

2011

REPORT OF THE
**AUSTRALIAN AND
NEW ZEALAND
NEONATAL NETWORK**



UNSW
AUSTRALIA

ANZNN

2011

REPORT OF THE AUSTRALIAN AND NEW ZEALAND NEONATAL NETWORK

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Acknowledgements

This is the sixteenth report of the Australian and New Zealand Neonatal Network (ANZNN) and the fourth report in the new format. The ANZNN has endeavoured to retain the information provided in previous reports to allow comparative reporting over time. Details of the current format can be found under 'Structure of this report'.

The number of Australian level II units continues to increase with a total of nine units contributing data for this report, with more units joining the ANZNN the number will continue to rise.

We would like to acknowledge all the units involved in the provision of data for this report. The ANZNN appreciates the contribution of all participating units and we thank them for their ongoing support together with our data managers for their hard work and attention to detail.

The ANZNN greatly values the time, effort and expertise of the members of the ANZNN Advisory Committee and their conceptual, intellectual and financial contributions, all of which have helped make this network a respected and world-recognised organisation.

We thank the following members of the ANZNN Executive: Ross Haslam (Chairperson), Kaye Bawden, Roland Broadbent, David Cartwright, Jenny Corban, Brian Darlow, Nick Evans, Kei Lui, Shelley Reid, Karen Simmer, Elizabeth Sullivan, Kenneth Tan and William Tarnow-Mordi for their commitment and guidance for all the activities of the ANZNN. Particular thanks to the ANZNN Data Collection Operation Committee, namely Kei Lui (Chairperson), Jo Brooks, Ian Callander, David Cartwright, Deborah Donoghue, Lex Doyle, Lisa Hilder, Peter Marshall and Elizabeth Sullivan.

We thank QHealth (Australia) and Douglas Pharmaceuticals (New Zealand) for their ongoing support and for helping us to achieve our aims. We also thank the Leslie Stevens Fund for Newborn Care, Sydney Children's Hospital Foundation for infrastructure support (2008 to 2010), as well as the Royal Hospital for Women Foundation for funding development of the data validation program. We acknowledge our colleagues from the Perinatal & Reproductive Epidemiology Research Unit for their continued technical support and encouragement.

Structure of this report

- Chapter 1:** This chapter presents the structure and organisation of the ANZNN together with some historical information related to its establishment. Also included is information on funding, selection criteria as well as a brief synopsis of level III registrants in Australia and New Zealand for 2011.
- Chapter 2:** ‘Babies registered to level III units’ provides information and characteristics on the ANZNN registrants in 2011 who are either born in a hospital with a level III unit or who are born elsewhere and then transferred to a level III unit within the first 28 days of life.
- Chapter 3:** ‘Mothers of level III registrants’ provides information on the mothers of level III registrants registered to the ANZNN in 2011.
- Chapter 4:** ‘Characteristics of level III registrants’ provides information about the babies admitted to a level III neonatal unit during 2011.
- Chapter 5:** ‘Babies registered to level II units’ provides information about babies registered to the level II special care baby units during 2011.
- Appendices:** Appendix 1 presents 10-year trends
Appendix 2 presents data tables by birthweight for 2011
Appendix 3 presents the methods employed for this report
Appendix 4 contains confidentiality guidelines, and conditions for data collection, use and security
Appendix 5 presents the Minimum Data Set for the ANZNN.

Abbreviations

| | |
|----------------|--|
| ABS | Australian Bureau of Statistics |
| ANZNN | Australian and New Zealand Neonatal Network |
| APH | antepartum haemorrhage |
| CI | confidence interval |
| CLD | chronic lung disease |
| CPAP | continuous positive airways pressure |
| CRIB | Clinical Risk Index for Babies |
| ECMO | extracorporeal membrane oxygenation |
| g | gram |
| GIFT | gamete intra-fallopian transfer |
| HFOV | high frequency oscillatory ventilation |
| HMD | hyaline membrane disease |
| ICD-10-AM | The International Statistics Classification of Diseases and Related Health Problems, Tenth Revision, Australian Modification |
| IPPV | intermittent positive pressure ventilation |
| IQR | interquartile range |
| IUGR | intrauterine growth restriction |
| IVF | <i>in vitro</i> fertilisation |
| IVH | intraventricular haemorrhage |
| LOS | length of stay |
| NEC | necrotising enterocolitis |
| NHFT | nasal high flow therapy |
| HFNC | high flow nasal cannulae |
| NHMRC | National Health and Medical Research Council |
| NICU | neonatal intensive care unit |
| NO | nitric oxide |
| O ₂ | oxygen – normal air is 21% oxygen |
| PMA | post menstrual age (completed weeks) |
| PPROM | preterm pre-labour rupture of membranes |
| PRERU | Perinatal & Reproductive Epidemiology Research Unit |
| PVL | periventricular leukomalacia |
| RD | respiratory distress |
| RDS | respiratory distress syndrome |
| ROM | rupture of membranes |
| ROP | retinopathy of prematurity |
| UNSW | University of New South Wales |
| WHO | World Health Organization |

