	21	10	105
Data not available	—	—	—	—	—	2	—	—	2	1	2	7
All infants	**31**	**333**	**655**	**702**	**850**	**1,126**	**712**	**633**	**523**	**337**	**181**	**6,083**
						Per cent						
Not born in a hospital	0.0	0.9	0.5	1.3	0.6	0.2	0.6	0.7	1.4	1.9	4.1	0.9
Hospital, no NICU	9.7	6.9	10.2	10.0	10.4	15.1	32.1	45.7	48.0	51.4	50.3	23.6
Hospital with a NICU	90.3	92.2	89.3	88.7	89.0	84.7	67.3	53.6	50.6	46.7	45.6	75.5
All infants	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**

Note: 'Unknown' and 'not available' data are excluded from per cent calculations.

Table 15: Level of hospital of birth by birthweight group, all infants, 1997

Level of hospital	250-499	500-749	750-999	1000-1249	1250-1499	1500-1999	2000-2499	2500-2999	3000-3499	3500-3999	4000+	All infants
						Number						
Not born in a hospital	—	3	2	5	10	7	5	6	4	4	—	47
Hospital, no NICU	—	26	41	58	80	134	230	257	314	202	93	1,435
Hospital with a NICU	28	384	544	723	760	928	501	331	274	152	94	4,719
Unknown	—	—	—	—	—	—	1	1	1	—	—	3
Data not available	—	—	—	—	—	—	—	—	1	—	—	1
All infants	**28**	**413**	**587**	**786**	**850**	**1,069**	**737**	**595**	**594**	**358**	**187**	**6,204**
						Per cent						
Not born in a hospital	—	0.7	0.3	0.6	1.2	0.7	0.7	1.0	0.7	1.1	—	0.8
Hospital, no NICU	—	6.3	7.0	7.4	9.4	12.5	31.2	43.3	53.0	56.4	49.7	23.1
Hospital with a NICU	100.0	93.0	92.7	92.0	89.4	86.8	68.1	55.7	46.3	42.5	50.3	76.1
All infants	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**

Note: 'Unknown' and 'not available' data are excluded from per cent calculations.

Table 16: Transport type for infants transferred immediately after birth to registration hospital, by gestational age group, 1996

Transportation method	20-23	24-27	28-31	32-33	34-36	37-44	All infants
				Number			
Non-specialised transport[(a)]	3	9	33	15	21	87	168
Specialist transport team[(b)]	3	82	173	154	372	739	1,523
All infants	**6**	**91**	**206**	**169**	**393**	**826**	**1,691**
				Per cent			
Non-specialised transport[(a)]	50.0	9.9	16.0	8.9	5.3	10.5	9.9
Specialist transport team[(b)]	50.0	90.1	84.0	91.1	94.7	89.5	90.1
All infants	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**

(a) Infant is transferred from any other hospital, by a non-specialist transfer method, including transport by ambulance.

(b) A specialist neonatal transport retrieval team using appropriate equipment retrieves infant.

Note: These data represent those infants who qualify for the ANZNN cohort only, and do not include neonates who are transferred to a paediatric intensive care unit, or who are transferred after the perinatal period.

Table 17: Transport type for infants transferred immediately after birth to registration hospital, by gestational age group, 1997

Transportation method	20-23	24-27	28-31	32-33	34-36	37-44	All infants
				Number			
Non-specialised transport[a]	—	8	15	5	37	128	193
Specialist transport team[b]	6	68	165	125	327	651	1,342
All infants	**6**	**76**	**180**	**130**	**364**	**779**	**1,535**
				Per cent			
Non-specialised transport[a]	—	10.5	8.3	3.9	10.2	16.4	12.6
Specialist transport team[b]	100.0	89.5	91.7	96.1	89.8	83.6	87.4
All infants	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**

(a) Infant is transferred from any other hospital, by a non-specialist transfer method, including transport by ambulance.

(b) A specialist neonatal transport retrieval team using appropriate equipment retrieves infant.

Note: These data represent those infants who qualify for the ANZNN cohort only, and do not include neonates who are transferred to a paediatric Intensive care unit, or who are transferred after the perinatal period.

Table 18: Transport type for infants transferred immediately after birth to registration hospital, by birthweight group, 1996

Transportation method	250-499	500-749	750-999	1000-1249	1250-1499	1500-1999	2000-2499	2500-2999	3000-3499	3500-3999	4000+	All infants
						Number						
Non-specialised transport[a]	1	6	8	14	11	18	17	29	30	20	14	168
Specialist transport team[b]	—	14	63	61	79	164	255	312	288	185	102	1,523
All infants	**1**	**20**	**71**	**75**	**182**	**272**	**341**	**318**	**205**	**301**	**112**	**1,580**
						Per cent						
Non-specialised transport[a]	100.0	30.0	11.3	18.7	12.2	9.9	6.3	8.5	9.4	9.8	12.1	9.9
Specialist transport team[b]	—	70.0	88.7	81.3	87.8	90.1	93.7	91.5	90.6	90.2	87.9	90.1
All infants	**—**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**

(a) Infant is transferred from any other hospital, by a non-specialist transfer method, including transport by ambulance.

(b) A specialist neonatal transport retrieval team using appropriate equipment retrieves infant.

Note: These data represent those infants who qualify for the ANZNN cohort only, and do not include neonates who are transferred to a paediatric intensive care unit, or who are transferred after the perinatal period.

Table 19: Transport type for infants transferred immediately after birth to registration hospital, by birthweight group, 1997

Transportation method	250-499	500-749	750-999	1000-1249	1250-1499	1500-1999	2000-2499	2500-2999	3000-3499	3500-3999	4000+	All infants
						Number						
Non-specialised transport[a]	—	4	2	8	9	10	21	35	51	37	16	193
Specialist transport team[b]	—	30	40	58	76	133	217	248	284	176	80	1,342
All infants	—	34	42	66	85	143	238	283	335	213	96	1,535
						Per cent						
Non-specialised transport[a]	—	11.8	4.8	12.1	10.6	7.0	8.9	12.4	15.2	17.4	16.7	12.6
Specialist transport team[b]	—	88.2	95.2	87.9	89.4	93.0	91.1	87.6	84.8	82.6	83.3	87.4
All infants	**—**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**

(a) Infant is transferred from any other hospital, by a non-specialist transfer method, including transport by ambulance.

(b) A specialist neonatal transport retrieval team using appropriate equipment retrieves infant.

Note: These data represent those infants who qualify for the ANZNN cohort only, and do not include neonates who are transferred to a paediatric intensive care unit, or who are transferred after the perinatal period.

Table 20: Method of birth by gestational age group, all infants, 1996

Mode of birth	20-23	24-27	28-31	32-33	34-36	37-44	All infants
			Number				
Vaginal	62	427	672	274	357	608	2,400
Vaginal - with instruments	—	35	67	34	65	146	347
Caesarean section – emergency (labour)	2	241	484	194	168	226	1,315
Caesarean section - elective (no labour)	3	197	724	344	284	224	1,776
Unknown	—	1	33	14	3	6	57
Data not available	—	4	12	16	34	122	188
All infants	**67**	**905**	**1,992**	**876**	**911**	**1,332**	**6,083**
			Per cent				
Vaginal	92.5	47.4	34.5	32.4	40.9	50.5	41.1
Vaginal - with instruments	—	3.9	3.4	4.0	7.5	12.1	5.9
Caesarean section – emergency (labour)	3.0	26.8	24.9	22.9	19.2	18.8	22.5
Caesarean section - elective (no labour)	4.5	21.9	37.2	40.7	32.5	18.6	30.4
All infants	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**

Note: 'Not examined' and 'not available' data are excluded from per cent calculations.

Table 21: Method of birth by gestational age group, all infants, 1997

Mode of birth	20-23	24-27	28-31	32-33	34-36	37-44	All infants
			Number				
Vaginal	65	401	670	224	340	565	2,265
Vaginal - with instruments	5	40	114	47	47	143	396
Caesarean section – emergency (labour)	3	251	516	196	195	231	1,392
Caesarean section - elective (no labour)	1	185	713	357	272	238	1,766
Unknown	—	6	9	17	30	155	217
Data not available	—	—	—	27	79	62	168
All infants	**74**	**883**	**2,022**	**868**	**963**	**1,394**	**6,204**
			Per cent				
Vaginal	87.8	45.7	33.3	27.2	39.8	48.0	38.9
Vaginal - with instruments	6.8	4.6	5.7	5.7	5.5	12.2	6.8
Caesarean section - elective (no labour)	4.1	28.7	25.6	23.8	22.8	19.6	23.9
Caesarean section - elective (no labour)	1.3	21.1	35.4	43.3	31.9	20.2	30.4
All infants	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**

Note: 'Not examined' and 'not available' data are excluded from per cent calculations.

Table 22: Method of birth by birthweight group, all infants, 1996

Mode of birth	250-499	500-749	750-999	1000-1249	1250-1499	1500-1999	2000-2499	2500-2999	3000-3499	3500-3999	4000+	All infants
						Number						
Vaginal	9	168	237	222	299	400	310	283	232	152	88	2,400
Vaginal - with instruments	—	7	24	20	27	52	44	50	62	45	16	347
Caesarean section – emergency (labour)	6	53	174	178	199	278	144	108	79	56	40	1,315
Caesarean section – elective (no labour)	16	104	214	273	302	352	179	156	105	51	24	1,776
Unknown	—	1	—	4	19	24	2	1	2	4	—	57
Data not available	—	—	6	5	4	20	33	35	43	29	13	188
All infants	**31**	**333**	**655**	**702**	**850**	**1,126**	**712**	**633**	**523**	**337**	**181**	**6,083**
						Per cent						
Vaginal	29.0	50.6	36.5	32.0	36.2	37.0	45.8	47.4	48.5	50.0	52.4	41.1
Vaginal - with instruments	—	2.1	3.7	2.9	3.3	4.8	6.5	8.4	13.0	14.8	9.5	5.9
Caesarean section – emergency (labour)	19.4	16.0	26.8	25.7	24.1	25.7	21.3	18.1	16.5	18.4	23.8	22.5
Caesarean section - elective (no labour)	51.6	31.3	33.0	39.4	36.5	32.5	26.4	26.1	22.0	16.8	14.3	30.4
All infants	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**

Note: 'Not examined' and 'not available' data are excluded from per cent calculations.

Table 23: Method of birth by birthweight group, all infants, 1997

Mode of birth	250-499	500-749	750-999	1000-1249	1250-1499	1500-1999	2000-2499	2500-2999	3000-3499	3500-3999	4000+	All infants
						Number						
Vaginal	11	185	199	241	279	405	256	224	251	142	72	2,265
Vaginal - with instruments	—	20	23	37	46	64	50	39	57	38	22	396
Caesarean section – emergency (labour)	4	89	142	209	214	271	162	118	89	63	31	1,392
Caesarean section - elective (no labour)	13	116	222	295	305	289	195	131	114	56	30	1,766
Unknown	—	3	1	4	6	14	30	43	55	43	18	217
Data not available	—	—	—	—	—	26	44	40	28	16	14	168
All infants	**28**	**413**	**587**	**7865**	**850**	**1069**	**737**	**595**	**594**	**358**	**187**	**6,204**
						Per cent						
Vaginal	39.3	45.1	34.0	30.7	33.1	39.4	38.6	43.7	49.1	47.5	46.5	38.9
Vaginal - with instruments	—	4.9	3.9	4.7	5.5	6.2	7.5	7.6	11.2	12.7	14.2	6.8
Caesarean section – emergency (labour)	14.3	21.7	24.2	26.8	25.4	26.3	24.4	23.1	17.4	21.1	20.0	23.9
Caesarean section - elective (no labour)	46.4	28.3	37.9	37.8	36.1	28.1	29.4	25.6	22.3	18.7	19.3	30.4
All infants	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**

Note: 'Not examined' and 'not available' data are excluded from per cent calculations.

Table 24: Respiratory support by gestational age group, all infants, 1996

Type of respiratory support		20-23	24-27	28-31	32-33	34-36	37-44
IPPR	n	64	867	1,264	509	652	1,013
	median (days)	4	13	3	2	3	3
	interquartile range	1-25	3-31	2-6	1-4	2-4	2-5
	no IPPR (n)	3	38	728	366	260	319
	data not available	—	1	1	—	1	1
CPAP	n	14	667	1,095	420	381	366
	median (days)	9	14	3	2	2	2
	interquartile range	3-15	5-26	1-8	1-3	1-3	1-3
	no CPAP (n)	53	238	897	455	531	966
	data not available	—	2	11	5	2	2
Oxygen	n	65	857	1,582	681	748	1,054
	median (days)	4	37	4	3	4	4
	interquartile range	2-19	7-75	2-21	2-6	2-6	2-7
	no oxygen (n)	2	48	411	196	165	280
	data not available	—	22	113	64	71	141
All infants		**67**	**905**	**1,992**	**876**	**911**	**1,332**

Note: Median and range (days) are for all infants who received this therapy.

Table 25: Respiratory support by gestational age group, all infants, 1997

Type of respiratory support		20-23	24-27	28-31	32-33	34-36	37-44
IPPR	n	73	848	1,258	460	599	990
	median (days)	21	15	3	2	3	3
	interquartile range	2-51	4-30	2-6	1-4	2-4	2-5
	no IPPR (n)	—	34	764	407	363	402
	data not available	1	1	—	1	—	1
CPAP	n	26	680	1,167	394	415	382
	median (days)	17	19	4	2	1	1
	interquartile range	6-25	10-31	2-10	1-3	1-2	1-2
	no CPAP (n)	48	201	853	473	545	1,012
	data not available	—	2	2	1	3	—
Oxygen	n	66	814	1,340	488	621	864
	median (days)	35	57	8	4	4	4
	interquartile range	3-115	24-88	3-33	2-7	2-7	2-9
	no Oxygen (n)	8	44	303	144	101	128
	data not available	—	25	379	236	241	402
All infants		**74**	**883**	**2,022**	**868**	**963**	**1,394**

Note: Median and range (days) are for all infants who received this therapy.

Table 26: Respiratory support by birthweight group, all infants, 1996

Type of respiratory support		250-499	500-749	750-999	1000-1249	1250-1499	1500-1999	2000-2499	2500-2999	3000-3499	3500-3999	4000+
IPPR	n	29	323	604	531	420	665	513	497	392	257	138
	median (days)	7	16	9	4	3	3	3	3	3	3	3
	interquartile range	2-17	3-38	2-25	2-8	2-5	1-4	2-4	2-4	2-5	2-5	2-5
	no IPPR (n)	2	1	47	171	430	461	199	134	129	80	43
	data not available	—	—	2	—	—	—	—	1	1	—	—
CPAP	n	7	194	498	465	388	540	326	238	164	85	38
	median (days)	21	14	13	6	3	2	2	2	1	2	1
	interquartile range	6-23	4-27	4-23	2-18	1-6	1-3	1-3	1-3	1-2	1-3	1-3
	no CPAP (n)	24	139	154	231	446	576	386	395	355	250	143
	data not available	—	—	3	3	8	5	—	—	2	1	—
Oxygen	n	31	317	609	593	583	885	607	538	416	269	143
	median (days)	4.5	19	34	4	4	3	4	4	4	4	3
	interquartile range	2-15	5-73	5-68	1-11	1-11	2-6	2-6	2-7	2-7	2-8	2-7
	no Oxygen (n)	—	2	16	81	193	102	32	8	3	7	21
	data not available	—	14	30	28	74	70	73	87	104	61	17
All infants		**31**	**333**	**655**	**702**	**850**	**1,126**	**712**	**633**	**523**	**337**	**181**

Note: Median and range (days) are for all infants who received this therapy.

Table 27: Respiratory support by birthweight group, all infants, 1997

Type of respiratory support		250-499	500-749	750-999	1000-1249	1250-1499	1500-1999	2000-2499	2500-2999	3000-3499	3500-3999	4000+
IPPR	n	27	402	526	556	450	580	468	423	420	265	120
	median (days)	10	21	11	4	3	2	3	3	3	3	3
	interquartile range	2-33.5	5-40	4-25	2-8.5	2-5	1-4	2-4	2-5	2-5	2-5	2-5
	no IPPR (n)	0	11	61	238	400	489	268	173	174	93	66
	data not available	1	—	—	—	—	—	1	—	—	—	1
CPAP	n	9	269	370	545	401	499	334	209	174	100	68
	median (days)	7	21	18	6	3	2	2	2	1	2	2
	interquartile range	3-14	11-35	8.3-28	2-17	1-7	1-4	1-4	1-7	1-3	1-3	1-7.8
	no CPAP (n)	19	144	119	248	448	568	401	387	422	257	119
	data not available	—	—	1	1	1	2	2	—	—	1	—
Oxygen	n	28	376	403	573	487	601	496	399	382	233	109
	median (days)	8.5	63	59	25	6	4	4	4	4	5	4
	interquartile range	2-86	13-106	34-87	3-49	2-24	2-8	2-7	2-7	2-8	2-10	2-11
	no Oxygen (n)	—	29	30	80	140	207	89	50	55	27	20
	ata not available	—	6	30	124	273	244	62	57	75	45	19
All infants		**28**	**413**	**587**	**785**	**850**	**1069**	**737**	**595**	**594**	**358**	**187**

Note: Median and range (days) are for all infants who received this therapy.

Table 28: Oxygen dependency by gestational age group, all infants, 1996

Oxygen dependency	20-23	24-27	28-31	32-33	34-36	37-44	All infants
Oxygen therapy at day 28	18	580	386	32	24	53	1,093
Per cent survivors with oxygen therapy on day 28	100.0%	76.5%	20.0%	3.8%	2.8%	4.5%	19.5%
Chronic lung disease	13	296	192	—	—	—	501
Per cent of survivors with chronic lung disease [(a)]	81.3%	42.0%	10.6%	—	—	—	19.8%
Data not available	—	22	113	64	71	141	411
All infants	**67**	**905**	**1,992**	**876**	**911**	**1,332**	**6,083**

(a) Calculated for infants born at less than 32 week's gestation, total number with chronic lung disease (requiring respiratory assistance) as a percentage of those alive at 36 weeks post menstrual age (gestational age plus chronological age, n: 2,569) who have oxygen therapy information available (n: 2,497).

Note: 'Not examined' and 'not available' data are excluded from per cent calculations.

Table 29: Oxygen dependency by gestational age group, all infants, 1997

Oxygen dependency	20-23	24-27	28-31	32-33	34-36	37-44	All infants
Oxygen therapy at day 28	36	600	407	31	28	40	1,142
Per cent survivors with oxygen therapy on day 28	100.0%	94.5%	31.1%	4.7%	4.7%	5.5%	24.6%
Chronic lung disease	23	312	214	—	—	—	549
Per cent of survivors with chronic lung disease [(a)]	92.0%	53.9%	23.3%	—	—	—	36.0%
Data not available	—	25	378	236	241	402	1,282
All infants	**74**	**883**	**2,022**	**868**	**963**	**1,394**	**6,204**

(a) Calculated for infants born at less than 32 week's gestation, total number with chronic lung disease (requiring respiratory assistance) as a percentage of those alive at 36 weeks post menstrual age (gestational age plus chronological age, n: 2,569) who have oxygen therapy information available (n: 2,497).