Participating units and supporting staff

Level III nurseries:

Australia

New South Wales

Children's Hospital at Westmead

(Nursery beds: 23)

Nadia Badawi (Director), Rob Halliday, Karen Walker, Caroline Karskens

John Hunter Hospital

(Nursery beds: 41)

Paul Craven (Director), Chris Wake, Lynne Cruden, Alissa Argomand

Liverpool Health Service

(Nursery beds: 31)

Jacqueline Stack (Acting Director), Robert Guaran, Ian Callander, Kathryn Medlin, Sara Wilson, Kaye Marcin

Nepean Hospital

(Nursery beds: 35)

Vijay Shingde (Acting Director), Lyn Downe, Mee Fong Chin

Royal Hospital for Women

(Nursery beds: 44)

Kei Lui (Director), Diane Cameron

Royal North Shore Hospital

(Nursery beds: 25)

Mary Paradisis (Director), Jennifer Bowen, Martin Kluckow, Sara Sedgley, Claire Jacobs

RPA Women and Babies

(Nursery beds: 34)

Nick Evans (Director), Shelley Reid, David Osborn (Clinical Director)

Sydney Children's Hospital

(Nursery beds: 4)

Andrew Numa (Director), Janelle Young

Westmead Hospital

(Nursery beds: 39)

Mark Tracy (Director), Jane Baird

Neonatal Intensive Care Units' (NICUS) Data Collection

(New South Wales and Australian Capital Territory)

Barbara Bajuk, Sara Sedgley, Mark Leckie

Australian Capital Territory

The Canberra Hospital

(Nursery beds: 24)

Zsuzsoka Kecskes (Director), Alison Kent, Lyn Barnes

Victoria

Mercy Hospital for Women

(Nursery beds: 58)

Andrew Watkins (Director), Jim Holberton, Julie Keng

Monash Medical Centre

(Nursery beds: 52)

Andrew Ramsden (Director), Elizabeth Carse (Acting Director), Kenneth Tan, Kaye Bawden, Rose Li

Royal Children's Hospital

(Nursery beds: 24)

Rod Hunt (Director), Jo Brooks

Royal Women's Hospital

(Nursery beds: 52)

Carl Kuschel (Director), Caroline Collis, Lex Doyle (Professor of Neonatology), Sheryle Rogerson, Esther Wong

Tasmania

Royal Hobart Hospital

(Nursery beds: 26)

Peter Dargaville (Director), Karen Butterley

Queensland

Mater Mothers' Hospital

(Nursery beds: 79)

David Knight (Director), Peter Gray, Chrissy Harbridge, Judith Zenchysen

Royal Brisbane and Women's Hospital

(Nursery beds: 71)

David Cartwright (Director), Paul Colditz (Professor of Perinatal Medicine), Tim Donovan

The Townsville Hospital

(Nursery beds: 32)

Guan Koh (Director), Gary Alcock, Jenny Binney, Cherie Boniface

South Australia

Flinders Medical Centre

(Nursery beds: 35)

Peter Marshall (Director), Rebecca Davis

Women's and Children's Hospital

(Nursery beds: 49)

Chad Andersen (Director), Ross Haslam, Andy McPhee, Ann Fitzgerald, Cindy Golding

Western Australia

King Edward Memorial and Princess Margaret Hospitals

(Nursery beds: 105)

Karen Simmer (Director and Professor of Neonatal Medicine), Annette Butler, Noel French, Rolland Kohan, Shripada Rao, Andy Gill, Jane Pillow, John McTigue

Northern Territory

Royal Darwin Hospital

(Nursery beds: 18)

Charles Kilburn (Director), Alan Ruben, Gurmeet Singh, Margaret Stewart

Newborn emergency transport services

NSW Newborn & Paediatric Emergency Transport Service

Andrew Berry (Director)

Newborn Emergency Transport Service (Victoria)

Michael Stewart (Director)

Western Australia Neonatal Transport Service

Steven Resnick

New Zealand

Christchurch Women's Hospital

(Nursery beds: 38)

Nicola Austin (Director), Brian Darlow (Professor of Paediatrics), Nina Mogridge

Dunedin Hospital

(Nursery beds: 16)

Roland Broadbent (Director), Carole Chettleburgh, Frances McCaffrey

Middlemore Hospital

(Nursery beds: 30)

Lindsay Mildenhall (Director), Maisie Wong

National Women's Health (at Auckland City Hospital)

(Nursery beds: 46)

Malcolm Battin (Director), Coila Bevan

Waikato Hospital

(Nursery beds: 41)

David Bouchier (Director), Phil Weston, Deborah Harris, Arun Nair

Wellington Women's Hospital

(Nursery beds: 40)

Vaughan Richardson (Director), Dawn Elder, Keith Fisher, Michael Hewson

Level II nurseries:

Australia

New South Wales

Blacktown Hospital

(Nursery beds: 24)

Heather Coughtrey (Director), Kavita Bhola, Anjali Dhawan, Debbie Green, Therese Freeman

Campbelltown Hospital

(Nursery beds: 15)

Raymond Chin (Director), Melissa Cooke

Gosford District Hospital

(Nursery beds: 25)

John Erikson (Director), Adam Buckmaster, Kerry Field

St George Hospital

(Nursery beds: 8)

Bob Fonseca (Director), Helen Giles

Wollongong Hospital

(Nursery beds: 20)

Allan James (Director), Susie Piper, Sylvia Lees

Queensland

Cairns Base Hospital

(Nursery beds: 22)

Ross Messer (Director), Sue McMahon

Gold Coast Hospital

(Nursery beds: 22)

Timothy Hong (Director), John Hyland

Mackay Base Hospital

(Nursery beds: 4)

Michael Williams (Director), Kerry Topping

Tasmania

Launceston General Hospital

(Nursery beds: 12)

Chris Bailey (Director), Jennifer James, Robyn Morey, Frances McCarroll, Christine Coker

Northern Territory

Alice Springs Hospital

(Nursery beds: 8)

Rose Fahy, Marion Bates

New Zealand

Gisborne Hospital

(Nursery beds: 6)

Heinrich Stander (Director), Graeme Lear, Barbara Reid

Hawkes Bay Hospital

(Nursery beds: 12)

Jenny Corban (Director), Kay Hodson

Lower Hutt Hospital

(Nursery beds: 12)

Robyn Shaw (Director), Debbie Bashaw, Anne Mitchell

Nelson Hospital

(Nursery beds: 10)

Peter McIlroy (Director), Nathalie Robinson, Maureen Higgs

North Shore Hospital

(Nursery beds: 12)

Jutta van den Boom (Director), Diane Chesney

Palmerston North Hospital

(Nursery beds: 17)

Jeff Brown (Director), Amy Hinder

Rotorua Hospital

(Nursery beds: 10)

Stephen Bradley (Director), Jacquie Koberstein, Gaye France

Southland Hospital

(Nursery beds: 6)

Ian Shaw (Director), Paul Tomlinson

Taranaki Base Hospital

(Nursery beds: 8)

John Doran (Director)

Tauranga Hospital

(Nursery beds: 10)

Hugh Lees (Director), Heather McAlley

Timaru Hospital

(Nursery beds: 3)

Philip Morrison (Director), Bid Esler, Mark Liddy

Wairau Hospital

(Nursery beds: 4)

David Bond (Director)

Wanganui Hospital

(Nursery beds: 4)

David Montgomery (Director), Barbara Hammond

Whakatane Hospital

(Nursery beds: 5)

Chris Moyes (Director), Margret Norris, Lee Willetts

Whangarei Area Hospital

(Nursery beds: 8)

Ransford Addo (Director), Janine Whale, Lynne Clarke

Waitakere Hospital

(Nursery beds: 12)

Jutta van den Boom (Director), Janis Stockman

ANZNN Program and Secretariat**Perinatal & Reproductive Epidemiology
Research Unit (PRERU)**

Elizabeth Sullivan (Director), Sharon Chow, Vicki Gallimore, Sadia Hossain, Lisa Hilder

1. Organisation of the ANZNN

History

A prospective audit commenced in 1994 with all level III units in Australia and New Zealand contributing data on babies from 1 January 1995. Level II units in New Zealand joined in 1998, followed by one level II unit in Tasmania, Australia in 1999. Level II units within Australia continue to join with a total of nine units contributing data in 2011.