Note: 'Not examined' and 'not available' data are excluded from per cent calculations.

Table 30: Oxygen dependency by birthweight group, all infants, 1996

Oxygen dependency	250-499	500-749	750-999	1000-1249	1250-1499	1500-1999	2000-2499	2500-2999	3000-3499	3500-3999	4000+	All infants
Oxygen therapy at day 28	7	184	396	247	90	83	26	29	13	16	3	1094
Per cent survivors with oxygen therapy on day 28	87.5%	81.1%	68.0%	37.3%	10.8%	7.6%	3.9%	5.0%	2.7%	5.2%	1.8%	19.5%
Chronic lung disease	4	111	207	101	39	36	3	—	—	—	—	501
Per cent of survivors with chronic lung disease [(a)]	50.0%	56.0%	38.8%	17.8%	7.4%	5.5%	6.1%	—	—	—	—	19.8%
Data not available	—	7	15	32	74	70	42	47	31	—	93	411
All infants	**31**	**333**	**655**	**703**	**850**	**1,126**	**712**	**633**	**523**	**337**	**181**	**6,083**

(a) Calculated for infants born at less than 32 week's gestation, total number with chronic lung disease (requiring respiratory assistance) as a percentage of those alive at 36 weeks post menstrual age (gestational age plus chronological age, n: 2,569) who have oxygen therapy information available (n: 2,497).

Note: 'Not examined' and 'not available' data are excluded from per cent calculations.

Table 31: Oxygen dependency by birthweight group, all infants, 1997

Oxygen dependency	250-499	500-749	750-999	1000-1249	1250-1499	1500-1999	2000-2499	2500-2999	3000-3499	3500-3999	4000+	All infants
Oxygen therapy at day 28	9	255	369	270	104	65	23	18	15	7	7	1,142
Per cent survivors with oxygen therapy on day 28	100%	93.8%	79.5%	41.2%	14.4%	7.4%	3.7%	3.6%	3.0%	2.6%	4.5%	22.6%
Chronic lung disease	8	165	184	123	42	28	3	1	—	1	—	549
Per cent of survivors with chronic lung disease [a]	100%	65.7%	42.4%	23.8%	10.7%	9.0%	20.0%	100%	—	100%	—	28.5%
Data not available	—	6	30	124	273	244	62	57	75	45	19	1,282
All infants	**28**	**413**	**587**	**785**	**850**	**1069**	**737**	**595**	**594**	**358**	**187**	**6,204**

(a) Calculated for infants born at less than 32 week's gestation, total number with chronic lung disease (requiring respiratory assistance) as a percentage of those alive at 36 weeks post menstrual age (gestational age plus chronological age, n: 2,569) who have oxygen therapy information available (n: 2,497).

Note: 'Not examined' and 'not available' data are excluded from per cent calculations.

Table 32: Exogenous surfactant use by gestational age group, all infants, 1996

Surfactant use	20-23	24-27	28-31	32-33	34-36	37-44	All infants
			Number				
None	9	166	1,035	535	560	1,137	3,442
Exosurf	17	221	310	113	110	46	817
Survanta	35	492	578	199	211	115	1,630
Other / both	1	4	10	5	6	4	30
Unknown	5	19	57	23	24	27	155
Data not available	—	3	2	1	—	3	9
All infants	**67**	**905**	**1,992**	**876**	**911**	**1,332**	**6,083**
			Per cent				
None	14.5	18.8	53.6	62.8	63.1	87.3	58.2
Exosurf	27.4	25.0	16.0	13.3	12.4	3.5	13.8
Survanta	56.4	55.7	29.9	23.4	23.8	8.8	27.5
Other / both	1.6	0.5	0.5	0.6	0.7	0.3	0.5
All infants	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**

Note: 'Not examined' and 'not available' data are excluded from per cent calculations.

Table 33: Exogenous surfactant use by gestational age group, all infants, 1997

Surfactant use	20-23	24-27	28-31	32-33	34-36	37-44	All infants
			Number				
None	11	190	1,077	554	569	1,129	3,530
Exosurf	4	62	94	46	53	27	286
Survanta	58	607	806	220	250	154	2,095
Other / both	1	5	13	7	3	8	37
Unknown	—	19	32	14	9	14	88
Data not available	—	—	—	27	79	62	168
All infants	**74**	**883**	**2,022**	**868**	**963**	**1,394**	**6,204**
			Per cent				
None	14.9	22.0	54.1	67.0	65.0	85.7	59.4
Exosurf	5.4	7.2	4.7	5.6	6.1	2.1	4.8
Survanta	78.4	70.2	40.5	26.6	28.6	11.7	35.2
Other / both	1.4	0.6	0.7	0.9	0.30	0.6	0.6
All infants	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**

Note: 'Not examined' and 'not available' data are excluded from per cent calculations.

Table 34: Exogenous surfactant use by birthweight group, all infants, 1996

Surfactant use	250-499	500-749	750-999	1000-1249	1250-1499	1500-1999	2000-2499	2500-2999	3000-3499	3500-3999	4000+	All infants
						Number						
None	4	47	171	295	524	676	431	434	406	288	156	3,442
Exosurf	9	79	147	126	112	143	100	62	27	8	4	817
Survanta	16	187	319	254	178	275	157	119	76	33	16	1,630
Other / both	—	1	7	4	5	2	4	2	—	—	—	30
Unknown	2	9	9	20	31	29	20	13	10	7	—	155
Data not available	—	—	2	3	—	1	—	1	1	1	—	9
All infants	**31**	**333**	**655**	**702**	**850**	**1,126**	**712**	**633**	**523**	**337**	**181**	**6,083**
						Per cent						
None	13.8	15.0	26.5	43.4	64.0	61.7	62.3	70.3	79.8	87.6	88.6	58.2
Exosurf	31.0	25.2	22.8	18.6	13.7	13.0	14.4	10.1	5.3	2.4	2.3	13.8
Survanta	55.2	59.5	49.5	37.4	21.7	25.1	22.7	19.3	14.9	10.0	9.1	27.5
Other / both	—	0.3	1.1	0.6	0.6	0.2	0.6	0.3	—	—	—	0.5
All infants	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**

Note: 'Not examined' and 'not available' data are excluded from per cent calculations.

Table 35: Exogenous surfactant use by birthweight group, all infants, 1997

Surfactant use	250-499	500-749	750-999	1000-1249	1250-1499	1500-1999	2000-2499	2500-2999	3000-3499	3500-3999	4000+	All infants
						Number						
None	6	73	182	378	525	651	446	399	444	278	148	3,530
Exosurf	2	21	31	54	29	53	37	26	19	11	3	286
Survanta	20	311	361	335	271	319	197	124	93	47	17	2,095
Other / both	—	3	2	4	7	6	5	2	3	4	1	37
Unknown	—	5	11	15	18	14	8	4	7	2	4	88
Data not available	—	—	—	—	—	26	44	40	28	16	14	168
All infants	**28**	**413**	**587**	**786**	**850**	**1069**	**737**	**595**	**594**	**358**	**187**	**6,204**
None	21.4	17.9	31.6	49.1	63.1	63.3	65.1	72.4	79.4	81.8	87.6	59.4
Exosurf	7.1	5.2	5.4	7.0	3.5	5.1	5.4	4.7	3.4	3.3	1.8	4.8
Survanta	71.4	76.2	62.7	43.4	32.6	31.0	28.8	22.5	16.7	13.8	10.1	35.2
Other / both	—	0.7	0.3	0.5	0.8	0.6	0.7	0.4	0.5	1.2	0.6	0.6
All infants	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**

Note: 'Not examined' and 'not available' data are excluded from per cent calculations.

Table 36: Intraventricular haemorrhage by gestational age group, infants born at < 32 weeks' gestation, 1996

Head ultrasound result	20-23	24-27	28-31	Infants < 32 weeks'
		Number		
None	31	548	1,505	2,084
Grade I	5	117	189	311
Grade II	2	63	53	118
Grade III	6	53	33	92
Grade IV	8	66	24	98
Not examined	15	39	127	181
Data not available	—	19	61	80
All infants	**67**	**905**	**1,992**	**2,964**
		Per cent		
None	59.6	64.7	83.4	77.1
Grade I	9.6	13.8	10.5	11.5
Grade II	3.9	7.4	2.9	4.4
Grade III	11.5	6.3	1.8	3.4
Grade IV	15.4	7.8	1.3	3.6
All infants	**100.0**	**100.0**	**100.0**	**100.0**

Note: 'Not examined' and 'not available' data are excluded from per cent calculations.

Table 37: Intraventricular haemorrhage by gestational age group, infants born at < 32 weeks' gestation, 1997

Head ultrasound result	20-23	24-27	28-31	Infants < 32 weeks'
		Number		
None	30	518	1,512	2,060
Grade I	9	125	200	335
Grade II	7	78	39	124
Grade III	9	45	34	88
Grade IV	2	48	21	71
Not examined	13	41	141	195
Data not available	4	29	75	108
All infants	**74**	**883**	**2,022**	**2,979**
		Per cent		
None	52.6	63.7	83.7	77.0
Grade I	15.8	15.3	11.1	12.4
Grade II	12.3	9.6	2.2	4.6
Grade III	15.8	5.5	1.9	3.3
Grade IV	3.5	5.9	1.2	2.7
All infants	**100.0**	**100.0**	**100.0**	**100.0**

Note: 'Not examined' and 'not available' data are excluded from per cent calculations.

Table 38: Intraventricular haemorrhage by birthweight group, infants born at < 1500 g, 1996

Head ultrasound result	250-499	500-749	750-999	1000-1249	1250-1499	Infants < 1500 g
			Number			
None	16	192	434	494	670	1,806
Grade I	3	37	86	94	59	279
Grade II	4	23	29	30	24	110
Grade III	2	20	33	24	9	88
Grade IV	1	27	37	21	3	89
Not examined	5	26	25	24	52	132
Data not available	—	8	11	15	33	67
All infants	**31**	**333**	**655**	**702**	**850**	**2,571**
			Per cent			
None	61.5	64.2	70.1	74.5	87.6	76.1
Grade I	11.5	12.4	13.9	14.2	7.7	11.8
Grade II	15.4	7.7	4.7	4.5	3.1	4.6
Grade III	7.7	6.7	5.3	3.6	1.2	3.7
Grade IV	3.9	9.0	6.0	3.2	0.4	3.8
All infants	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**

Note: 'Not examined' and 'not available' data are excluded from per cent calculations.

Table 39: Intraventricular haemorrhage by birthweight group, all infants, 1997

Head ultrasound result	250-499	500-749	750-999	1000-1249	1250-1499	Infants < 1500 g
			Number			
None	12	225	393	592	622	1,844
Grade I	2	53	81	89	78	303
Grade II	3	35	36	27	17	118
Grade III	2	28	21	18	14	83
Grade IV	1	23	23	14	9	70
Not examined	4	34	18	22	74	152
Data not available	4	15	15	25	36	95
All infants	**28**	**413**	**587**	**786**	**850**	**2,664**
			Per cent			
None	60.0	61.8	70.9	80.1	84.1	76.3
Grade I	10.0	14.6	14.6	11.9	10.5	12.5
Grade II	15.0	9.6	6.5	3.7	2.3	4.9
Grade III	10.0	7.7	3.8	2.4	1.9	3.4
Grade IV	5.0	6.3	4.2	1.9	1.2	2.9
All infants	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**

Note: 'Not examined' and 'not available' data are excluded from per cent calculations.

Table 40: Results of eye examination for ROP for infants born at less than 32 weeks' gestation who were in their registration hospital on day 42, by gestational age group, 1996

Eye examination result	20-23	24-27	28-31	Infants < 32 weeks'
		Number		
No ROP	—	305	597	902
Stage I	5	121	66	192
Stage II	3	130	35	168
Stage III	2	70	14	86
Stage IV	1	3	1	5
Received therapy	*4*	*33*	*8*	*45*
Not examined	3	30	71	104
Data not available	—	15	38	53
Infants in hosp. on day 42	**14**	**674**	**822**	**1,510**
		Per cent		
No ROP	—	48.5	83.7	66.7
Stage I	45.5	19.2	9.3	14.2
Stage II	27.3	20.7	4.9	12.4
Stage III	18.2	11.1	2.0	6.4
Stage IV	9.1	0.5	0.1	0.4
Infants in hosp. on day 42	**100.0**	**100.0**	**100.0**	**100.0**

Notes

1. Indicates worst stage of ROP seen
2. 'Not examined' and 'not available' data are excluded from per cent calculations.

Table 41: Results of eye examination for ROP for infants born at less than 32 weeks' gestation who were in their registration hospital on day 42, by gestational age group, 1997

Eye examination result	20-23	24-27	28-31	Infants < 32 weeks'
		Number		
No ROP	4	274	577	855
Stage I	6	143	70	219
Stage II	3	126	37	166
Stage III	11	61	8	80
Stage IV	1	5	—	6
Received therapy	*10*	*39*	*3*	*52*
Not examined	4	22	82	108
Data not available	—	12	44	56
Infants in hosp. on day 42	**29**	**643**	**818**	**1,490**
		Per cent		
No ROP	16.0	45.0	83.4	64.5
Stage I	24.0	23.5	10.1	16.5
Stage II	12.0	20.7	5.4	12.5
Stage III	44.0	10.0	1.2	6.0
Stage IV	4.0	0.8	—	0.5
Infants in hosp. On day 42	**100.0**	**100.0**	**100.0**	**100.0**

Table 42: Results of eye examination for ROP for infants born at less than 1500 grams who were in their registration hospital on day 42, by birthweight group, 1996

Eye examination result	250-499	500-749	750-999	1000-1249	1250-1499	Infants < 1500 g
			Number			
No ROP	5	64	233	311	208	821
Stage I	1	38	87	41	20	187
Stage II	—	50	87	27	5	169
Stage III	1	35	44	5	2	87
Stage IV	—	1	3	1	—	5
Received therapy	—	*16*	*26*	*2*	*1*	*45*
Not examined	1	12	21	23	35	92
Data not available	—	4	12	14	16	46
Infants in hosp. On day 42	**8**	**204**	**487**	**422**	**286**	**1,407**
			Per cent			
No ROP	71.4	34.0	51.3	80.8	88.5	64.7
Stage I	14.3	20.2	19.2	10.6	8.5	14.7
Stage II	—	26.6	19.2	7.0	2.1	13.3
Stage III	14.3	18.6	9.7	1.3	0.9	6.9
Stage IV	—	0.5	0.7	0.3	—	0.4
Infants in hosp. on day 42	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**

Table 43: Results of eye examination for ROP for infants born at less than 1500 grams who were in their registration hospital on day 42, by birthweight group, 1997

Eye examination result	250-499	500-749	750-999	1000-1249	1250-1499	Infants < 1550 g
			Number			
No ROP	3	81	220	354	209	867
Stage I	—	64	94	47	19	224
Stage II	1	69	59	31	5	165
Stage III	1	39	33	6	1	80
Stage IV	—	3	3	—	—	6
Received therapy	*1*	*28*	*21*	*2*	—	*52*
Not examined	3	13	14	37	46	113
Data not available	—	—	14	28	14	56
Infants in hosp. on day 42	**8**	**269**	**437**	**503**	**294**	**1,511**
			Per cent			
No ROP	60.0	31.6	53.8	80.8	89.3	64.6
Stage I	—	25.0	23.0	10.7	8.1	16.7
Stage II	20.0	27.0	14.4	7.1	2.1	12.3
Stage III	20.0	15.2	8.1	1.4	0.4	6.0
Stage IV	—	1.2	0.7	—	—	0.5
Infants in hosp. on day 42	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**

Table 44: Survival to discharge by gestational age, all infants, 1996

Gestational age (weeks)	All infants admitted	No. with discharge home data	No. with lethal cong malform.	No. alive at 7 days	No. alive at 28 days	No. alive at discharge	Per cent survival at discharge
21	2	2	—	—	—	—	—
22	10	10	—	5	5	4	40.0
23	55	52	1	27	13	10	18.2
24	143	137	1	118	93	84	58.7
25	206	190	3	182	167	151	73.3
26	273	248	2	247	234	226	82.8
27	283	257	2	270	263	254	89.8
28	359	329	2	346	339	331	92.2
29	423	375	5	410	403	400	94.6
30	517	460	2	506	501	501	96.9
31	693	583	5	686	684	678	97.8
32	485	420	6	477	473	472	97.3
33	391	348	7	381	379	377	96.4
34	356	319	2	351	340	339	95.2
35	292	265	4	281	274	274	93.8
36	263	245	6	252	245	244	92.8
37	244	227	7	227	218	217	88.9
38	291	274	14	274	268	262	90.0
39	195	183	12	177	169	165	84.6
40	400	366	17	374	364	362	90.5
41	156	140	4	143	140	140	89.7
42	42	39	2	37	35	35	83.3
43	3	1	—	2	2	2	66.7
44	1	1	—	—	—	—	—
All infants	**6,083**	**5,471**	**104**	**5,773**	**5,609**	**5,528**	**90.9**

Note: Per cent survival to discharge is calculated from 'number alive at discharge' divided by 'all infants admitted' (the number of babies admitted to the level III NICUs). Hence, the survival calculations include those babies with congenital malformations that are considered to have directly contributed to their death. Where babies have been transferred to a peripheral hospital and the date of discharge to home is not available (10.1% of all babies), these babies have been assumed to have survived to go home.

Table 45: Survival to discharge by gestational age, all infants, 1997

Gestational age (weeks)	All infants admitted	No. with discharge home data	No. with lethal cong malform.	No. alive at 7 days	No. alive at 28 days	No. alive at discharge	Per cent survival at discharge
21	—	—	—	—	—	—	—
22	11	11	—	3	2	1	9.09
23	63	59	—	44	35	27	42.9
24	142	136	1	112	96	83	58.5
25	204	180	4	167	156	150	73.5
26	263	246	4	236	228	215	81.8
27	274	248	3	261	255	250	91.6
28	365	312	8	355	344	341	93.4
29	487	418	5	469	462	456	93.6
30	563	493	5	555	550	545	96.8
31	607	530	6	602	599	594	97.9
32	485	393	6	479	476	468	96.5
33	383	335	7	375	372	370	96.6
34	383	353	6	377	373	372	97.1
35	278	252	7	266	264	262	94.2
36	302	282	9	287	280	277	91.7
37	222	203	9	210	206	203	91.4
38	331	298	19	306	297	293	88.5
39	221	201	10	205	199	198	89.6
40	373	339	14	351	336	333	89.3
41	190	163	4	176	174	172	90.5
42	54	50	1	50	47	47	87.0
43	2	2	—	2	2	2	100.0
44	1	1	—	1	1	1	100.0
All infants	**6,204**	**5,505**	**128**	**5,889**	**5,754**	**6,203**	**91.3**

Note: Per cent survival to discharge is calculated from 'number alive at discharge' divided by 'all infants admitted' (the number of babies admitted to the level III NICUs). Hence, the survival calculations include those babies with congenital malformations that are considered to have directly contributed to their death. Where babies have been transferred to a peripheral hospital and the date of discharge to home is not available (10.1% of all babies), these babies have been assumed to have survived to go home.