Purpose of this report

The purpose of the *Report of the Australian and New Zealand Neonatal Network* is 'to improve the care of high-risk newborn infants and their families in Australia and New Zealand through collaborative audit and research'.

This is achieved through:

- providing a core data set that will:
 - provide information on neonatal outcomes, adjusted for case mix and disease severity, to participating neonatal units to assist with quality improvement
 - identify trends and variations in morbidity or mortality
 - assist with the identification of areas of priority for research
 - enhance the ability to carry out multicentre studies and randomised controlled trials through collaboration
- monitoring the clinical indicators for perinatal care and improving clinical practice while maintaining national standards of evidence-based care
- monitoring the use of new technologies, e.g. high flow/oxygen air usage by patient type and outcome
- consistency in national data collections.

Structure of the ANZNN

The ANZNN is located in the Perinatal & Reproductive Epidemiology Research Unit (PRERU) within the University of New South Wales (UNSW). The arrangement is outlined in the memorandum of understanding (MOU) between ANZNN and UNSW.

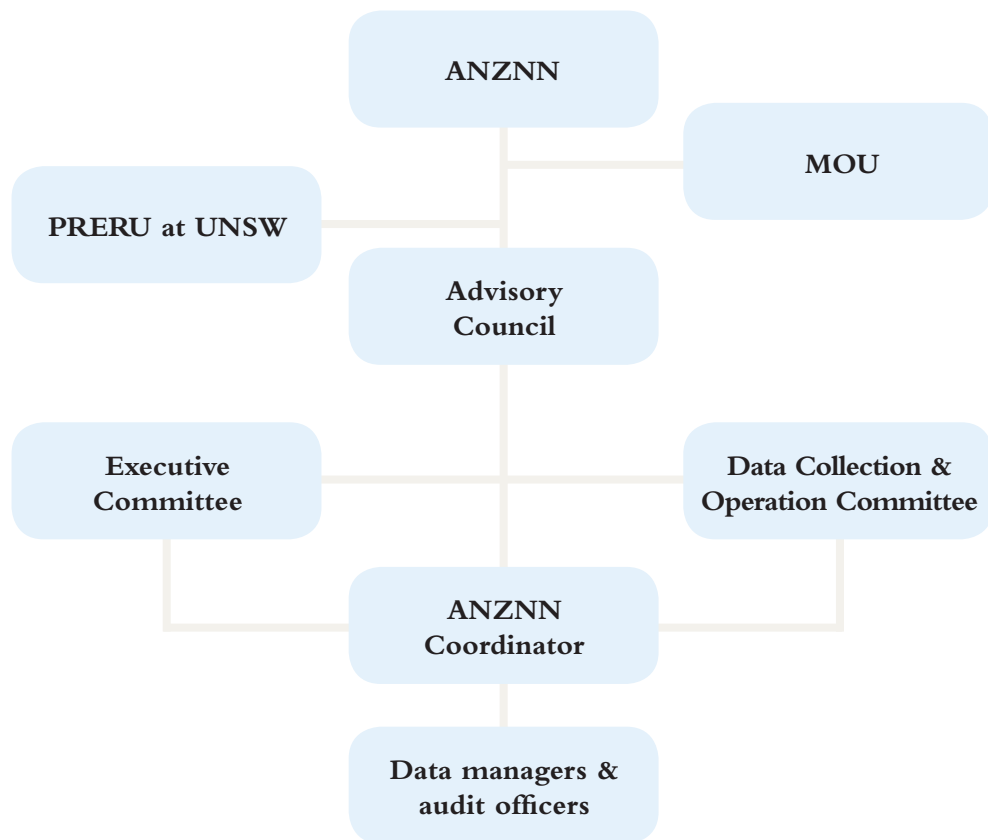
The governance structure of the ANZNN (refer to Figure 1) consists of the Advisory Council (formerly Advisory Committee), the Data Collection and Operations Committee and the Executive Committee (formerly Management Committee). The Advisory Council is the governing body of ANZNN and includes the directors (or their nominee) of each participating unit, the academic neonatologists and neonatal nurses in the region. The Director of PRERU, who is the data custodian for ANZNN, is also a member of the Advisory Council. The purpose of the Advisory Council is to monitor the progress of ANZNN, discuss current issues and agree on new variables for inclusion in the minimum data set and to approve the use of the data for research.

The Data Collection and Operation Committee coordinates the operations of the ANZNN data collection, monitors the workload and progress of the annual report and reports to both the Executive Committee and Advisory Council.

The Executive Committee is an elected committee that has representation from directors, data managers and nurses from across the network and is concerned with the general functioning of the network, finance and decision-making.

The data managers and audit officers are responsible for the collection and submission of data for ANZNN. The ANZNN coordinator is the point of contact for ANZNN and liaises with ANZNN committees, PRERU, data managers and audit officers.

FIGURE 1: Schematic flow chart of ANZNN



Registration criteria

Babies who meet one or more of the following criteria are eligible for registration with the audit:

- born at less than 32 weeks gestation, or
- weighed less than 1,500 grams at birth, or
- received assisted ventilation (mechanical ventilation) including intermittent positive pressure ventilation (IPPV) or continuous positive airways pressure (CPAP) or high flow for four or more consecutive hours, or died while receiving mechanical ventilation prior to four hours of age, or
- received major surgery (surgery that involved opening a body cavity), or
- received therapeutic hypothermia.

Babies who were discharged home and readmitted to a neonatal intensive care unit (NICU) during their neonatal period were not eligible for registration in the ANZNN audit. The hospital of registration was the first level III NICU in which the baby, aged less than 28 days, stayed for four or more hours. Babies who received their entire care in a level II hospital or who were not transferred to a level III NICU during the first 28 days were registered to the first level II centre that they remained in for four or more hours.

Funding support

Currently the major share of funding is from annual contributions received from level III units. The contribution was a voluntary and unanimous decision made by the unit directors. In return individual units receive a feedback report that enables them to benchmark their unit against the combined ANZNN data set.

QHealth (Australia) and Douglas Pharmaceuticals (New Zealand) make an annual contribution and the ANZNN thanks them for their generosity and support. The ANZNN also thanks the Leslie Stevens Fund for Newborn Care, Sydney Children's Hospital Foundation for infrastructure support (2008 to 2010), as well as the Royal Hospital for Women Foundation for funding development of the data validation program.

Data set variables

The variables used for the 2011 audit are listed in Appendix 5 and are also available on the website **<www.preru.unsw.edu.au/ANZNN>**.

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Babies born in Australia

There were 7,412 babies registered to the ANZNN from 22 level III NICUs in Australia, representing 2.5% of notified live births in 2011 (Australian Bureau of Statistics 2011). Of these registrants, 77.0% were born in a hospital with tertiary care facilities. There were 3,006 babies born before 32 weeks gestation representing 40.6% of Australian registrants.

Maternal ethnicity was provided for 95.1% of mothers: 75.0% of the mothers of these babies identified as Caucasian and 9.5% as Asian. Over one in twenty mothers (6.1%) identified as Aboriginal or Torres Strait Islander compared to 4.3% of all births in Australia in 2011 (Australian Bureau of Statistics 2011).

Among Australian NICU admissions registered to the ANZNN, 1,506 were from multiple births representing 20.3% of ANZNN admissions in Australia in 2011.

Male babies were over-represented among NICU admissions – 57.4% of the Australian ANZNN registrants, compared with 51.4% among live births in Australia (Australian Bureau of Statistics 2011).

Assisted ventilation was provided for 6,855 babies (2.3% of live births) and continuous positive airways pressure (CPAP) was the only form of respiratory assistance for 3,251 babies.

Babies born in New Zealand

There were 1,770 babies who met ANZNN registration criteria from six level III NICUs in New Zealand representing 2.9% of the 61,403 live births registered in New Zealand in 2011 (Statistics New Zealand 2011). Of these registrants, 90.2% were born in a hospital with tertiary care facilities. There were 530 babies born before 32 weeks gestation representing 29.9% of New Zealand registrants.