Table 46: Survival to discharge by birthweight group, all infants, 1996

Birthweight group (grams)	All infants admitted	No. with discharge home data	No. with lethal cong malform.	No. alive at 7 days	No. alive at 28 days	No. alive at discharge	Per cent survival at discharge
250-499	31	30	1	18	9	5	17.9
500-599	89	84	1	59	59	48	49.5
600-699	158	148	1	134	139	122	62.9
700-799	211	201	3	185	198	190	81.2
800-899	259	235	2	242	198	193	86.2
900-999	271	243	5	255	239	233	92.8
1000-1099	257	226	3	245	265	261	96.3
1100-1199	288	254	3	275	302	301	94.7
1200-1299	318	277	0	316	328	324	95.3
1300-1399	332	290	3	325	322	317	95.5
1400-1499	357	312	2	355	360	358	95.7
1500-1999	1,126	981	10	1,104	1,033	1,027	96.1
2000-2499	712	652	18	688	706	702	95.3
2500-2999	633	583	17	598	561	552	92.8
3000-3499	523	485	17	492	547	542	91.3
3500-3999	337	307	14	314	314	312	87.2
4000 +	181	164	4	168	174	173	92.5
All infants	**6,083**	**5,471**	**104**	**5,773**	**5,607**	**5,660**	**91.3**

Notes

1. Per cent survival to discharge is calculated from 'number alive at discharge' divided by 'all infants admitted' (the number of babies admitted to the level III NICUs). Hence, the survival calculations include those babies with congenital malformations that are considered to have directly contributed to their death. Where babies have been transferred to a peripheral hospital and the date of discharge to home is not available (10.1% of all babies), these babies have been assumed to have survived to go home.
2. Data are divided into 100 grams group from 500 grams to 1500 grams, then 500 grams groups.

Table 47: Survival to discharge by birthweight group, all infants, 1997

Birthweight group (grams)	All infants admitted	No. with discharge home data	No. with lethal cong malform.	No. alive at 7 days	No. alive at 28 days	No. alive at discharge	Per cent survival at discharge
250-499	28	26	—	17	9	5	17.9
500-599	97	91	1	70	59	48	49.5
600-699	194	180	3	157	139	122	62.9
700-799	234	213	4	207	198	190	81.2
800-899	224	206	4	203	198	193	86.2
900-999	251	214	3	244	239	233	92.8
1000-1099	272	240	3	267	266	262	96.3
1100-1199	318	269	5	308	303	301	94.7
1200-1299	340	310	4	334	328	324	95.3
1300-1399	332	291	5	325	322	317	95.5
1400-1499	374	329	6	363	360	358	95.7
1500-1999	1,069	912	18	1,044	1,033	1,027	96.1
2000-2499	737	651	17	714	706	702	95.3
2500-2999	595	539	17	572	561	552	92.8
3000-3499	594	547	19	562	547	542	91.3
3500-3999	358	318	16	324	314	312	87.2
4000 +	187	169	3	178	174	173	92.5
All infants	**6,204**	**5,505**	**128**	**5,889**	**5,756**	**5,661**	**91.3**

Notes

1. Per cent survival to discharge is calculated from 'number alive at discharge' divided by 'all infants admitted' (the number of babies admitted to the level III NICUs). Hence, the survival calculations include those babies with congenital malformations that are considered to have directly contributed to their death. Where babies have been transferred to a peripheral hospital and the date of discharge to home is not available (10.1% of all babies), these babies have been assumed to have survived to go home.
2. Data are divided into 100 grams group from 500 grams to 1500 grams, then 500 grams groups.

Table 48: Place transferred to and level of hospital if transferred, by gestational age group, all infants, 1996

Hospital level	20-23	24-27	28-31	32-33	34-36	37-44	All infants
			Number				
Not transferred	60	563	934	407	477	817	3,258
Level 1 or 2 hospital	4	262	956	432	374	344	2,372
Hospital with NICU (level 3)	—	37	67	28	31	71	234
NICU in children's hospital	3	43	35	9	29	100	219
All infants	**67**	**905**	**1,992**	**876**	**911**	**1,332**	**6,083**
			Per cent				
Not transferred	89.6	62.21	46.9	46.5	52.4	61.3	53.6
Level 1 or 2 hospital	5.9	28.9	48.0	49.3	41.1	25.8	39.0
Hospital with NICU (level 3)	—	4.1	3.4	3.2	3.4	5.3	3.9
NICU in children's hospital	4.5	4.8	1.7	1.0	3.2	7.5	3.6
All infants	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**

Notes

1. Where an infant was transferred many times, the level of hospital was recorded for the stay of most significance, or as the level 1 or 2 transfer if this was not apparent. This was to allow computation of stay in level 3 NICUs compared to step-down or level 1 or 2 stay.
2. 'Not transferred' refers to infants who went home from or died in their hospital of registration.

Table 49: Place transferred to and level of hospital if transferred, by gestational age group, all infants, 1997

Hospital level	20-23	24-27	28-31	32-33	34-36	37-44	All infants
			Number				
Not transferred	56	552	914	413	532	868	3,335
Level 1 or 2 hospital	7	257	1,009	411	377	355	2,416
Hospital with NICU (level 3)	—	32	41	21	31	68	193
NICU in children's hospital	11	42	58	23	23	103	260
All infants	**74**	**883**	**2,022**	**868**	**963**	**1,394**	**6,204**
			Per cent				
Not transferred	75.8	62.6	45.2	47.6	55.2	62.3	53.8
Level 1 or 2 hospital	9.5	29.0	49.9	47.4	39.2	25.5	38.9
Hospital with NICU (level 3)	—	3.6	2.0	2.4	3.2	4.9	3.1
NICU in children's hospital	14.9	4.8	2.9	2.7	2.4	7.4	4.2
All infants	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**

Notes

1. Where an infant was transferred many times, the level of hospital was recorded for the stay of most significance, or as the level 1 or 2 transfer if this was not apparent. This was to allow computation of stay in level 3 NICUs compared to step-down or level 1 or 2 stay.
2. 'Not transferred' refers to infants who went home from or died in their hospital of registration.

Table 50: Place transferred to and level of hospital if transferred, by birthweight group, all infants, 1996

Hospital level	250-499	500-749	750-999	1000-1249	1250-1499	1500-1999	2000-2499	2500-2999	3000-3499	3500-3999	4000+	All infants
						Number						
Not transferred	27	237	385	350	403	513	351	356	312	211	113	3228
Level 1 or 2 hospital	3	67	215	311	407	559	322	215	138	87	48	2,372
Hospital with NICU (level 3)	—	13	32	19	29	33	28	21	37	14	8	234
NICU in children's hospital	1	16	23	22	11	21	11	41	36	25	12	219
All infants	**31**	**333**	**655**	**702**	**850**	**1,126**	**712**	**633**	**523**	**337**	**181**	**6,083**
						Per cent						
Not transferred	87.1	71.2	58.8	49.7	47.4	45.6	49.3	56.2	59.7	62.6	62.4	53.3
Level 1 or 2 hospital	9.7	20.1	32.8	44.3	47.9	49.6	45.2	34.0	26.4	25.8	26.5	39.2
Hospital with NICU (level 3)	—	3.9	4.9	2.7	3.4	2.9	3.9	3.3	7.1	4.2	4.4	3.9
NICU in children's hospital	3.2	4.8	3.5	3.1	1.3	1.9	1.5	6.5	6.9	7.4	6.6	3.6
All infants	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**

Notes

1. Where an infant was transferred many times, the level of hospital was recorded for the stay of most significance, or as the level 1 or 2 transfer if this was not apparent. This was to allow computation of stay in level 3 NICUs compared to step-down or level 1 or 2 stay.
2. 'Not transferred' refers to infants who went home from or died in their hospital of registration.

Table 51: Place transferred to and level of hospital if transferred, by birthweight group, all infants, 1997

Hospital level	250-499	500-749	750-999	1000-1249	1250-1499	1500-1999	2000-2499	2500-2999	3000-3499	3500-3999	4000+	All infants
						Number						
Not transferred	23	274	332	398	381	503	379	342	349	226	128	3,335
Level 1 or 2 hospital	3	88	210	345	435	513	318	191	176	95	42	2,416
Hospital with NICU (level 3)	—	16	19	27	10	26	21	26	28	15	5	193
NICU in children's hospital	2	35	26	16	24	27	19	36	41	22	12	260
All infants	**28**	**413**	**587**	**786**	**850**	**1,069**	**737**	**595**	**594**	**358**	**187**	**6,204**
						Per cent						
Not transferred	82.1	66.3	56.6	50.7	44.8	47.1	51.4	57.5	58.8	63.1	68.4	53.8
Level 1 or 2 hospital	10.7	21.3	35.8	43.8	51.2	48.0	43.2	32.1	29.6	26.5	22.5	38.9
Hospital with NICU (level 3)	—	3.9	3.2	3.5	1.2	2.4	2.9	4.4	4.7	4.2	2.7	3.1
NICU in children's hospital	7.2	8.5	4.4	2.0	2.8	2.5	2.6	6.0	6.9	6.2	6.4	4.2
All infants	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**

Note:

1. Where an infant was transferred many times, the level of hospital was recorded for the stay of most significance, or as the level 1 or 2 transfer if this was not apparent. This was to allow computation of stay in level 3 NICUs compared to step-down or level 1 or 2 stay.
2. 'Not transferred' refers to infants who went home from or died in their hospital of registration.

Table 52: Total days until discharge home from hospital by gestational age group, 1996

Days to discharge	20-23	24-27	28-31	32-33	34-36	37-44
Median (days)	128	94	51	32	18	13
Inter quartile range	124–144	81-110	41–64.8	25–40	12–26	9-23
All survivors with discharge data	**11**	**645**	**1,666**	**741**	**775**	**1,081**

Notes

1. Discharge data is available for 4,919 (89.0%) of surviving infants
2. Data are for all infants, regardless of level of hospital at discharge

Table 53: Total days until discharge home from hospital by gestational age group, 1997

Days to discharge	20-23	24-27	28-31	32-33	34-36	37-44
Median (days)	127.5	93	52	31	18	11
Inter quartile range	111-146.3	79-110	41-65	24-40	12-26	7-19
All survivors with discharge data	**24**	**626**	**1,667**	**698**	**835**	**1,112**

Notes

1. Discharge data is available for 4,919 (89.0%) of surviving infants
2. Data are for all infants, regardless of level of hospital at discharge

Table 54: Total days until discharge home from hospital by birthweight group, 1997

Days to discharge	250-499	500-749	750-999	1000-1249	1250-1499	1500-1999	2000-2499	2500-2999	3000-3499	3500-3999	4000+
Median (days)	125	107.5	87.5	64	47	37	23	15	12	12	14
Inter quartile range	107-139	92-127	73-104	53-79	38-57	29-46	16-30	11-24	8-20	8-20	8-23
All survivors with discharge data	**6**	**182**	**504**	**569**	**722**	**944**	**605**	**518**	**435**	**153**	**145**

Notes

1. Discharge data is available for 4,919 (89.0%) of surviving infants
2. Data are for all infants, regardless of level of hospital at discharge

Table 55: Total days until discharge home from hospital by birthweight group, 1997

Days to discharge	250-499	500-749	750-999	1000-1249	1250-1499	1500-1999	2000-2499	2500-2999	3000-3499	3500-3999	4000+
Median (days)	150	107.5	85	62	47	36	21	14	11	11	11
Inter quartile range	—	90-121	73-103	52-75	37-58	28-45	15-29	9-21	7-18	7-19	8-18
All survivors with discharge data	**3**	**238**	**451**	**649**	**715**	**871**	**616**	**496**	**495**	**272**	**130**

Notes

1. Discharge data is available for 4,919 (89.0%) of surviving infants
2. Data are for all infants, regardless of level of hospital at discharge

Appendix 1
Definitions of data items in 1996 and 1997

1.1 Definition format

Definitions at the time of the 1996 and 1997 data collection were in a format similar to the Australian National Data Dictionary. For brevity, only the sections relating to the definition, classification or coding methods used, guide for use any additional comments are presented. The full definitions are available from ANZNN.

1.2 Minimum dataset variables:

Registration hospital:
The first hospital with an Neonatal Intensive Care Unit (NICU) that the baby remains in for longer than four hours.
Classification / coding:
numeric code representing the registration hospital.
Guide for use:
If baby is transferred, she/he is considered to be in the next hospital from the time the transport team arrives to collect her/him. If the baby dies within four hours, she/he is registered to unit where she/he dies.

Maternal age:
Age in completed years of the woman giving birth on the date of her baby's birth.
Classification / coding:
2-digit number representing the number of completed years.

Previous preterm birth:
This mother has had a previous birth that was at less than 37 completed weeks gestation and more than 20 completed weeks, regardless of outcome.
Classification / coding:
0 = no previous preterm birth
1 = yes, there was a previous preterm birth
* = unknown

Previous perinatal death:
This mother has had a previous perinatal loss.
Classification / coding:
0 = no previous perinatal death
1 = yes, has had a previous perinatal death
* = unknown
Guide for use:
A perinatal loss is when an baby with a birthweight of more than 400 grams or a gestational age of > 20 completed weeks died during the first 28 days of life.

Assisted conception in this pregnancy:
The type of infertility treatment used during the conception or used to conceive this pregnancy.
Classification / coding:
0 = *Unknown* - information not available.
1 = *None* - no infertility treatment used for this pregnancy.
2 = *Hyperovulation* - any hormone therapy used to stimulate ovulation.
3 = *IVF / GIFT etc.* - any method of in-vitro fertilisation. Includes in-vitro fertilisation, gamete intra-fallopian transfer, zygote IFT, etc.
4 = *Other* - other infertility treatment not mentioned above, including artificial insemination.
Guide for use:
Disregard any treatment for a previous pregnancy.

Ethnicity of mother:
Ethnic origin of the mother of baby, as identified by the mother.
Classification / coding:
0 = *Unknown* - information not available.
1 = *Aboriginal or Torres Strait Islander* - is a person of Aboriginal or Torres Strait Islander descent who identifies as an Aboriginal or Torres Strait Islander and is accepted as such by the community with which she is associated. i.e. Aboriginality is determined by patient self-identification
2 = Asian - includes all whose ethnic background originates from the countries of Asia, South East Asia & Indian subcontinent. Includes say, Fijian Indian.
3 = *Caucasian* - includes all of Caucasoid heritage, including European, Russian, Middle Eastern, and Arabic.
4 = *Other* - includes African Negroes, American Blacks and Indians, Inuit and Melanesian. There is a separate category for Polynesian.
5 = *Other Polynesian* - all of Polynesian background,
6 = *Maori* - a person of Maori descent who identifies as a Maori

Source of referral::
Source of referral to the NICU where baby is registered.
Classification / coding:
0 = *unknown* - information not available.
1 = *Booked at tertiary obstetric hospital* - Mother booked into a hospital with a NICU and was not transferred during the most recent admission.
2 = *In-utero transfer from obstetric hospital* - Mother transferred during most recent admission, baby in utero.
3 = *Ex-utero retrieval* - Baby retrieved from any other hospital by a specialist neonatal transport retrieval team using appropriate equipment.
4 = *Ex-utero transfer* - Baby transferred from any other hospital, by a non specialist transfer method. This includes transport by ambulance.
5 = *Other* - includes born in transit, not booked.
Guide for use:
Use most recent referral if more than one.

Presenting antenatal problem:
The antenatal complication that the mother presented with, in this pregnancy, that started the train of events that lead to the baby's birth.
Classification / coding:
0 = *Unknown* - presenting problem unknown.
1 = *Preterm pre-labour rupture of membranes (PPROM)* - confirmed spontaneous rupture of membranes occurring prior to the onset of labour, and before 37 completed weeks gestation. Rupture of the membranes is defined as the obvious gush or clear amniotic fluid from the vagina, or (if fluid is available) by differentiation with urine and vaginal secretions[11]
2 = *Preterm labour* - see 'Preterm Labour'.
3 = *Hypertension in Pregnancy* - see 'Hypertension in Pregnancy'.
4 = *Antepartum Haemorrhage* - see 'Antepartum Haemorrhage'.
5 = *Suspected intrauterine growth restriction* - see 'Intra-UterineGrowth Restriction'.
6 = *Fetal distress* - see 'Fetal distress'.
7 = *Other* - see 'Other antenatal complication'.
8 = *None* - No presenting antenatal problem, must be born at term.
Guide for use:
Only one complication to be chosen. If the baby is preterm there must be a presenting problem.

Other antenatal complications:
The presence of any other antenatal complications, in addition to that listed in presenting antenatal problem.
Classification / coding:
0 = no other antenatal complications present
1 = yes other antenatal complications were present
* = unknown

Prolonged rupture of membranes (PROM):
Confirmed spontaneous membrane rupture for more than 24 hours before birth of the baby. Rupture of the membranes is diagnosed by the obvious gush or clear amniotic fluid from the vagina, or (if fluid is available) by differentiation with urine and vaginal secretions[11]
Classification / coding:
0 = no, membranes not ruptured or ruptured < 24 hrs
1 = yes, membranes ruptured for more than 24 hours
* = unknown

Preterm labour (PTL):
The presence of regular painful contractions, leading to progressive effacement and dilatation of the cervix, eventually leading to the birth of the baby [5], and commencing before 37 completed weeks gestation.
Classification / coding:
0 = no, labour did not commence in the preterm period
1 = yes, labour commenced in the preterm period
* = unknown

Hypertension in pregnancy:
Hypertension in pregnancy is defined as a systolic blood pressure ≥ 140 mmHg and / or diastolic blood pressure ≥ 90 mmHg, or rise in systolic blood pressure 25 mmHg and/or rise in diastolic blood pressure ≥ 15 mmHg from blood pressure reading before conception or in the first trimester (confirmed by 2 readings six hours apart) [1].
Classification / coding:
0 = no hypertension in pregnancy detected
1 = yes, hypertension in pregnancy diagnosed
* = unknown

Antepartum haemorrhage (APH):
Significant haemorrhage in the time from 20 weeks gestation to the end of second stage of labour. This excludes a 'show'.
Classification / coding:
0 = no antepartum haemorrhage noted
1 = yes, antepartum haemorrhage
* = unknown

Suspected intrauterine growth restriction (IUGR):

Suspected intrauterine growth restriction of this fetus, a condition of the fetus in which it fails to reach its genetically predetermined full growth potential due to intrinsic or extrinsic factors [14] based on more than one obstetric ultrasound.

Classification / coding:

0 = no intrauterine growth restriction present

1 = yes, suspected intrauterine growth restriction

* = unknown

Fetal distress:

Any 'distress' of this fetus leading to intervention by the obstetric team.

Classification / coding:

0 = no intervention necessary

1 = yes, obstetric intervention required

* = unknown

Other antenatal complication:

Other significant antenatal complication, not specified.

Classification / coding:

0 = no other significant antenatal complication

1 = yes, other significant antenatal complication

* = unknown

Antenatal corticosteroids for fetal lung enhancement:

Corticosteroids given antenatally via any route to the mother at a time likely to enhance fetal lung maturation. Excludes steroids given for other reasons.

Classification / coding:

0 = *Unknown* - information not available.

1 = *None* - corticosteroids not ever given during this pregnancy at a time likely to enhance fetal lung maturation.

2 = *less than 24 hours* - first dose given at < 24 hours prior to this baby's birth.