The ethnicity of the mother was reported for 98.3% of the New Zealand registrants. The percentage of Caucasian mothers in the ANZNN cohort was 54.7%. A higher proportion of mothers identified themselves as Maori (18.5%) compared to 11.6% of mothers identified as Pacific Islander and 9.3% as Asian.

Among New Zealand NICU admissions registered to the ANZNN, 264 were from multiple births representing 14.9% of ANZNN admissions in New Zealand in 2011.

Male babies were also over-represented among NICU admissions in New Zealand – 59.0% of the New Zealand registrants compared to 51.3% of total live births in New Zealand (Statistics New Zealand 2011).

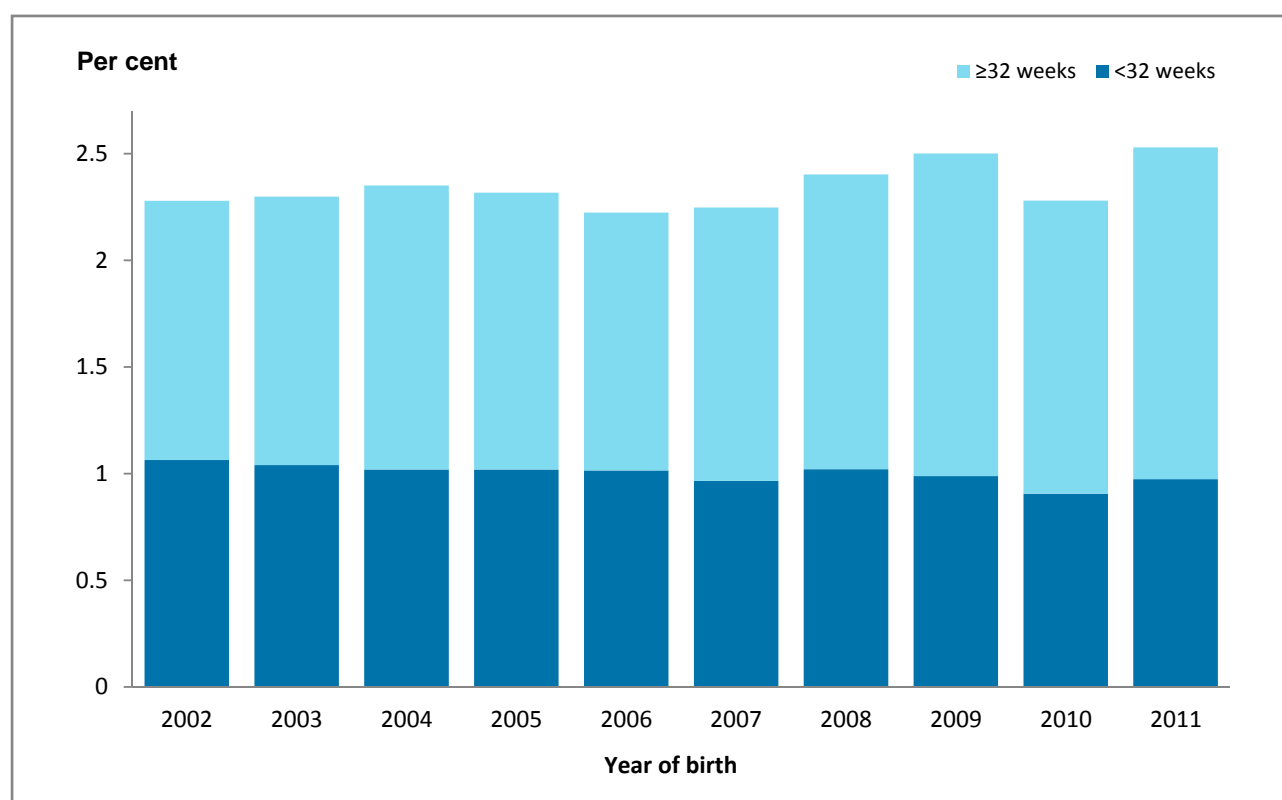
Assisted ventilation was given to 1,701 babies representing 2.8% of all live births with 1,153 babies receiving CPAP as the only form of respiratory assistance (1.9% of all live births).

2. Babies registered to level III units

This section includes data on the ANZNN registrants from 28 of the level III NICUs in Australia and New Zealand. Registrants also include babies born in other hospitals and transferred to a level III NICU within the first 28 days of life.