3 = *Complete* - more than one dose of corticosteroids given, and first dose was given more than 24 hours and less than 8 days before baby's birth.

4 = *more than 7 days* - steroids given > 7 days before the baby's birth.

Guide for use:

If two courses given, and one is fulfils the 'complete' criteria, use 'complete'. If the information of the time of doses given is not available, but two doses are known to have been given appropriately, also use 'complete'.

Plurality:

The total number of births resulting from this pregnancy.

Classification / coding:

0 = *Singleton* - only one baby born.

1 = *Twins* - two babies

2 = *Triplets* - three babies

3 = *Quads* - four babies

4 = *More*! - Quintuplets, sextuplets etc.,

Guide for use:

Plurality of a pregnancy is determined by the number of live births or by the number of fetuses that remain in utero at 20 weeks' gestation and that are subsequently born separately. In multiple pregnancies or, if gestational age is unknown, only live births of any birthweight or gestational age, or fetuses weighing 400 gram or more are taken into account in determining plurality.

Fetuses aborted before 20 completed weeks or fetuses compressed in the placenta at 20 or more weeks are excluded.

Birth order:

The order of each baby of a multiple birth.

Classification / coding:

A single digit numeric field representing the birth order.

0 = singleton.

1 = First of a multiple birth

2 = Second of a multiple birth.

3 = Third of a multiple birth, etc.

Patient identifier (baby):

Patient identifier unique within establishment.

Classification / coding: unspecified, 9 digit label

Date of birth:

Date of birth of the patient.

Classification / coding:

DD / MM / YYYY

Admission date:

The date on which an inpatient or same-day patient commences an episode of care.

Classification / coding:

DD / MM / YYYY

Sex:

The sex of the patient.

Classification / coding:

0 = *Unknown* - information not available.

1 = *Male* -

2 = *Female* -

3 = *Ambiguous* - or indeterminate.

Birthweight:
The first weight of the baby (stillborn or liveborn) obtained after birth (record in grams)
Classification / coding:
4 digit numbered field representing birthweight in grams
Guide for use:
The weight is usually measured to the nearest five grams and obtained within one hour of birth, or shortly after the infant has been admitted.

Gestational age:
The estimated gestational age of the baby in completed weeks as determined by clinical assessment immediately after birth.
Classification / coding:
2 digit numbered field representing the number of completed weeks.
Guide for use:
Derived from clinical assessment. Accurate information on the date of the last menstrual period (LMP) may not be available for every pregnancy. In these circumstances, clinical estimates of gestational age can be obtained during pregnancy or by examination of the baby immediately after birth.

Hospital of birth:
The name of the hospital in which the infant was born.
Classification/coding:
numeric code as for registration hospital.
Guide for use:
Must be coded as when place of birth is "non-tertiary hospital" or "tertiary hospital"

Place of birth:
Place of baby's birth
Classification / coding:
0 = *unknown* - information not available
1 = *Non tertiary hospital* - born in a hospital without a neonatal intensive care nursery .
2 = *Tertiary hospital* - Born in a hospital with a Level 3 neonatal intensive care nursery.
3 = *Home birth* - birth planned for and occurred at home.
4 = *Born before arrival* - baby was born at home (unplanned), or in an ambulance, a car etc.

Presentation at birth:
Presenting part of the fetus (i.e. at lower segment of the uterus) at birth.
Classification / coding:
0 = *Unknown* - information not available, not stated
1 = *Cephalic* - including face and brow
2 = *Breech* - legs or feet were facing the cervix
3 = *Other* - includes transverse.

Mode of birth:
Mode of birth
Classification / coding:
0 = *Unknown* - information not available.
1 = *Vaginal* - Vaginal birth, includes vaginal breech
2 = *Instrument* - vaginal birth using instrument. Includes forceps, rotations, and vacuum extractions.
3 = *Caesarean section in labour* - caesarean performed after the commencement of labour (regular painful contractions, leading to progressive effacement and dilatation of cervix, eventually leading to the birth of the baby). Also known as emergency caesarean section.
4 = *Caesarean section, no labour* - caesarean section performed prior to labour commencing . Also known as elective caesarean section.

Apgar (1 minute):
Numerical score to evaluate the babies condition at 1 minute after birth.
Classification / coding:
2 digit numeric field representing the Apgar scores
Guide for use:
The score is based on the five characteristics of heart rate, respiratory condition, muscle tone, reflexes and colour.

Apgar (5 minute):
Numerical score to evaluate the babies condition at 5 minutes after birth.
Classification / coding:
2 digit numeric field representing the Apgar scores
Guide for use:
as for Apgar (1 minute)

Intubated at resuscitation:
An active measure taken shortly after birth to establish independent respiration and heart rate, or to treat depressed respiratory effort by endotracheal intubation.
Classification / coding:
0 = no, intubation not necessary in labour ward
1 = yes, intubation necessary in labour ward
* = unknown
Guide for use:
This does not include intubation for tracheal aspiration or intubation in the NICU after resuscitation has been completed.

Major congenital malformations:
A structural abnormality (including deformation) was present at birth that was diagnosed prior to discharge to home.
Classification / coding:
0 = no major congenital malformations noted
1 = yes, major congenital malformations noted
* = unknown
Guide for use:
An exclusion list of minor abnormalities is supplied in Appendix A.
Justification:
Required to monitor trends in the reported incidence of congenital malformations, to detect new drug & environmental teratogens, to analyse possible causes in epidemiological studies, & to determine survival rates & utilisation of paediatric services.

Specified congenital malformations:
Specified structural abnormalities (including deformation) that were present at birth that were diagnosed prior to discharge to home.
Classification / coding:
ICD-9-CM
Guide for use:
An exclusion list of minor abnormalities is supplied in Appendix A.

Temperature on admission:
Temperature on admission to Neonatal Intensive Care Unit (NICU) or soonest to admission to registration unit. Use rectal temperature or, if not available, per axillae.
Classification / coding:
3-digit numbered field representing temperature measured in degrees Celsius, correct to 1 decimal place.
Guide for use:
If the baby is transported from a peripheral area by a specialist neonatal retrieval team, admission (for the purpose of this study) is considered to commence when the retrieval team arrive at the baby's bedside. If the baby is more than twelve hours old at admission to the registration unit or when specialist neonatal team arrives (whichever is earlier) write 'M' to denote 'missing'. If an admission temperature is not recorded, write 'M'. If electronic data entry does not allow 'M', then a data set marked as 'complete' with this field marked as missing, will indicate that the data is not available.

Highest appropriate inspired oxygen (FiO_2):
Highest appropriate FiO2, recorded as percentage, between admission to NICU and 12 hours after birth. Appropriate range is when arterial PaO2 or TcPO2 is 50-80 mmHg, or if FiO2 is more than 25%, SaO2 is 88-95%, or if FiO2 is less than 25%, SaO2 is more than 88%.
Classification / coding:
3 digit numbered field representing FiO_2 recorded as a percentage.
Guide for use:
If the baby is transported from a peripheral area by a specialist neonatal retrieval team, data collection (for the purpose of this study) is considered to commence when the retrieval team arrive at the baby's bedside. If the baby is more than 12 hours old at admission to the registration unit or when the specialist neonatal team arrives (whichever is earlier) write 'M' to denote 'missing'. If no appropriate oxygen reading is recorded, write 'M'. If electronic data entry does not allow 'M', then a data set marked as 'complete' with this field marked as missing, will indicate that the data is not available.

Lowest appropriate inspired oxygen (FiO_2):
Lowest appropriate FiO2 recorded as percentage, between admission to NICU and 12 hours after birth. Appropriate range as for 'Highest appropriate inspired oxygen (FiO2)'
Classification / coding:
3 digit numbered field representing FiO_2 recorded as a percentage.
Guide for use:
as for 'highest appropriate inspired oxygen'.

Worst base excess:
Worst base deficit (mmol/l) recorded between admission to NICU and 12 hours after birth.
Classification / coding:
3 digits correct to one decimal place. May have negative values.
Guide for use:
as for 'highest appropriate inspired oxygen'.

Main respiratory diagnosis:
Definition:
Main indication for respiratory support of baby.
Classification/coding:
0 = *Unknown* - information not available
1 = *Normal* - normal lungs. No respiratory disease and no respiratory support.
2 = *Non specific* - any non-specific respiratory distress in term and preterm infants requiring support (combines "TTN" and "immature lung").
3 = *Hyaline membrane disease* (HMD) - increasing respiratory distress or O_2 requirements, or need for ventilator support from the first 6 hours of life with a CXR showing generalised reticulo-granular pattern ± air bronchogram.
4 = *Meconium aspiration* - Respiratory distress presenting from immediately after birth to 12 hours of age. Hypoxia, tachypnoea, gasping respirations, and often signs of underlying asphyxia. CXR: over-expansion of lungs with widespread coarse, fluffy infiltrates[6]
5 = *Pneumonia* - respiratory distress with proven or suspected infection (toxic blood count), and CXR showing persisting opacities.
6 = *Persistent pulmonary hypertension* (PPH) - echocardiac (shunting or clinical evidence (O_2 requirement unexplained by CXR or loud P_2, or differential pre and post ductal $TCPO_2$).
7 = deleted.
8 = *Apnoea* - recurrent pauses in breathing of more than 20 seconds, or for less than 20 seconds and associated with bradycardia or desaturation requiring intervention.
9 = *Congenital abnormality* - Congenital abnormality was the primary reason for respiratory distress, e.g. diaphragmatic hernia (abnormality needs to be listed under congenital malformation field).
10 = *Other* - unspecified other respiratory disease. Specify
11 = *Peri surgical* - indication for respiratory support is surgical intervention. Must have neonatal surgery.
12 = *Newborn encephalopathy* - a syndrome of disturbed neurological function in an infant with difficulties in initiating or maintaining respiration, depression of tone reflexes or consciousness and often with seizures[12a]
Guide for use:
For a diagnosis other than 'normal' the baby must have received some form of respiratory support (supplemental oxygen therapy and / or assisted ventilation for more than four consecutive hours, or died prior to four hours). If more than one diagnosis is possible, use the condition that was most serious. For example, severe HMD requiring surfactant replacement and mechanical ventilation plus later apnoea requiring CPAP would be coded as 'HMD'. However, diaphragmatic hernia with mild HMD would be coded as 'congenital abnormality'.
Effective from: 1/1/94, amended 2/4/95, 1/1/98

Exogenous surfactant:
The dose of any type of exogenous surfactant used to treat this baby.
Classification / coding:
0 = *Unknown* - information not available
1 = *None* - no artificial surfactant ever given to this baby
2 = *Exosurf* - any treatment using "Exosurf"
3 = *Survanta* - any treatment using "Survanta"
4 = *Other* - other artificial surfactant given
Guide for use:
Includes incomplete administration.

Air leak requiring drainage:
The presence of any form of air leak requiring drainage (either transient or continuous drainage). Pulmonary airleaks may include pneumothorax, pulmonary interstitial emphysema, pneumomediastinum, pneumo-pericardium, pneumoperitoneum, and subcutaneous or surgical emphysema[12].
Classification / coding:
0 = no air leak requiring drainage present.
1 = yes, air leak requiring drainage
* = unknown

Days of intermittent positive pressure ventilation (IPPR):
Total number of days of IPPR via an endotracheal tube, at any rate. Four consecutive hours in any one 24 hour period constitutes a day.
Classification / coding:
3 digit numbered field representing IPPR days
Guide for use:
The highest level of assisted ventilation therapy for any 24 hour period is used. For example, if the baby has 8 hours of CPAP, then 5 hours of IPPR, then 11 hours of head box oxygen in any one 24 hour period, this is recorded as one 'IPPR' day.

Days of continuous positive airways pressure (CPAP) :
Total number of days of CPAP via any route. Four consecutive hours in any one 24 hour period constitutes a day.
Classification / coding:
3 digit numbered field representing CPAP days
Guide for use:
as for Days of intermittent positive pressure ventilation

High frequency ventilation:
Assisted mechanical ventilation presented at high frequency (ie where small tidal volumes are presented at frequencies more than or equal to 4Hz) initiated as respiratory support for this baby [7].
Classification/coding:
0 = no high frequency ventilation ever initiated
1 = yes, high frequency ventilation ever initiated
* = unknown

Nitric oxide:
Nitric Oxide (NO) used in any form or dose for respiratory support of the baby.
Classification/coding:
0 = no, nitric oxide therapy never used
1 = yes, nitric oxide therapy used
* = unknown

Extra Corporeal Membrane Oxygenation (ECMO):
An extracorporeal circuit established to divert baby's blood to a membrane lung for oxygenation (ECMO) initiated for the baby3.
Classification/coding:
0 = no, ECMO never initiated
1 = yes, ECMO initiated
* = unknown

Date of final added oxygen therapy:
Date supplemental oxygen (O_2) finally ceased (appropriately).
Classification / coding: DD / MM / YYYY
Guide for use:
Four consecutive hours in any one 24 hour period constitutes a day. Any route of oxygen administration is used. If oxygen is ceased, and then the baby required more supplemental O_2 for the same illness, use final day of all the days that supplemental oxygen was used. However, do not include days of oxygen for subsequent illnesses such as oxygenation after surgery, RSV etc. If the baby never received supplemental oxygen leave blank. If the baby received only say, 5 hours of oxygen on day one, use the date of birth. If the baby received supplemental oxygen after discharge from hospital use the discharge date here.

Home oxygen therapy:
Supplemental oxygen was used by the baby at home after discharge from hospital.
Classification / coding:
0 = no supplemental oxygen used at home
1 = yes, home oxygen therapy
* = unknown
Guide for use:Must have required supplemental oxygen in hospital;date of final added oxygen therapy must be date of discharge to home.

Proven necrotising enterocolitis (NEC):
Diagnosis of necrotising enterocolitis (NEC) is definite.
Classification / coding:
0 = no NEC proven
1 = yes, NEC proven
* = unknown
Guide for use:
Definite NEC includes having at least four of the symptoms listed below, plus a profile consistent with definite NEC as listed below, plus the baby warranted treatment which included nil by mouth and antibiotics. NEC symptoms must include at least one systemic sign (apnoea, bradycardia, temperature instability or lethargy) and one intestinal sign (residuals more than 25% of previous feed on two consecutive occasions, abdominal distension, vomiting or faecal blood) and may also include dilated bowel. A profile consistent with definite NEC includes at least one of the following: abdominal wall cellulitis and palpable abdominal mass, or pneumatosis intestinalis, or portal vein gas, or a persistent dilated loop on serial Xrays, or a surgical or post mortem diagnosis [2].

Number of episodes of proven infection:
The total number of separate episodes of proven bacteria, fungal or viral systemic infections.
Classification / coding:
2 digit number representing the number of episodes of proven infection.
Guide for use:
Systemic sepsis is defined as a clinical picture consistent with sepsis, and either a positive bacterial or fungal culture of blood and/or cerebrospinal fluid, or a positive urine culture by sterile collection only. Infections with coagulase-negative staphylococci, and other potential contaminants, or group streptococcal antigen detected in urine were included only if the baby was considered clinically septic and there was supporting evidence such as raised white cell count or thrombocytopenia Viral infections are proven by culture and/or haematological results consistent with infection. (adapted from [10]).

Neonatal surgery:
Did this baby have major surgery.
Classification / coding:
0 = no
1 = yes
* = unknown

Maximum grade of IVH :
Worst level of intraventricular haemorrhage (IVH) seen on either side by either ultrasound or post mortem examination.
Classification / coding:
0 = *None* - ultrasound / post mortem shows no haemorrhage.
1 = *Grade 1* - subependymal germinal matrix haemorrhage.
2 = *Grade 2* - intraventricular haemorrhage with no ventricular dilatation.
3 = *Grade 3* - intraventricular haemorrhage with ventricle distended with blood.
4 = *Grade 4* - intraparenchymal haemorrhage [13].
5 = *Not examined* - by ultrasound or post mortem.

Date of late head ultrasound:
Date of the worst cerebral ultrasound scan.
Classification / coding:
DD/MM/YYYY

Ventricle size:
Ventricular size at the ultrasound closest to six weeks of age as in above date. Ventricular index (mm) is measured as the furthest lateral extent of each ventricle from midline measured at level of Foramen of Monro[12]
Classification / coding:
0 = *Unknown* - information not available, includes not scanned.
1 = *No dilatation* - ventricle size <= to 97th centile.
2 = *Dilatation* - ventricle size > 97th centile, but ≤ 4 mm > 97th centile.
3 = *Hydrocephalus* - ventricle size > 4 mm larger than 97th centile, or hydrocephalus present that required a shunt or any form of drainage (permanent or transient).

Cerebral cystic formations :
Changes in brain parenchyma seen at the worst scan.
Classification / coding:
0 = *Unknown* - information not available, includes not scanned.
1 = *No cysts* - none seen on ultrasound
2 = *Porencephalic cyst(s)* - Parenchymal lesions corresponding to grade 4 IVH.
3 = *Periventricular leukomalacia* - refers to ischaemic brain injury affecting the periventricular white matter in the boundary zones supplied by terminal branches of the both the centripetal and centrifugal arteries[8].
4 = *Encephaloclastic porencephaly* - relatively late development on cerebral ultrasound scan of extensive dense & cystic lesions involving the periphery of brain.

Eye examination completed:
The examination of the eyes for ROP was completed beyond the period when eye disease likely.
Classification / coding:
0 = no, eye examination not completed
1 = yes, eyes examined beyond period when disease is likely.
* = unknown

Retinopathy of prematurity (ROP):
Worst stage of ROP in either eye prior to going home.
Classification / coding:
0 = *None seen* - no changes seen
1 = *Stage I* - Demarcation line.
2 = *Stage II* - Ridge.
3 = *Stage III* - Ridge with extra-retinal fibrovascular proliferation.
4 = *Stage IV* - Retinal detachment [9].
5 = *Not examined* - no eye examination performed.

Therapy for retinopathy of prematurity:
Any therapy used to treat retinopathy of prematurity i.e. laser or cryotherapy.
Classification / coding:
0 = no therapy for ROP received
1 = yes, therapy given for ROP
* = unknown

Died:
The death of this baby prior to discharge from hospital.
Classification / coding:
0 = no, survived to discharge to home.
1 = yes, died
* = unknown

Date of death:
Date of death of baby if occurred prior to discharge to home.
Classification / coding:
DD/MM/YYYY

Post Mortem:
A post mortem examination was performed.
Classification / coding:
0 = no post mortem performed
1 = yes, a post mortem was performed
* = unknown

Immediate cause of death :

Immediate cause of death
Classification / coding:
unspecified free field
Guide for use:
To be described in morbid anatomical terms

Death due to congenital malformation:

The death of the infant may be directly attributed to the congenital malformation.
Classification/coding:
0 = no
1 = yes, death attributable to congenital malformation.
* = unknown

Transferred to another hospital:

The baby was transferred to another hospital nursery before going home.
Classification / coding:
0 = no, never transferred
1 = yes, transferred
* = unknown

Specify hospital of transfer:

Specify the name of the hospital to which the baby was transferred.
Classification / coding:
unspecified free field
Guide for use:
If the baby is transferred many times, say to another hospital for surgery and then back, or for specialist assessment, and then is transferred to a peripheral hospital, use the latter.

Date of transfer:

Date on which a newborn baby completes an episode of care after birth in the hospital of registration. Formal separation is the administrative process by which a hospital records the completion of treatment and / or care and accommodation of a patient.
Classification / coding:
DD / MM / YYYY
Guide for use:
If the baby is transferred many times, say to another hospital for surgery and then back, or for specialist assessment, and then is transferred to a peripheral hospital, use the latter. Use the most significant date.

Discharge date:

Date on which a same-day patient or an inpatient completes an episode of care.
Classification / coding:
DD / MM / YYYY
Comment: All data collection ceases when the baby is discharged to home.

References:

(1) Australasian Society for the Study of Hypertension in Pregnancy 1993, *Management of hypertensive in pregnancy: executive summary.* Med J Aust 158:700-702.

(2) Australian NEC Project, Queensland Institute of Medical Research.

(3) Bancalari E & Sinclair J 1994, *Mechanical ventilation,* In: Effective care of the newborn, Sinclair JC & Bracken MB, eds, Oxford University Press, Oxford.

(4) Cross JH, Harrison CJ, Preston PR, et al, 1992, *Postnatal encephaloclastic porencephaly - a new lesion?* Arch Dis Child 67:307-311.

(5) Crowther C, Enkin M, Keirse MJNC & Brown I 1989, *Monitoring the progress of labour,* In: Effective care in pregnancy and childbirth, Vol. 2, Chalmers I, Enkin M & Keirse MJNC eds, Oxford University Press, Oxford, 833.

(6) Halliday HL 1992, *Other acute lung disorders,* In: Effective care of the newborn, Sinclair, JC & Bracken MB eds, Oxford University Press, Oxford.

(8) Horbar JD 1992, *Periventricular intra-ventricular haemorrhage,* In Effective Care of the Newborn, Sinclair JC, Bracken MB & Silverman WA eds, Oxford University Press, Oxford 563.

9) International Committee for the Classification of Retinopathy of Prematurity 1984, *An International classification of retinopathy of prematurity,* Pediatrics 74:127-133.

(10) Isaacs D, Barfield CP, Grimwood K, McPhee AJ, Minutillo C & Tudehope DI 1995. *Systemic bacterial and fungal infections in infants in Australian neonatal units.* Australian Study Group for Neonatal Infections. Med J Aust 162:198-201.

(11) Keirse MJNC, Ohlsson A, Treffers PE, Humphrey HH & Kanhai HHH 1989, *Pre-labour rupture of the membranes preterm,* In: Effective care in pregnancy and childbirth, Vol. 1, Chalmers I, Enkin M & Keirse MJNC. eds, Oxford University Press, Oxford, 666-669.

(12) Levene MI 1981, *Measurement of the growth of the lateral ventricles in preterm babies with real-time ultrasound.* Arch Dis Child, 56:900-904.

(13) Papile LA, Burstein J, Burstein R & Koffler H 1978, *Incidence and evolution of subependymal and intraventricular haemorrhage: A study of babies with birth weights less than 1500 gm,* J. Pediatr 92:529-534.

(14) Report of the Health Care Committee Expert Panel on Perinatal Morbidity 1995, *Perinatal Morbidity,* Government Publishing Service, Canberra, 40.

(15) Watts JL 1992, *Retinopathy of Prematurity,* In: Effective Care of the Newborn, Sinclair JC, Bracken MB & Silverman WA eds, Oxford University Press, Oxford, 635.

Appendix 2
Hospitals participating in ANZNN

New South Wales		1996	1997
John Hunter Hospital	Number of livebirths:	3,547	3,536
	Number of beds for newborn infants:	29	29
King George V Hospital	Number of livebirths:	5,019	4,888
	Number of beds for newborn infants:	32	32
Liverpool Health Service	Number of livebirths:	2,870	3,267
	Number of beds for newborn infants:	19	23
Nepean Hospital	Number of livebirths:	2,986	2,868
	Number of beds for newborn infants:	28	28
Royal Alexandra Hospital for Children	Number of livebirths:	*Children's centre*	
	Number of beds for newborn infants:	24	24
Royal Hospital for Women	Number of livebirths:	3,730	3,830
	Number of beds for newborn infants:	34	34
Royal North Shore Hospital	Number of livebirths:	2,422	2,616
	Number of beds for newborn infants:	26	26
Sydney Children's Hospital	Number of livebirths:	*Children's centre*	
	Number of beds for newborn infants:	5	5
Westmead Hospital	Number of livebirths:	4,282	4,260
	Number of beds for newborn infants:	39	39

Victoria			
Mercy Hospital for Women	Number of livebirths:	5,063	4,950
	Number of beds for newborn infants:	54	54
Monash Medical Centre	Number of livebirths:	4,631	4,614
	Number of beds for newborn infants:	44	48
Royal Children's Hospital	Number of livebirths:	*Children's centre*	
	Number of beds for newborn infants:	23	23
Royal Women's Hospital	Number of livebirths:	7,144	6,746
	Number of beds for newborn infants:	58	58

Queensland			
Kirwan Hospital for Women	Number of livebirths:	1,695	1,660
	Number of beds for newborn infants:	25	28
Mater Misericordiae Mother's Hospital	Number of livebirths:	6,968	7,445
	Number of beds for newborn infants:	60	60
Royal Women's Hospital	Number of livebirths:	4,503	4,349
	Number of beds for newborn infants:	60	60

South Australia			
Flinders Medical Centre	Number of livebirths:	2,317	2,518
	Number of beds for newborn infants:	33	33
Women's and Children's Hospital	Number of livebirths:	3,486	3,764
	Number of beds for newborn infants:	49	49

Western Australia

		1996	1997
King Edward Memorial Hospital for Women	Number of livebirths:	5,117	5,080
	Number of beds for newborn infants:	60	60
Princess Margaret Hospital for Children	Number of livebirths:	*Children's centre*	
	Number of beds for newborn infants:	20	20

Tasmania

Royal Hobart Hospital	Number of livebirths:	2,080	2,031
	Number of beds for newborn infants:	19	14

Australian Capital Territory

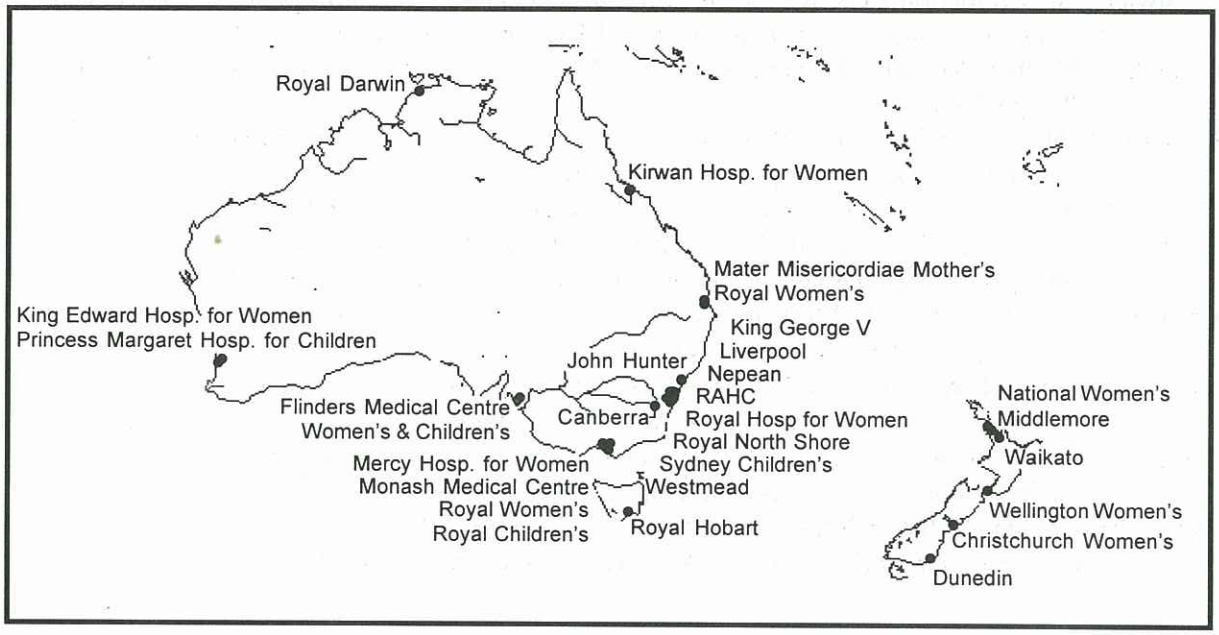
The Canberra Hospital	Number of livebirths:	2,467	2,378
	Number of beds for newborn infants:	24	24

Northern Territory

Royal Darwin Hospital	Number of livebirths:	1,448	1,419
	Number of beds for newborn infants:	18	18

New Zealand

Christchurch Women's Hospital	Number of livebirths:	3,576	3,620
	Number of beds for newborn infants:	26	26
Dunedin Hospital	Number of livebirths:	1,771	1,772
	Number of beds for newborn infants:	16	16
Middlemore Hospital	Number of livebirths:	4,715	5,049
	Number of beds for newborn infants:	20	20
National Women's Hospital	Number of livebirths:	9,283	8,196
	Number of beds for newborn infants:	64	64
Waikato Hospital	Number of livebirths:	3,102	3,368
	Number of beds for newborn infants:	26	26
Wellington Women's Hospital	Number of livebirths:	3,140	3,100
	Number of beds for newborn infants:	26	31



Appendix 3

Publications by staff of the Neonatal Intensive Care Units in Australia & New Zealand

3.1 Journal articles

3.1.1 Articles published in 1996

Anderson N, Wells E, Hay R & Darlow B 1996. *Cerebellar vermis measurement at cranial sonography for assessing gestational age in the newborn weighing less than 2000 grams.* Early Hum Dev. 44: 9-70.

Badawi N, Kurinczuk JJ, Allessandri LM, Burton PR, Pemberton PJ & Stanley FJ 1996. *Maternal thyroid disease in pregnancy and newborn encephalopathy in the term infant.* Paediatr Perinatal Epi 10: A14.

Badawi N, Kurinczuk JJ, Blair E, Keogh J and Stanley F 1996. *Early prediction of the development of microcephaly after hypoxic-ischemic encephalopathy in the full-term newborn.* Pediatrics 97: 151-152.

Ball KT, Gunn TR, Gluckman PD & Power GG 1996. *Suppressive action of endogenous adenarine on ovine fetal non-shivering thermogenesis.* J Appl Physiol. 81: 2393-2398.

Beeby PJ, Bhuta T & Taylor LK 1996. *New South Wales population-based birthweight percentile charts.* J Paediatr Child Health. 32: 512-518.

Beeby P, Chan D & Henderson-Smart D 1996. *Improved outcomes following the introduction of surfactant to an Australian neonatal unit.* J Paediatr Child Health. 32: 257-260.

Bolton DP, Nelson EA, Taylor BJ & Weatherall IL 1996. *Thermal balance in infants.* J Appl Physiol. 80: 2234-2242.

Bonacruz GL, Arnold JD, Leslie GI, Wyndham L & Koumantakis G 1996. *Survey of the definition & screening of neonatal hypoglycaemia in Australia.* J Paediatr Child Health. 32: 299-301.

Bowen JR, Gibson FL, Leslie GI, Arnold JD, Ma PJ & Starte DR 1996. *Predictive value of the Griffiths assessment in extremely low birthweight infants.*J Paediatr Child Health 32: 25-30.

Campbell AJ, Bolton DP, Williams SM & Taylor BJ 1996.*A potential danger of bedclothes covering the face.* Acta Paediatr. 85: 281-284.

Chadwick LM, Pemberton PJ & Kurinczuk JJ 1996. *Neonatal subgaleal haematoma: associated risk factors, complications and outcome.* J Paediatr Child Health. 32: 228-232.

Chan A & McPhee AJ 1996. *Neonatal medicine. A safer leap into this dangerous world.* Lancet. 348 Suppl2: sII12.

Cohen G & Henderson-Smart DJ 1996. *The characteristics and frequency of augmented breaths during CO2-induced hyperpnoea of newborn infants.* J Physiol. 490: 551-557.

Colditz P 1996. *Neurological impairment in ELBW infants* J Paediatr Child Health. 32: 545-546.

Contractor CP, Leslie GI, Bowen JR & Arnold JD 1996. *The Neonatal Neurobiologic Risk Score: does it predict outcome in very premature infants?.* Indian Pediatr. 33: 95-101.

Craig S, Permezel M, Doyle L, Mildenhall L & Garland S 1996. *Perinatal infection with Listeria monocytogenes.* Aust. NZ J Obstet Gynaecol. 36: 286-290.

Daniels L, Gibson R & Simmer K 1996. *Randomised clinical trial of parenteral selenium supplementation in preterm infants.* Arch. Dis. Child Fetal & Neonatal Ed. 74: F158-164.

Dargaville PA, South M & McDougall PN 1996. *Surfactant abnormalities in infants with severe viral bronchiolitis.* Arch. Dis. Child. 75: 133-136.

Davies PS, Clough H, Bishop NJ, Lucas A, Cole JJ & Cole TJ 1996. *Total energy expenditure in small for gestational age infants.* Arch. Dis. Child Fetal Neonatal Ed. 75: F46-48.

Dockerty JD, Cox B, Cockburn MG, Scragg RK, Mitchell EA, Stewart AW, Ford RP, Taylor BJ, Hassall IB, Williams SM & Thompson JM 1996. *Infant room-sharing and prone sleep position in sudden infant death syndrome.* New Zealand Cot Death Study Group. Lancet. 347: 7-12.

Doyle L 1996. *Antenatal phenobarbitone and neonatal outcome.* Lancet. 348: 975-6.

Dockerty JD, Cox B, Cockburn MG, Scragg RK, Mitchell EA, Stewart AW, Ford RP, Taylor BJ, Doyle LW, Davis P, Dharmalingam A & Bowman E 1996. *Assisted ventilation and survival of extremely low birthweight infants.* J Paediatr Child Health. 32: 138-142.

Doyle LW, Ford GW, Olinsky A, Knoches AM & Callanan C 1996. *Passive smoking and respiratory function in very low birthweight children.* Med J Aust 164: 266-269.

Doyle LW, Ford GW, Olinsky A, Knoches AM & Callanan C 1996. *Bronchopulmonary dysplasia and very low birthweight: lung function at 11 years of age.* J Paediatr Child Health. 32: 339-343.

East CE & Colditz PB 1996. *Women's evaluations of their experience with fetal intrapartum oxygen saturation monitoring and participation in a research project.* Midwifery 12:93-7

Elder DE, Bolton DP, Dempster AG, Taylor BJ & Broadbent RS 1996. *Pathophysiology of over-heating in a piglet model: findings compared with sudden infant death syndrome.* J Paediatr Child Health. 32: 113-119.

Elder DE, Hagan R, Evans SF, Benninger HR & French NP 1996. *Recurrent wheezing in very preterm infants.* Arch Dis Child Fetal & Neonatal Ed. 74: F165-171.

Ellyett KM, Broadbent RS, Fawcett ER & Campbell AJ 1996. *Surfactant aerosol treatment of respiratory distress syndrome in the spontaneously breathing premature rabbit.* Pediatr Res. 39: 953-957.

Evans N & Kluckow M 1996. *Early determinants of right and left ventricular output in ventilated preterm infants.* Arch Dis Child Fetal Neonatal Ed. 74: F88-94.

Evans N & Kluckow M 1996. *Early ductal shunting and intraventricular haemorrhage in ventilated preterm infants.* Arch Dis Child Fetal & Neonatal Ed. 75: F183-186.

Ewer AK & Yu VY 1996. *Gastric emptying in pre-term infants: the effect of breast milk fortifier.* Acta Paediatr. 85: 1112-1115.

Fan WQ, Smolich JJ, Wild J, Yu VYH & Walker AM 1996. *Nitric oxide modulates regional blood flow differences in the fetal gastrointestinal tract.* Am. J Physiol (Gastrointest Liver Physiol. 34: G598-G604.

Ferguson JK & Gill A 1996. *Risk-stratified nosocomial infection surveillance in a neonatal intensive care unit: report on 24 months of surveillance.*J Paediatr Child Health 32:525-31

Ferrante A, Carman K, Nandoskar M, McPhee A & Poulos A 1996. *Cord blood neutrophil responses to polyunsaturated fatty acids: effects on degranulation and oxidative respiratory burst.* Biol Neonate. 69: 368-375.

Fitzgerald DA, Van Asperen PP, Lam AH, De Silva M & Henderson-Smart DJ 1996. *Chest radiograph abnormalities in very low birthweight survivors of chronic neonatal lung disease.* J Paediatr Child Health. 32: 491-494.

Ford C, Rendle M, Tracy M, Richardson V & Ford H 1996. *Vitamin B12 levels in human milk during the first nine months of lactation.* Int. J Vitamin Nutrit Res. 66: 329-331.

Ford RP, Hassall IB, Mitchell EA, Scragg R, Taylor BJ, Allen EM & Stewart AW 1996. *Life events, social support and the risk of sudden infant death syndrome.* J Child Psychol Psychiatry Allied Discipl. 37: 835-840.

Ford RP, Schluter PJ, Taylor BJ, Mitchell EA & Scragg R 1996. *Allergy and the risk of sudden infant death syndrome. New Zealand Cot Death Study Group.* Clin Exp Allergy 26: 580-4.

Fraser S, Drew JH & Fraser C 1996. *False negative cytogenic results following amniocentesis.* Aust NZ J Obstet Gynaecol; 36: 149-151.

Fraser SH & Tudehope DI 1996. *Neonatal neutropenia and thrombocytopenia following maternal hypertension.* J Paediatr Child Health. 32: 31-34.

Galland BC, Wehner NS, Bolton DP & Taylor BJ 1996. *Arousal responses of the newborn piglet to airways obstruction and rebreathing during normothermia and hyperthermia.* Reprod Fertility Develop. 8: 365-371.

Gill AW, Warner G & Bull L 1996. *Iatrogenic neonatal hypertrophic cardiomyopathy.* Pediatr Cardiol. 17: 335-339.

Gilles MT, Blair E, Watson L, Badawi N, Alessandri L, Dawes V, Plant AJ and Stanley FJ 1996. *Trauma in pregnancy and cerebral palsy: is there a link?* Med J Aust 164: 500-501.

Gluckman PD, Cutfield W, Harding JE, Milner D, Jensen E, Woodhall S. Gallaher B, Bauer M & Breier BH. *Metabolic consequences of intrauterine growth retardation.* Acta Paediatr Suppl. 417: 3-6.

Gunn AJ & Gunn TR 1996. *Effect of radiant heat on head temperature gradient in term infants.* Arch Dis Child Fetal Neonatal Ed. 74: F200-203.

Gunn AJ, Gunn TR, Rabone DL, Breier BH, Blum WF & Gluckman PD 1996. *Growth hormone increases milk volumes in mothers of preterm infants.* Pediatrics 98: 279-282.

Gunn AJ, Wake M & Cutfield WS 1996. *High and low dose initial thyroxine therapy for congenital hypothyroidism.* J Paediatr Child Health. 32: 242-245.