Of the babies admitted to an NICU in Australia and New Zealand in 2011, 9,182 fulfilled the registration criteria for inclusion in the ANZNN audit. The population represents 2.5% of the 363,020 live births in the two countries in 2011 (Australian Bureau of Statistics 2011; Statistics New Zealand 2011) (Figure 2) illustrating an increase of 946 registrants (2.3% of all live births) from 2010. It should be noted that data on the ANZNN registrants from two level III NICUs were unable to be included in the 2010 report.

FIGURE 2: Babies registered to ANZNN audit of level III units each year as a percentage of liveborn babies in Australia and New Zealand 2002-2011



Note: Data on the ANZNN registrants from two level III NICUs were not included in 2010.

There were 3,536 (38.5 %) babies born before 32 weeks gestation and 5,646 babies born at 32 weeks or more (61.5%). Of the registrants born before 32 weeks gestation 93.2% received assisted ventilation. The major indication for assisted ventilation in this age group was hyaline membrane disease.

The largest level III NICU in Australia and New Zealand registered just over 1,000 babies in 2011, the smallest less than 50 (Figure 3). The median number of babies registered to an ANZNN unit was 286.

The gestational age group at birth and birthweight for babies qualifying for inclusion in the ANZNN 2011 level III audit is set out in Tables 1 and 2 respectively. The 10-year trend (2002–2011) in gestational age at birth is presented in Figure 10 in Appendix 1.

FIGURE 3: Number of level III registrants born at each neonatal intensive care unit, 2011