Gunn TR & Wright IMR 1996. *The use of blue and black cohosh in labour.* NZ Med J 109: 410-411

Hagan R, Benninger H, Chiffings D, Evans S & French N 1996. *Very preterm birth—a regional study. Part 1: Maternal and obstetric factors.* Br J Obstet Gynaecol. 103: 230-238.

Hagan R, Benninger H, Chiffings D, Evans S & French N 1996. *Very preterm birth—a regional study. Part 2: The very preterm infant.* Br J Obstet Gynaecol. 103: 239-245.

Hassall IB, Williams SM & Thompson JM 1996. *Infant room-sharing and prone sleep position in sudden infant death syndrome. New Zealand Cot Death Study Group.* Lancet. 347: 7-12.

Henderson-Smart DJ 1996. *Giving vitamin K to the newborn - a therapeutic dilemma.* Med J Aust 165: 414-415.

Hickling KG, Town IG, Epton M, Neill A, Tie A, Whitehead M, Graham P, Everest E, A'Court G, Darlow B & Laubscher K 1996. *Pressure-limited ventilation with permissive hypercapnia and minimum PEEP in saline-lavaged rabbits allows progressive improvement in oxygenation, but does not avoid ventilator-induced lung injury* Intensive Care Med. 22: 1445-1452.

Ikegami M, Polk DH, Jobe AH, Newnham J, Sly P, Kohan R & Kelly R 1996. *Effect of interval from fetal corticosteriod treatment to delivery on postnatal lung function of preterm lambs.* J Appl Physiol. 80: 591-597.

Inder TE, Darlow BA, Sluis KB, Winterbourn CC, Graham P, Sanderson KJ & Taylor BJ 1996. *The correlation of elevated levels of an index of lipid peroxidation (MDA-TBA) with adverse outcome in the very low birthweight infant.* Acta Paediatric 85: 1116-1122.

Isaacs D, Barfield C, Clothier T, Darlow B, Diplock R, Ehrlich J, Grimwood K, Humphrey I, Jeffery H, Kohan R, McNeil R, McPhee A, Minutillo C, Morey F, Tudehope D & Wong M 1996. *Late-onset infections of infants in neonatal units.* J Paediatr Child Health. 32: 158-161.

Iyer P, McDougall P, Loughnan P, Mee RB, Al-Tawil K & Carlin J 1996. *Accuracy of pulse oximetry in hypothermic neonates and infants undergoing cardiac surgery.* Crit Care Med. 24: 507-511.

Jeffery HE, Henderson-Smart DJ & Hill DA 1996. *Competency-based learning in neonatology.* Med Educ. 30: 440-444.

Jones RF, Kwok BC, Stening WA & Vonau M 1996. *Third ventriculostomy for hydrocephalus associated with spinal dysraphism: indications and contraindications.* Eur J Pediatr Surgery. 6 Suppl 1: 5-6.

Johnston CC & Stevens BJ 1996. *Experience in a neonatal intensive care unit affects pain response.* Pediatrics. 98: 925-930.

Katz I, Godsel P, Bowen J & Wyndham L 1996. *An unusual cause of hyperglycorrhachia.* Annals Clin Biochem. 33: 84-5.

Khan N, Couper J, Goldsworthy W, Aldis J, McPhee A & Couper R 1996. *Relationship of hepatocyte growth factor in human umbilical vein serum to gestational age in normal pregnancies.* Pediatr Res. 39: 386-389.

Kluckow M & Evans N 1996. *Relationship between blood pressure and cardiac output in preterm infants requiring mechanical ventilation.* J Pediatr. 129: 506-512.

Koh TH 1996. *Glucose and the newborn baby: sweet justice?* J Paediatr Child Health. 32: 281-284.

Koh TH 1997. *Simplified way of counseling parents about outcome of extremely premature babies*. Lancet 348: 963.

Koh TH & Vong SK 1996. *Definition of neonatal hypoglycaemia: is there a change?* J Paediatr Child Health. 32: 302-305.

Lee JK & Yu VY 1996. *Calorie intake in sick versus respiratory stable very low birthweight babies.* Acta Paediatr Japonica. 38: 449-454.

Lee TC, Charles BG, Steer PA & Flenady VJ 1996. *Saliva as a valid alternative to serum in monitoring intravenous caffeine treatment for apnea of prematurity.* Therapeutic Drug Monit. 18: 288-293.

Lee TC, Charles BG, Steer PA., Flenady VJ & Grant TC 1996. *Theophylline population pharmaco-kinetics from routine monitoring data in very premature infants with apnoea.* Br J Clin Pharmacol. 41: 191-200.

Levene MI, Wright IMR & Griffiths G 1996. *Is informed consent for neonatal trials an elaborate ritual?* Lancet 347: 475.

Loughnan PM & McDougall PN. *Does intramuscular vitamin K1 act as an unintended depot preparation*? J Paediatr Child Health. 32: 251-254.

Loughnan PM, McDougall PN, Balvin H, Doyle LW & Smith AL 1996. *Late onset haemorrhagic disease in premature infants who received intravenous vitamin K1*. J Paediatr Child Health. 32: 268-269.

Macdonald JM & Leslie GI 1996. *An unusual congenital dorsal midline thoracic mass.* J Paediatr Child Health. 32: 71-72.

McNamee HP, Liley HG & Ingber DE 1996 *Integrin-dependent control of inositol lipid synthesis in vascular endothelial cells and smooth muscle cells.* Exp. Cell Res. 224: 116-122.

Malcolm GA & Henderson-Smart DJ 1996. *The effect of temperature on the ventilatory response to carbon dioxide in the neonatal rat. Pediatr Res.* 40: 504-507.

Mohay H, Hindmarsh G & Rogers Y 1996. *Conducting longitudinal research: first locate your subjects*. Aust. Educ. Dev. Psychol. 13: 74-76.

Narendran V, Gupta G, Todd DA & John E 1996. *Bacterial colonization of indwelling vascular catheters in newborn infants*. J Paediatr Child Health. 32: 391-396.

O'Callaghan MJ, Burns YR, Gray PH, Harvey JM, Mohay H, Rogers YM & Tudehope DI 1996. *School performance of ELBW children:a controlled study.* Dev Med Child Neurol. 38: 917-926.

Oliver MH, Harding JE, Breier BH & Gluckman PD 1996. *Fetal insulin-like growth factor (IGF)-1 and IGF-11 are regulated differently by glucose or insulin in the sheep fetus*. Reprod Fert Develop. 8: 167-172.

Pemberton PJ, Badawi N, Kurinczuk JJ, Keogh JM, Allessandri LM, Burton PR & Stanley FJ 1996. *Encephalopathy in the term infant and maternal thyroid disease.* Prenatal Neonatal Med. 1, supp 1, 178.

Rajadurai VS, Yu VYH, Oates A & Walker AM 1996. *Evaluation of pulse oximetry in preterm infants in the first three days of life.* J. Neonat 3: 21-30.

Rodwell RL, Gray PH, Taylor KM & Minchinton R 1996. *Granulocyte colony stimulating factor treatment for alloimmune neonatal neutropenia.* Arch Dis Child Fetal Neonatal Ed. 75: F57-58.

Sanghvi KP & Tudehope DI 1996. *Neonatal bacterial sepsis in a neonatal intensive care unit: a 5 year analysis*. J Paediatr Child Health. 32: 333-338.

Scott F, Beeby P & Abbott J 1996. *Accuracy of estimated fetal weight below 1,000 g.* Aust. NZ J Obstet Gynaecol. 36: 129-132.

Scott F, Beeby P, Abbott J, Edelman D & Boogert A 1996. *New formula for estimating fetal weight below 1000 g: comparison with existing formulas*. J Ultrasound Med. 15: 669-672.

Scragg RK, Mitchell EA, Stewart AW, Ford RP, Taylor BJ, Hassall IB, Williams SM & Thompson JM 1996. *Infant room-sharing and prone sleep position in sudden infant death syndrome.* New Zealand Cot Death Study Group. Lancet. 347: 7-12.

Simmer K 1996. *A new breast milk supplement for preterm infants.* J Paediatr Child Health 32:233-5

Skelton R & Jeffery HE 1996. *Factors affecting the neonatal response to artificial surfactant*. J Paediatr Child Health. 32: 236-241.

Schmidt B, Davis P, La Point h, Monkman S, Coates G & de Da D. 1996. *Thrombin inhibitors reduce intrapulmonary accumulation of fibrinogen and procoagulant activity of bronchoalveolar lavage fluid during acute lung injury induced by pulmonary overdistention in newborn piglets*. Pediatr Res. 39: 798-804.

Sutton L & Bajuk B 1996. *Postmortem examinations in a statewide audit of neonatal intensive care unit admissions in Australia in 1992. New South Wales Neonatal Intensive Care Unit Study Group*. Acta Paediatr. 85: 865-869.

Tang SF & Miller OI 1996. *Low-dose inhaled nitric oxide for neonates with pulmonary hypertension.* J Paediatr Child Health. 32: 419-423.

Tang SF & Miller OI 1996. *Inhaled nitric oxide during emergency neonatal transportation.* J Paediatr Child Health. 32: 539-541.

Taylor BJ, Williams SM, Mitchell EA & Ford RP 1996. *Symptoms, sweating and reactivity of infants who die of SIDS compared with community controls. New Zealand National Cot Death Study Group*. J Paediatr Child Health. 32: 316-322.

Term PROM Study Group 1996. *Induction of labour compared with expectant management for prelabour rupture of membranes at term.* New Eng J Med 334: 1005-1010.

Tudehope DI & Steer PA 1996. *Which milk for the preterm infant?* J Paediatr Child Health. 32: 275-277.

Victorian Infant Collaborative Study Group: Doyle LW (convenor), Callanan C, Carse E, Charlton MP, Drew J, Ford G, Fraser S, Kelly E, Knoches A, Mc Dougall P, Rickards A, Watkins A, Woods H & Yu V 1996. *Surgery and the tiny baby: Sensorineural outcome at 5 years of age*. J Paediatr Child Health 32: 167-172.

Visva-Lingam S, Jana A, Murray H & John E 1996. *Preterm premature rupture of membranes associated with aplasia cutis congenita and fetus papyraceous.* Aust. NZ J Obstet Gynaecol. 36: 90-91.

Waugh J, O'Callaghan MJ, Tudehope DI, Mohay HA, Burns YR, Gray PH & Rogers YM 1996. *Prevalence and aetiology of neurological impairment in extremely low birthweight infants*. J Paediatr Child Health. 32: 120-124.

Wheatley JM, Stephens FD & Hutson JM 1996. *Prune-belly syndrome: ongoing controversies regarding pathogenesis and management.* Sem. Pediatr Surg. 5: 95-106.

Wilkinson I, Bear J, Smith J, Gill A, Challinor C, Jones W, Shahidullah M & Wooderson S 1996. *Neurological outcome of severe cystic periventricular leukomalacia.* J Paediatr Child Health. 32: 445-449.

Willet KE, Gurrin L, Burton P,. Lanteri CJ, Reese AC, Vij J, Matsumoto I, Jobe AH, Ikegami M, Polk D, Newnham J, Kohan R, Kelly R & Sly PD 1996. *Differing patterns of mechanical response to direct fetal hormone treatment.* Resp Physiol. 103: 271-280.

Williams SM, Mitchell EA, Stewart AW & Taylor BJ 1996. *Temperature and the sudden infant death syndrome.* Paediatr Perinatal Epidemiol. 10: 136-149.

Williams SM, Scragg R, Mitchell EA & Taylor BJ 1996. *Growth and the sudden infant death syndrome.* Acta Paediatr. 85: 1284-1289.

Williams SM, Taylor BJ & Mitchell EA1996. *Sudden infant death syndrome: insulation from bedding and clothing and its effect modifiers. The National Cot Death Study Group.* Int J Epidemiol. 25: 366-375.

Wright IMR 1996. *Periventricular leucomalacia*. Neonatal Monit 14: 9-12.

Yip E, Lee J & Sheehy Y 1996. *Breast-feeding in neonatal intensive care.* J Paediatr Child Health. 32: 296-298.

Yu VYH 1996. *Surfactant therapy in neonatal Respiratory Distress Syndrome.* Iranian J Pediatr 7 (Suppl 1): 5-20.

Yu VYH 1996. *Medical management of patent ductus arteriosus in preterm neonates*. Iranian J Pediatr 7 (Suppl 1): 21-46.

Yu VYH 1996. *Advances in treatment of neonatal persistent pulmonary hypertension*. Iranian J Pediatr 7 (Suppl 1): 47-63.

Yu VYH 1996. *Ethical decision-making in newborn infants*. Internat Tutorials 3: 7-13.

Yu VYH 1996. *Management of birth asphyxia.* Proc. 8th Nepalese Congress of Paediatrics, Kathmandu, Nepalese Paediatr Soc J. 16: 1-20.

Yu VYH 1996. *Quality assurance in perinatal-neonatal medicine.* Proc. 8th Nepalese Congress of Paediatrics, Kathmandu, Nepalese Paediatr Soc J. 16: 31-40.

Yu VYH 1996. *Strategies to improve perinatal health in developing countries.* Pakistan Pediatr J. 20: 155-161.

3.1.2 Articles published in 1997

Anderson NG, Abbott GD, Mogridge N, Allan RB, Maling TM & Wells JE 1997. *Vesicoureteric reflux in the newborn: relationship to fetal renal pelvic diameter.* Pediatr Nephrol. 11(5): 610-616.

Arnold J, Leslie G, Bowen J, Watters S, Kreutzmann D & Silink M 1997. *Longitudinal study of plasma cortisol and 17-hydroxyprogesterone in very-low-birth-weight infants during the first 16 weeks of life.* Biol. Neon. 72: 48-155.

Badawi N, Stanley FJ, Alessandri L, Keogh J, Kurnczuk J, Burton P & Pemberton PJ 1997. *Methodological issues in the aetiological and outcome studies of newborn encephalopathy.* Int J Neurol.

Barr P 1997 *Paediatric grief – an existential view.* Aust Paeditr. Rev. 7: 6-8.

Barcham N, Egan I & Dowd SB 1997. *Radiation protection: Gonadal protection methods in neonatal chest radiography.* Radiologic Technol. 69: 157-161.

Battin M, Kennedy J & Singh S 1997. *A case of plastikophagia.* Postgrad Med J 73: 243-244.

Battin M, Maalouf EF, Counsell SM, Herlihy AM & Edwards AD 1997. *Magnetic resonance imaging in very preterm infants.* Lancet 349: 1741.

Battin M, Maalouf EF, Rutherford MA, Counsell SM, Herlihy AM, Azzopardi D & Edwards AD 1997. *Cerebral magnetic resonance imaging in extremely preterm infant.* Pediatr Res 42: 36A.

Battin M, Williams A, Barker A & Azzopardi D 1997. *Recurrence of neonatal haemochromatosis (NH) in half siblings.* Pediatr Res 42: 73A.

Bhuta T, Kent-Biggs J & Jeffery HE 1997. *Prediction of surfactant dysfunction in term infants by the click test.* Pediatr Pulmonol. 23: 287-291.

Blakelock RT, Harding JE, Kolbe A & Pease PW 1997. *Gastroschisis: can the morbidity be avoided?* Pediatr Surg Internat. 12: 276-282.

Blakelock RT, Upadhyay V, Pease PW & Harding JE 1997. *Are babies with gastroschisis small for gestational age?* Pediatr Surg Internat. 12: 580-582.

Bloomfield FH, Hadden W & Gunn TR 1997. *Lymphatic dysplasia in a neonate with Noonan's syndrome.* Pediatr Radiol. 27: 321-323.

Bloomfield GP & Harding JE 1997. *How many neonates in New Zealand would qualify for extra-corporeal membrane oxygenation?* NZ Med J. 110: 207-209.

Botham SJ, Isaacs D & Henderson-Smart DJ 1997. *Incidence of apnoea and bradycardia in preterm infants following DTPw and Hib immunization: a prospective study.* J Paed & Child Health 33: 418-421.

Bourchier D & Weston PJ 1997. *Randomised trial of dopamine compared with hydrocortisone for the treatment of hypotensive very low birthweight infants* Arch Dis Child Fetal Neonatal Ed. 76: F174-F180.

Bowman ED & Roy RN 1997. *Control of temperature during newborn transport: an old problem with new difficulties.* J Paed & Child Health 33: 398-401.

Braadtvedt G & Mildenhall L 1997. *Insulin requirements and metabolic control in children with diabetes attending a summer camp.* Diabetes Med.143: 258-261.

Burns Y, Gray P & O'Callaghan M 1997. *Bronchopulmonary dysplasia: a comparative study of motor development to two years of age.* Aust. J Physiotherapy. 43:19-25.

Campbell AJ, Taylor BJ & Bolton DP 1997. *Comparison of two methods of determining asphyxial potential of infant bedding.* J Pediatr 130: 245-249.

Charles BG, Preechagoon Y, Lee TC, Steer PA, Flenady VJ & Debuse N 1997. *Population pharmacokinetics of intravenous amoxicillin in very low birth weight infants.* J Pharm Sciences. 86: 1288-1292.

Carmichael K, Burns Y, Gray P & O'Callaghan M 1997. *Neuromotor behavioural assessment of preterm infants at risk for impaired development.* Aust. J Physiotherapy. 43: 101-107.

Cohen G, Malcolm G & Henderson-Smart D 1997. *A comparison of the ventilatory response of sleeping newborn lambs to step and progressive hypoxaemia.* J Physiol. 503: 203-213.

Cohen G, Malcolm G & Henderson-Smart D 1997. *Ventilatory response of the newborn infant to mild hypoxia.* Pediatr Pulmonol. 24: 163-172.

Crowther CA, Hiller JE, Haslam RR & Robinson JS 1997. *Australian Collaborative Trial of Antenatal Thyrotropin-Releasing Hormone: adverse effects at 12-month follow-up. ACTOBAT Study Group* Pediatrics 99: 311-317.

Croxson M, Couper A, Voss L, Groves D & Gunn T 1997. *Vertical transmission of hepatitis C virus in New Zealand.* NZ Med J. 110: 165-167.

Counsell S, Herlihy A, Battin M, Maalouf E, Strehle E & Edwards AD 1997. *A dedicated neonatal magnetic resonance scanner: initial clinical experience. Radiology* 23: 57-58.

Davies MW & Cartwright DW 1997. *Neonatal post extubation atelectasis and routine chest Xrays* J Paed & Child Health 33: A19.

Daniels L, Gibson R & Simmer K 1997. *Selenium status of preterm infants: the effect of postnatal age and method of feeding.* Acta Paediatrica. 86: 281-218.

Dargaville PA, South M & McDougall PN 1997. *Pulmonary surfactant concentration during transition from high frequency oscillation to conventional mechanical ventilation* J Paed & Child Health 33: 517-521.

Darlow BA, Clemett RS, Horwood LJ & Mogridge N 1997. *Prospective study of New Zealand infants with birth weight less than 1500 g and screened for retinopathy of prematurity: visual outcome at age 7-8 years.* Br J Ophthalmol. 81: 935-940.

Darlow BA, Horwood LJ, Mogridge N & Clemett RS 1997. *Prospective study of New Zealand very low birthweight infants: outcome at 7-8 years* J Paed & Child Health 33: 47-51.

Darlow BA, Sluis KB, Inder TE & Winterbourn CC 1997. *Endotracheal suctioning of the neonate: comparison of two methods as a source of mucus material for research.* Pediatr Pulm. 23: 217-221.

Davey J 1997 *Nursing students understanding of aseptic technique.* Int J Nurs Pract 3: 105-110.

Davis SL, Tonkin SL & Gunn TR 1997. *Air entry in infant resuscitation: oral or nasal routes.* J Appl Physiol. 82: 152-155.

DeHaan HH, Gunn AJ, Gunn TR & Gluckman PD 1997. *Perinatal asphyxia? Keep a cool head!* Nederlands Tijdschrift voor Osst Gyn 110: 202-204.

Delatycki MB, Cleary MA, Bankier A, McDougall PN, Ahluwalia JS, Chow CW & Cooke-Yarborough CM 1997. *A maternally transmitted lethal neonatal progeroid syndrome with prominent genitourinary and gastrointestinal features.* J Med Genetics. 34: 520-524.

Denbow ML, Battin MR, Kyle PM, Fogliani R, Johnson PV & Fisk N 1997. *Selective termination by intrahepatic vein alcohol injection of a monochorionic twin pregnancy discordant for fetal abnormality.* Br J Obstet Gynaecol. 104: 626-627.

Dezoete JA, MacArthur BA & Aftimos S 1997. *Developmental outcome at 18 months of children less than 1000 grams.* NZ Med J. 110: 205-207.

Dickinson, JE, Nichols CR and Pemberton PJ 1997 *The rising incidence of gastroschisis in teenage pregnancies.* J Mat-Fetal Med 6: 225-229.

Doyle LW 1997. *Kangaroo mother care.* Lancet 350: 1721-1722.

Doyle LW 1997. *Outcome for tiny babies beyond the nursery.* J Paed & Child Health 33: 96-97.

Drew JH, Guaran RL, Cichello M & Hobbs JB 1997. *Neonatal whole blood hyperviscosity: the important factor influencing later neurologic function is the viscosity and not the polycythemia.* Clin Hemorheol Microcirc. 17: 67-72.

East CE & Colditz PB 1997. *Stability of women's perceptions of fetal intrapartum oximetry.* J Qual Clinical Pract. 17: 27-31.

East CE, Dunster KR, Colditz PB, Nath CE & Earl JW 1997. *Fetal oxygen saturation monitoring in labour: an analysis of 118 cases.* Aust NZ J Obstet Gynaecol. 37: 397-401.

Ford RP, Mitchell EA, Stewart AW, Scragg R& Taylor BJ 1997. *SIDS, illness, and acute medical care. New Zealand Cot Death Study Group.* Arch Dis Child. 77: 54-55.

Gibbons AJ, Bachoo S, Picketts DJ, Aftimos S, Asenbauer B, Bergoffen J, Berry S, Dahl N, Fryer A, Keppler K, Kurosawa J, Lewin M, Masuro M & Higgs D 1997. *Mutations in transcriptional regulator ATRX establish the functional significance of PHD-Like domain.* Nature Genetics 17: 146-148.

Gluckman PD, Cutfield W, Harding JE, Milner D, Jensen E, Woodhall S, Gallaher B, Bauer M & Breier BH 1997. *Metabolic consequences of intrauterine growth retardation.*Acta Paediatr. Suppl. 417: 3-6.

Gluckman PD & Harding JE 1997. *Fetal growth retardation: underlying endocrine mechanisms and postnatal consequences.* Acta Paediatrica. Suppl. 422: 69-72.

Gluckman PD & Harding JE 1997. *The physiology and pathophysiology of intrauterine growth retardation.* Acta Paediatr Scand. 48 Suppl 1: 11-16.

Gray PH, Hurley TM, Rogers YM, O'Callaghan MJ, Tudehope DI, Burns YR, Phty M & Mohay HA 1997. *Survival and neonatal and neurodevelopmental outcome of 24-29 week gestation infants according to primary cause of preterm delivery.* Aust NZ J Obstet Gynaecol. 37: 161-168.

Gultom E, Doyle LW, Davis P, Dharmalingam A & Bowman E 1997. *Changes over time in attitudes to treatment and survival rates for extremely preterm infants (23-27 weeks' gestational age).* Aust NZ J Obstet Gynaecol. 37: 56-58.

Gunn AJ & Gunn TR 1997. *Changes in risk factors for hypoxic-ischaemic seizures in term infants.* Aust NZ J Obstet Gynaecol. 37: 36-39.

Gunn AJ, Gunn TR, de Haan HH, Williams CE & Gluckman PD 1997. *Dramatic neuronal rescue with prolonged selective head cooling after ischaemia in fetal lambs.* J Clin Invest 99: 248-256.

Harding JE 1997. *Nutrition and fetal growth.* J Soc Obstetr Gynaecol Canada. 19: 1393-1397.

Harding JE 1997. *Prior growth rate determine the fetal growth response to acute maternal under-nutrition in fetal sheep of late gestation.* Prenatal Neonatal Med. 2: 300-309.

Harding JE 1997. *Periconceptual nutrition determines the fetal growth responses to acute maternal undernutrition in fetal sheep of late gestation.* Prenatal Neonatal Med. 2: 310-319.

Harding JE, Bauer MK & Kimble RM 1997. *Antenatal therapy for intrauterine growth retardation.* Acta Paediatr Scand. Suppl. 423: 196-200.

Harding JE, Evans PC & Gluckman PD 1997. *Maternal growth hormone treatment increases placental diffusion capacity but not fetal or placental growth in sheep.* Endocrin. 138: 5352-5328.

Harte GJ, Gray PH, Lee TC, Steer PA & Charles BG 1997. *Haemodynamic responses and population pharmacokinetics of midazolam following administration to ventilated, preterm neonates.* J Paed & Child Health 33: 335-338.

Hebbandi SB, Bowen JR, Hipwell GC, Ma PJ, Leslie GI & Arnold JD 1997. *Ocular sequelae in extremely premature infants at 5 years of age.* J Paed & Child Health 33: 339-342.

Herlihy A, Battin M, Maalouf E, Strehle E & Edwards AD 1997. *A dedicated neonatal magnetic resonance scanner: initial clinical experience.* Rad. 23: 57-58.

Inder TE, Clemett RS, Austin NC, Graham P & Darlow BA 1997. *High iron status in very low birth weight infants is associated with an increased risk of retinopathy of prematurity.* J Pediatr 131: 541-544.

Jackson AA, Persaud C, Hall M, Smith S, Evans NJ & Butler N 1997. *Urinary excretion of 5– 2-oxyproline (pyroglutaric acid) during early life in normal and preterm infants.* Arch Dis Child 76: 152-157.

Jankov RP & Roy RN 1997. *Minimal haemolysis in blood co-infused with amino acid and dextrose solutions in vitro.* J Paed & Child Health 33: 250-252.

Kecskes S, Reynolds G & Bennett G 1997. *Survival after gastrointestinal mucormycosis in a neonate.* J Paed & Child Health 33: 356-359.

Kennedy J, Todd DA, Watts J & John E 1997. *Retinopathy of prematurity in infants less than 29 weeks' gestation: 3 1/2 years pre- and post surfactant.* J Pediatr Ophthalmol Strabismus 34: 289-292.

Kimble RM, Harding J & Kolbe A 1997. *Additional congenital anomalies in babies with gut atresia or stenosis: when to investigate, and which investigation.* Pediatr Surgery Inter. 12: 565-570.

Kingo A, Battin M, Phang M & McGillvray A 1997. *A further case of Galloway-Mowat syndrome of abnormal gyral pattern and glomerulopathy.* Am J Med Gen 60: 431.

Koh TH 1997. *Prognosis of babies of less than 28 weeks gestation.* BMJ 314: 1048.

Kondo T, Uhlig T, Pemberton P & Sly PD 1997. *Laser monitoring of chest wall displacement.* Europ Resp J. 10: 1865-1869.

Kumar RK & Yu VY 1997. *Prolonged low-dose indomethacin therapy for patent ductus arteriosus in very low birthweight infants.* J Paed & Child Health 33: 38-41.

Lai PY, Seow WK, Tudehope DI & Rogers Y 1997. *Enamel hypoplasia and dental caries in very-low birthweight children: a case-controlled, longitudinal study.* Pediatr Dentistry. 19: 42-49.

Liang R, Gunn AJ & Gunn TR 1997. *Can preterm twins breast feed successfully*? NZ Med J. 110: 209-212.

Liley HG 1997. *Rescue in inner space:management of Rh haemolytic disease.* J Paediatr 131:340-342.

Lee TC, Charles B, Steer P, Flenady V & Shearman A 1997. *Population pharmacokinetics of intravenous caffeine in neonates with apnea of prematurity.* Clinical Pharmacol Therap. 61: 628-640.

Maalouf E, Battlin M, Counsell SJ, Rutherford MA & Manzur Ay 1997. *Arthrogryposis multiplex congenita and bilateral mid-brain infarction following maternal overdose of coproxamal.* Euro J Paediatr Neurol 5/ 6: 183-186.

McDonnell M & Henderson-Smart DJ 1997. *Delayed umbilical cord clamping in preterm infants: a feasibility study.* J Paed & Child Health 33: 308-310.

McIntyre S, Crowther CA, Hiller JE & McPhee AJ 1997. *Lag times between blood sampling, spinning and plasma glucose estimation.* Aust NZ J Obstet Gynaecol. 37: 286-288.

McMichael JE 1997. *Evaluation of neurodevelopmental outcome in high-risk infants in Australia.* J Paed & Child Health 33: 1-3.

Malpas TJ, Meates J, Horwood J & Darlow BA 1997. *How safe is antenatal transfer between level 3 units?* Aust NZ J Obstet Gynaecol. 37: 258-260.

Malpas T, Liley H, Darlow B, Kempthorne P, Macnab H, Robertson V & Sissons A 1997. *Retrievals from home births.* NZ Med J. 110: 20.

Meyer MP, Latief Z & Hawarth C 1997. *Symptomatic HIV in infancy: Clinical and laboratory markers of infection.* S Afr Med J. 87: 158-162.

Meyer MP 1997. *Anaemia of prematurity: epidemiology, management and costs.* Pharmaco Econ. 12: 438-444.

Mildenhall L, Stewart M, Ahluwalia J & Carlin J 1997. *Methemoglobin levels in premature babies admitted to neonatal intensive care.* Paediatr Res. 41 abstract 971.

Mitchell EA, Tuohy PG, Brunt JM, Thompson JM, Clements MS, Stewart AW, Ford RP & Taylor BJ. 1997.*Risk factors for sudden infant death syndrome following the prevention campaign in New Zealand: a prospective study.* Pediatrics. 100: 835-840.

Newman DG, O'Callaghan MJ, Harvey JM, Tudehope DI, Gray PH, Burns YR & Mohay HA 1997. *Characteristics at four months follow-up of infants born small for gestational age: a controlled study.* Early Hum Develop. 49: 169-181.

Nourse CB & Steer PA 1997. *Perinatal outcome following conservative management of mid-trimester pre-labour rupture of the membranes.* J Paed & Child Health 33: 125-130.

O'Callaghan MJ, Harvey JM, Tudehope DI & Gray PH 1997. *Aetiology and classification of small for gestational age infants.* J Paed & Child Health 33: 213-218.

O'Callaghan MJ & Harvey JM 1997. *Biological predictors and co-morbidity of attention deficit and hyper-activity disorder in extremely low birthweight infants at school.* J Paed & Child Health 33: 491-496.

O'Callaghan MJ, Williams GM, Andersen MJ, Bor W & Najman JM. 1997. *Obstetric and perinatal factors as predictors of child behaviour at 5 years.* J Paed & Child Health 33: 497-503.

Omari TI, Miki K, Davidson G, Fraser R, Haslam R, Goldsworthy W, Bakewell M & Dent J 1997. *Characterisation of relaxation of the lower oesophageal sphincter in healthy premature infants.* Gut. 40: 370-375.

Page M, Jeffery HE, Post EJ & Wood AKW 1997. *The mechanisms underlying pharyngeal fluid clearance in sleeping piglets are profoundly influenced by anaesthesia.* J SIDS 1: 281-393.

Radcliffe M, Meyer MP & Malan AF 1997. *Single-dose benzathine penicillin in infants at risk of congenital syphilis- results of a randomised study.* S Afr Med J.87: 62-65.

Ramsden CA. Pillow JJ. 1997. *High frequency ventilation.* J Paed & Child Health 33: 85-87.

Reid S. 1997. *Targeting handwashing : an educational experience.* Aust Infection Control 2: 22-26.

Reynolds GJ 1997. *Blood glucose monitoring in the newborn.* Arch Dis Child. 77: 157.

Ridings J, Nicholson IC, Goldsworthy W, Haslam R, Roberton DM & Zola H 1997. *Somatic hypermutation of immunoglobulin genes in human neonates.* Clinical Experiment Immunol. 108: 366-374.

Robertson S, Gunn T, Allen B, Chapman C & Becroft D 1997. *Are Melnick-Needles syndrome and oto-palato-digital syndrome type II allelic? Observations in a four-generation kindred.* Am J Med Genet. 71: 341-347.

Robertson S, Tsang B & Aftimos S 1997. *Cerebral infarction in Noonan syndrome.* Am J Med Genet. 71: 111-114.

Schluter PJ, Ford RP, Mitchell EA & Taylor BJ 1997. *Housing and sudden infant death syndrome.* The New Zealand Cot Death Study Group. NZ Med J. 110: 2 43-246.

Schwindt B, Doyle LW & Hutson JM 1997. *Serum levels of mullerian inhibiting substance in preterm and term male neonates* J Urol. 158: 610-612.

Shekhawat PS, Fong LV, Mitvalsky J & Yu VY 1997. *Spectrum of clinical and cardiac dysfunction in bronchopulmonary dysplasia: early prediction of long-term morbidity.* J Perinatol. 17: 95-100.

Shivanana H, Bowen JR, Hipwell G, Ma P, Leslie G & Arnold J 1997. *Ocular sequelae in extremely premature infants at 5 years of age.* J Paed & Child Health. 33: 339-342.

Simmer K, Metcalf R & Daniels L 1997. *The use of breastmilk in a neonatal unit and its relationship to protein and energy intake and growth.* J Paed & Child Health 33: 55-60.

Skinner AM, Battin M, Solimano A, Daaboul J & Kitson HF 1997. *The effect of dexamethasone on physical growth and growth factors in premature infants with bronchopulmonary dysplasia.* Am J Perinatol. 14: 539-546.

Spencer JA, Badawi N, Burton P, Keogh J, Pemberton P & Stanley F 1997. *The intrapartum CTG prior to neonatal encephalopathy at term: a case-control study.* Br J Obstet Gynaecol. 104: 25-28.

Spencer JD, Latt N, Beeby PJ, Collins E, Saunders JB, McCaughan GW & Cossart YE 1997. *Transmission of hepatitis C virus to infants of human immunodeficiency virus-negative intravenous drug-using mothers: rate of infection and assessment of risk factors for transmission.* J Viral Hepatitis. 4: 395-409.

Stanley TV 1997. *A case of kernicterus in New Zealand: a predictable tragedy?* J Paed & Child Health 33: 451-453.

Tobiansky R, Lui K, Dalton DM, Shaw P, Martin H & Isaacs D 1997. *Complications of central venous access devices in children with and without cancer.* J Paed & Child Health 33: 509-514.

Todd DA, Jana A & John E 1997. *Chronic oxygen dependency in infants born at 24-32 weeks' gestation: the role of antenatal and neonatal factors.* J Paed & Child Health 33: 402-407.

Tudehope DI 1997. *Economic evaluation in medicine.* J Paed & Child Health 33: 185-186.

Tudehope DI & Steer PA 1997. *Which milk for the preterm infant.* J Paed & Child Health 32: 275-277.

Uhlig T, Eber E, Devadason S, Pemberton P, Badawi N, LeSouef P & Wildhaber J 1997. *Aerosol delivery to spontaneously breathing neonates: spacer or nebuliser?* Pediatr Asthma, Allergy Immun. 11: 111-117.

Vance JC, Chant DC, Tudehope DI, Gray PH & Hayes AJ 1997. Infants *born to narcotic dependent mothers: physical growth patterns in the first 12 months of life.* J Paed & Child Health 33: 504-508.

Victorian Infant Collaborative Study Group: Doyle LW (convenor), Bowman E, Callanan C, Carse E, Charlton MP, Drew J, Ford G, Fraser S, Halliday J, Hayes M, Kelly E, Mc Dougall P, Rickards A, Watkins A, Woods H & Yu V 1997. *Outcome at 2 years of children 23-27 weeks' gestation born in Victoria in 1991-92.* J Paed & Child Health 33: 161-165.

Victorian Infant Collaborative Study Group: Doyle LW (convenor), Bowman E, Callanan C, Carse E, Charlton MP, Drew J, Ford G, Fraser S, Halliday J, Hayes M, Kelly E, Mc Dougall P, Rickards A, Watkins A, Woods H & Yu V 1997. *Economic outcome for intensive care of infants of birthweight 500-999 g born in Victoria in the post-surfactant era* J Paed & Child Health 33: 202-208.

Victorian Infant Collaborative Study Group: Doyle LW (convenor), Bowman E, Callanan C, Carse E, Charlton MP, Drew J, Ford G, Fraser S, Halliday J, Hayes M, Kelly E, Mc Dougall P, Rickards A, Watkins A, Woods H & Yu V 1997. *Improved outcome into the 1990s for infants of birthweight 500-999g.* Arch Dis Child 77: F91-F94.

Victorian Infant Collaborative Study Group: Doyle LW (convenor), Bowman E, Callanan C, Carse E, Charlton MP, Drew J, Ford G, Fraser S, Halliday J, Hayes M, Kelly E, Mc Dougall P, Rickards A, Watkins A, Woods H & Yu V 1997. *Changing outcome for infants of birth weight 500-999 g born outside level III centres in Victoria.* Aust. NZ J Obstet Gynaecol 37: 253-257.

Watson M 1997. *Neonatal intensive care unit: caring for mothers too.* Lamp 54: 27.

Willis F, Summers J, Minutillo C & Hewitt I 1997. *Indices of renal tubular function in perinatal asphyxia* Arch Dis Child Fetal Neonatal Ed. 77: F57-F60.

Wilson-Davis SL, Tonkin SL & Gunn TR 1997. *Air entry in infant resuscitation: oral or nasal routes?* J Appl Physiol. 82: 152-155.

Yu VYH1997 *Principles and practice of parenteral nutrition in the neonatal period.* Acta Medica Portuguesa 10: 185-196.

Yu VYH 1997. *Ethical decision-making in newborn infants.* Acta Medica Portuguesa 10: 197-204.

Yu VYH 1997. *The Federation of Asia and Oceania Perinatal Societies: Its aims and activities.* Prenatal Neonatal Med 2: 67-68.

Yu VYH 1997. *Breast milk and specialised feeding in preterm infants.* Pakistan Pediatr J 21: 1-6.

Yu VYH 1997. *Surfactant therapy in newborn infants. Its successes and remaining controversies.* Expert Med Opinion 4: 11-17.

3.2 Electronic publications

3.2.1 E articles first published in 1996

Bhuta T & Henderson-Smart D. *High frequency oscillatory ventilation for respiratory distress syndrome (RDS).* (Cochrane Review) In: The Cochrane Library Issue 1, 1999. Oxford: Update Software.

Crowther CA & Henderson-Smart DJ. *Prophylactic prenatal Vitamin K for preterm birth* (Cochrane Review) In: The Cochrane Library Issue 1, 1999. Oxford: Update Software.

Davies MW & Davis PG. *Nebulised racemic epinephrine in newborn infants being extubated* (Cochrane Review) In: The Cochrane Library Issue 1, 1999. Oxford: Update Software.

Davis PG & Henderson-Smart DJ. Nasal *continuous positive airways pressure immediately after extubation for preventing morbidity in preterm infants* (Cochrane Review) In: The Cochrane Library Issue 1, 1999. Oxford: Update Software.

Duley L, Gulmezoglu AM & Henderson-Smart D. *Anticonvulsants for pre-eclampsia* (Cochrane Review) In: The Cochrane Library Issue 1, 1999. Oxford: Update Software.

Henderson-Smart DJ & Davis PG. *Prophylactic methylxanthine for extubation in preterm infants* (Cochrane Review) In: The Cochrane Library Issue 1, 1999. Oxford: Update Software.

Henderson-Smart DJ & Steer P. *Methylxanthine for apnea in preterm infants.* (Cochrane Review) In: The Cochrane Library Issue 1, 1999. Oxford: Update Software.

Henderson-Smart DJ & Steer P. *Doxapram for apnea in preterm infants.* (Cochrane Review) In: The Cochrane Library Issue 1, 1999. Oxford: Update Software.

Henderson-Smart DJ & Steer P. *Doxapram versus methylxanthine for apnea in preterm infants.* (Cochrane Review) In: The Cochrane Library Issue 1, 1999. Oxford: Update Software.

3.2.2 E articles first published in 1997

Bhuta T & Henderson-Smart DJ. *Rescue high frequency oscillatory ventilation versus conventional ventilation for pulmonary dysfunction in preterm infants* (Cochrane Review) In: The Cochrane Library Issue 1, 1999. Oxford: Update Software.

Crowther CA, Alfirevic Z & Haslam RR. *Antenatal thyrotropin-releasing hormone (TRH) prior to preterm delivery* (Cochrane Review) In: The Cochrane Library Issue 1, 1999. Oxford: Update Software.

Crowther CA & Henderson-Smart DJ. *Prophylactic prenatal phenobarbital for preterm birth* (Cochrane Review) In: The Cochrane Library Issue 1, 1999. Oxford: Update Software.

Crowther CA & Henderson-Smart DJ. *Vitamin K prior to preterm birth.* (Cochrane Review) In: The Cochrane Library Issue 1, 1999. Oxford: Update Software.

Davis PG & Henderson-Smart DJ. *The use of dexamethasone to prevent extubation failure in neonates* (Cochrane Review) In: The Cochrane Library Issue 1, 1999. Oxford: Update Software.

Duley L & Henderson-Smart D. *Magnesium sulphate versus diazepam for eclampsia.* (Cochrane Review) In: The Cochrane Library Issue 1, 1999. Oxford: Update Software.

Flenady VJ & Gray PH. *Chest physiotherapy for prevention of morbidity in babies being extubated from mechanical ventilation* (Cochrane Review) In: The Cochrane Library Issue 1, 1999. Oxford: Update Software.

Flenady VJ & Woodgate PG. *Radiant warmers versus incubators for regulating body temperature in newborn infants* (Cochrane Review) In: The Cochrane Library Issue 1, 1999. Oxford: Update Software.

Henderson-Smart DJ & Davis PG. *Prophylactic methylxanthine for extubation in preterm infants* (Cochrane Review) In: The Cochrane Library Issue 1, 1999. Oxford: Update Software.

Henderson-Smart DJ & Osborn DA. *Kinesthetic stimulation for preventing apnea in preterm infants* (Cochrane Review) In: The Cochrane Library Issue 1, 1999. Oxford: Update Software.

Henderson-Smart DJ & Steer P. *Postoperative caffeine for preventing apnea in preterm infants* (Cochrane Review) In: The Cochrane Library Issue 1, 1999. Oxford: Update Software.

Henderson-Smart DJ Subramanian P & Davis PG. *Continous positive airway pressure versus theothylline for apnea in preterm infants. (Cochrane* Review) In: The Cochrane Library Issue 1, 1999. Oxford: Update Software.

3.3 Chapters

3.3.1 Chapters published in 1996

Adamson S, Badawi N, Alessandri L, Burton P, Pemberton PJ & Stanley FJ 1996. *Encephalopathy in term infants.* In: Year book of neonatal and perinatal medicine. Mosby-Year Book, Inc 175-176.

Adamson S, Badawi N, Alessandri L, Burton P, Pemberton PJ & Stanley FJ 1996. *Encephalopathy in term infants.* In: Year book of pediatrics (the "work"), Mosby-Year Book, Inc 30-35.

Adamson S, Badawi N, Alessandri L, Burton P, Pemberton PJ & Stanley FJ 1996. *Encephalopathy in term infants.* In: Focus and opinion: Pediatrics, Mosby-Year Book, Inc.

Doyle LW 1996. *Cost evaluation of intensive care for extremely tiny babies.* Seminars Neonat 1: 289-97.

Gluckman PD, Harding JE, Johnston BM, Milner RD, Oliver M, Woodall S, Bauer M, Breier B, Bassett N, Cutfield W, Hofman P, Kimble R, Evans P & Jensen E 1996. *The endocrine mechanism of fetal growth retardation and its postnatal consequences. Genetic versus environmental determination of human behaviour and health.* Nobel Forum, Karolinska Institute, Stockholm 35-37.

Gunn TR (Associate Ed) 1996. *Thermoregulation.* In: Pediatrics and perinatology: The scientific basis. Gluckman PD & Heymann MA (eds). Edward Arnold, Hodder & Stoughton Ltd 577-592.

Jeffery HE 1996. *Perinatal group B streptococcal infection. A significant public health problem.* In: Seminars Neonat. 1: 77-89.

Ling EWY & Yu VYH 1996. *Ethical problems in neonatal intensive care.* In: Textbook of neonatal medicine. Yu VYH, Feng ZK, Tsang RC, Yeung CY (eds), Hong Kong: Hong Kong University Press 847-855.

Ng PK & Yu VYH 1996. *Perinatal-neonatal audit.* In: Textbook of neonatal medicine. Yu VYH, Feng ZK, Tsang RC, Yeung CY (eds), Hong Kong: Hong Kong University Press 33-41.

Whitelaw A & Yu VYH 1996. *Ethics of selective non-treatment in extremely tiny babies.* In: Seminars Neonat. 1: 297-304.

Yu VYH 1996. *Perinatal management of hypertensive disorders of pregnancy from a neonatologist's perspective.* In: Increasingly safe and successful pregnancies focus: EPH Gestosis. Yabes-Almirante C & de Luna MB (eds), Amsterdam: Elsevier Science BV 239-245.

Yu VYH 1996. *Neonatal consequences of hypertensive disorders of pregnancy.* In: Increasingly safe and successful pregnancies focus: EPH Gestosis. Yabes-Almirante C & de Luna MB (eds), Amsterdam: Elsevier Science BV 295-299.

Yu VYH 1996. *Feeding the preterm infant.* In: Textbook of neonatal medicine. Yu VYH, Feng ZK, Tsang RC & Yeung CY (eds), Hong Kong: Hong Kong University Press 215-223.

Yu VYH 1996. *Parenteral nutrition.* In: Textbook of neonatal medicine. Yu VYH, Feng ZK, Tsang RC & Yeung CY (eds), Hong Kong: Hong Kong University Press 235-242.

Yu VYH 1996. *Persistent pulmonary hypertension.* In: Textbook of neonatal medicine. Yu VYH, Feng ZK, Tsang RC & Yeung CY (eds), Hong Kong: Hong Kong University Press 355-362.

Yu VYH 1996. *Outcome of low birthweight infants.* In: Textbook of neonatal medicine. Yu VYH, Feng ZK, Tsang RC & Yeung CY (eds), Hong Kong: Hong Kong University Press 829-837.

Yu VYH 1996. *Resource allocation in perinatal-neonatal medicine.* In: Relevance and excellence in perinatal care. Tambyraja RJ & Ho NK (eds), Bologna: Monduzzi Editore 155-160.

Yu VYH 1996. *Meeting the nutritional needs of high-risk newborn infants.* In: Relevance and excellence in perinatal care. Tambyraja RJ & Ho NK (eds), Bologna: Monduzzi Editore 283-288.

Yu VYH, Carse EA & Charlton MP 1996. *Outcome of infants born at less than 26 weeks gestation.* In: Current topics in neonatal care. McIntosh N & Hansen T (eds), Philadelphia: WB Saunders 67-84.

Yu VYH & Doyle LW 1996. *Survival and disabilities in extremely tiny babies.* Seminars Neonat 1: 257-265.

Yu VYH & Feng ZK 1996. *Perinatal asphyxia.* In: Textbook of neonatal medicine. Yu VYH, Feng ZK, Tsang RC & Yeung CY (eds), Hong Kong: Hong Kong University Press 125-134.

Yu VYH & Gan TE 1996. *Red blood cell transfusion in the preterm infant.* In: Textbook of neonatal medicine. Yu VYH, Feng ZK, Tsang RC & Yeung CY (eds), Hong Kong: Hong Kong University Press 545-550.

Yu VYH & Jin HZ 1996. *Prevention of respiratory distress syndrome.* In: Textbook of neonatal medicine. Yu VYH, Feng ZK, Tsang RC & Yeung CY (eds), Hong Kong: Hong Kong University Press. 255-263.

Yu VYH & Kao LC 1996. *Chronic lung disease.* In: Textbook of neonatal medicine. Yu VYH, Feng ZK, Tsang RC & Yeung CY (eds), Hong Kong: Hong Kong University Press. 309-317.

Yu VYH & Ng PC 1996. *Necrotising enterocolitis.* In: Textbook of neonatal medicine. Yu VYH, Feng ZK, Tsang RC & Yeung CY (eds), Hong Kong: Hong Kong University Press 437-449.

Yu VYH & Yu RJ 1996. *Hypoxic-ischaemic encephalopathy.* In: Textbook of neonatal medicine. Yu VYH, Feng ZK, Tsang RC & Yeung CY (eds), Hong Kong: Hong Kong University Press 579-588.

3.3.2 Chapters published in 1997

Badawi N, Kurinceuk JJ, Hall D, Field D, Pemberton PJ & Stanley FJ 1997. *Newborn encephalopathy in term infants: three approaches to population-based investigation.* In: Seminars Neonat. 2: 181-188.

Charlton M, Carse E, Bawden K, Hayes M, Yu V. 1997. *The education support needs of extremely low birthweight teenagers.* Melbourne: Proc Int School Psychol 20th Annual Colloquium, 46-48.

Evans NJ 1997. *Echocardiograph assessment of the newborn infants with suspected persistent pulmonary hypertension.* In: Seminars Neonat. 2: 37:48.

Harding JE 1997. *The newborn infant.* In: Introduction to Obstetrics & Gynaecology 2nd edition. Farquar C & Jamieson M (eds) Auckland: Dept Obstetrics & Gynaecology , University of Auckland.

Henderson-Smart DJ & Crowther CA 1997. *The Cochrane databases of randomised controlled trials and systematic reviews in pregnancy, childbirth and neonatal care.* In: Seminars Perinat. 2: 211-210.

Roy RN 1997. *Training and educational needs in neonatal transport.* In: Manual of neonatal transport. Nisar A & Mir (eds).

Sutton L 1997. Population-based data on full-term neonates with severe morbidity.In: Seminars Neonat. 2: 189-193.

Yu VYH 1997. *The survival of the weakest: The right to live or the right to die in the neonatal intensive care unit.* In: Advances in Neonatology. Szcapy J & Twarowskiej I (eds), Poznan: Polish Neonatology Society, 13-23.

Yu VYH 1997. *Early onset EPH gestosis: Strategies to improve neonatal outcome.* In: Recent Advances on the Pathophysiology of Pregnancy. Nakabayashi M & Araki T (eds), Tokyo: Organization Gestosis 343-349.

Yu VYH. 1997. *Improving outcome in infants born extremely preterm.* New Delhi: Proc 13th All India Congress of Indian Society of Perinatology and Reproductive Biology, 65-69.

Yu VYH 1997. *Perinatal management of hypertension in pregnancy.* New Delhi: Proc 13th All India Congress of Indian Society of Perinatology and Reproductive Biology, 87-91.

Yu VYH 1997. *Australian micropremies: 1977 to present.* Ross Special Conference "Hot Topics '97 in Neonatology," Washington DC, 338-350.

Yu VYH 1997. *Perinatal mortality and morbidity audit.* Kathmandu: Proc 1st Nat. Conference of Perinatal Society of Nepal & 3rd Workshop of Federation of Asia Oceania Perinatal Soc,1-11

Yu VYH. 1997. *Strategic planning for improvement of perinatal health in developing countries.* Kathmandu: Proc 1st National Conference of Perinatal Society of Nepal and 3rd Workshop of Federation of Asia Oceania Perinatal Soc, 35-46.

4.4 Books

4.4.1 Books published in 1996

Yu VYH (ed) 1996. *The extremely tiny baby.* London: WB Saunders ISSN 1084 2756.

Yu VYH, Feng ZK, Tsang RC & Yeung CY (eds) 1996. *Textbook of neonatal medicine.* Hong Kong: Hong Kong University Press ISBN 962 209 417 1.

4.4.2 Books published in 1997

Yu VYH & Monintja HE 1997. *Selected Topics in Neonatal Intensive Care.* Jakarta: University of Indonesia Press.

Appendix 4
Aims, objectives and guidelines

4.1 Aim

The aim of the Australian & New Zealand Neonatal Network (ANZNN) is 'to improve the care of high-risk newborn infants and their families in Australia and New Zealand through collaborative audit and research'. *As revised at the ANZNN Advisory Committee Meeting, Auckland, NZ, 2 April 1995.*

4.2 Objectives

The objectives of the Australian & New Zealand Neonatal Network (ANZNN) are

1. To provide a core data set that will:
   - i Identify trends and variations in morbidity or mortality warranting further study.
   - ii Enhance the ability to carry out multicentre studies and randomised controlled trials.
   - iii Provide information on neonatal outcomes adjusted for case mix and disease severity to participating neonatal units to assist with quality improvement.
2. Monitor the use of new technologies eg surfactant usage by patient type and outcome.
3. Develop and evaluate a clinical risk score for babies in Australian and New Zealand neonatal units (mortality and morbidity).
4. Develop and assess clinical indicators for perinatal care through neonatal outcomes.

As revised at the ANZNN Advisory Committee Meeting, Auckland, NZ, 2 April 1995.

4.3 Confidentiality guidelines

Confidentiality guidelines were devised and agreed to by the Advisory Committee to provide an unambiguous framework for the handing of data that met the strict criteria of governing bodies. These guidelines are set out in full below.

Confidentiality guidelines for the collection, processing, and analysis of data from the national minimum data set of the Australian & New Zealand Neonatal Network.

As revised at the ANZNN Advisory Committee Meeting, Auckland, NZ, 2 April 1995.

The purpose of these guidelines is to set out the principles under which the National Minimum Data set (NMD) for Neonatal Intensive Care Units is formulated and the conditions that apply to the use of these data and release to parties internal and external to the Australian & New Zealand Neonatal Network (ANZNN). As the ANZNN is part of the AIHW National Perinatal Statistics Unit, it is bound by Australian Institute of Health and Welfare Act, and thus confidentiality of any information covering another person must be upheld. The Act also allows for the data provider to place conditions on the use, release and publication of information.

The essential purpose of the NMD is to provide national unit record data on babies meeting specified criteria who have been admitted to Neonatal Intensive Care Units (NICU), or affiliated nurseries, in Australia and New Zealand. In general, this will be achieved through distribution of an annual report containing summary tables without identifying characteristics, either of a personal, institutional or State / Territory / national nature. In certain other instances, data may be provided internally in the following manner:

- as de-identified summary tables not provided in the annual report, but available upon request;
- as de-identified unit record data for analytical purposes as approved by the ANZNN; and
- as identifiable summary and / or unit record data for clinical audit purposes by the respective NICU providing the data.

These guidelines will cover the collection and provision of the data retrospectively from 1 January 1994.

A Principles of ownership and maintenance of the data

1. The ANZNN will be responsible for collection and maintenance of the data set and decision-making with respect to its use, under the auspices of the AIHW National Perinatal Statistics Unit.
2. The Custodians of the data will be the ANZNN Coordinators, David Henderson-Smart at King George V Hospital, Sydney, Paul Lancaster at the AIHW National Perinatal Statistics Unit, University of New South Wales, and Brian Darlow at the Christchurch School of Medicine, Christchurch, New Zealand. All queries related to the NMD should be referred to a Custodian, who will address them personally or refer them to the appropriate source person.

B Conditions for collection of the data

It is expected that all participating NICUs will collect an agreed-upon minimum set of data in a standardised format. Data entry on to hard-copy data forms or into an electronic data form will be performed at the respective NICU. The Clinical Reporting System (CRS) data management system is being used for data processing and all data sent to the coordinating centre will be in the form of CRS data files, as ASCII data, or on appropriate forms.

C Conditions for use and release of the data

1. Use of the data would entail agreement by the Advisory Committee (Directors, or their nominee, of each contributing NICU) and the Coordinators (David Henderson-Smart, Paul Lancaster and Brian Darlow).
2. Data will not be published or supplied with any patient identifying information.
3. Data will not be published or supplied with any NICU or State / Territory / nation identifying information without the written approval of all the NICU Directors of the State / Territory or nation concerned.
4. External requests for a hard copy of patient de-identified data will be made in writing to the data custodians. Any requests for data that could potentially identify a unit or State / Territory / nation will be referred to the Advisory Committee.

   External requests for patient de-identified data on computer disk will be made in writing to the data custodians, and then referred to the Advisory Committee.

   Requests in writing must be in the form of a one page research proposal. A confidentiality agreement must be signed by the person(s) requesting data prior to the release of the data.
5. Publication of data in any form must be endorsed in writing by seventy-five percent (75%) of the Advisory Committee prior to the material being submitted for publication. The mechanism for this will be by prior notification and then endorsement at an Advisory Committee meeting, or by faxing each committee member.

   All published data must acknowledge the ANZNN Advisory Committee and Coordinators.
6. Data will be released annually in a report provided free to each participating Director. This report will summarise the pooled, de-identified data. This report will be distributed widely after the majority of the Advisory Committee agree on content and form.

   Data will also be released to each Director in electronic form with their own unit data identified, and the rest of the data completely de-identified.

D Conditions for security of the data

Patient-identifiable data should not leave the site of the ANZNN. The electronic version of this data will be maintained on a single central computer protected by password. All hard copy patient identifiable data and electronic backup files will be kept in locked cabinets. Master lists of code material will be kept in a separate locked area.

All rooms and offices used by ANZNN are locked when not in use. Filing cabinets containing data are locked when not in use. Computerised data are protected by passwords known only to each person who has access to computerised data. Security disposal of data is available through use of designated bags or a shredding machine.