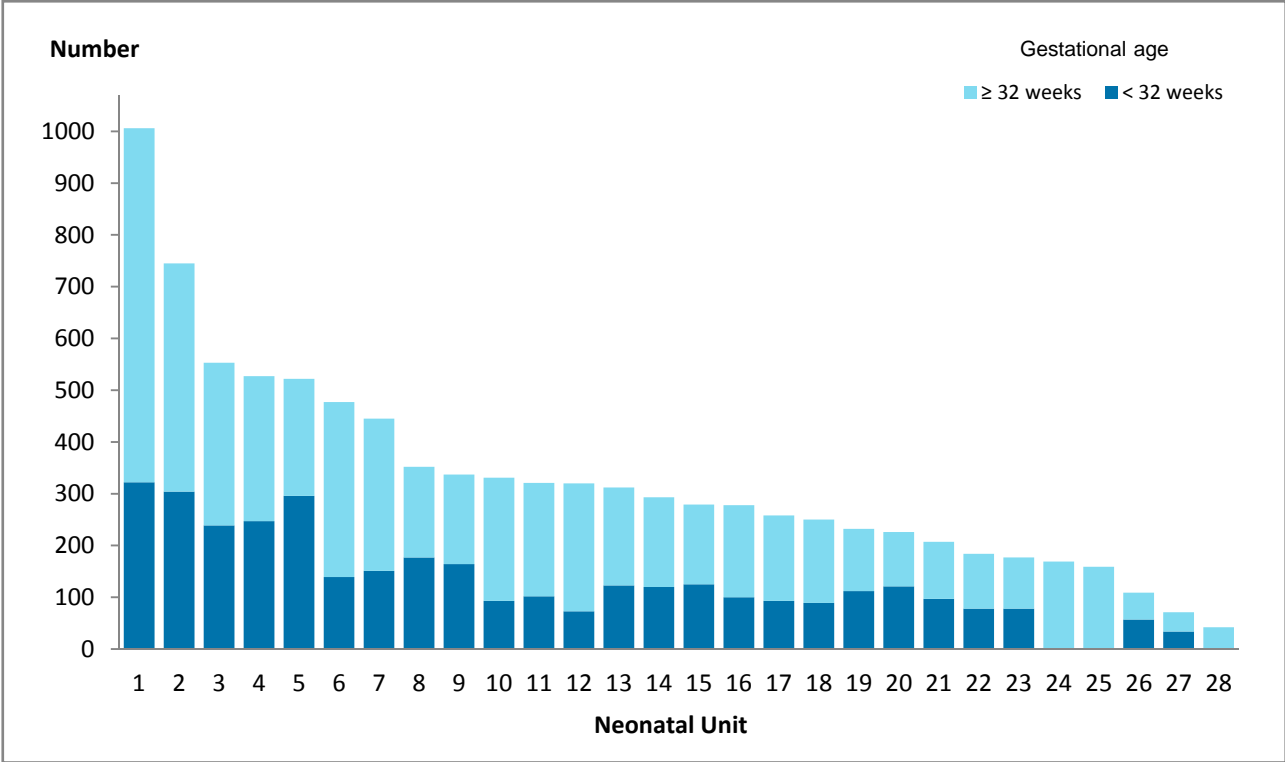


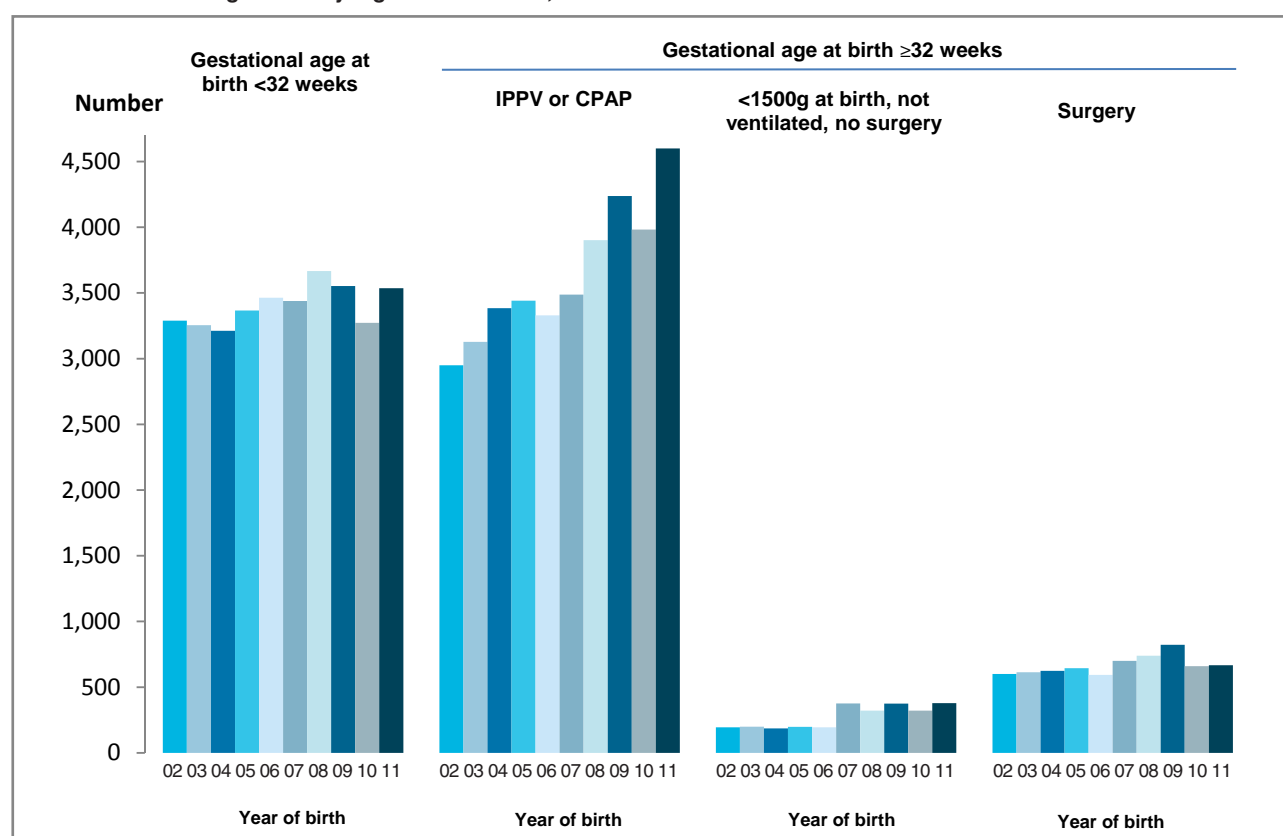
TABLE 1: Level III registrants born at each completed week of gestation, 2011

| Gestational age (completed weeks) | Number of babies | Percent | Cumulative percent |
|--|-------------------------|----------------|---------------------------|
| <24 | 55 | 0.6 | 0.6 |
| 24 | 193 | 2.1 | 2.7 |
| 25 | 230 | 2.5 | 5.2 |
| 26 | 298 | 3.2 | 8.5 |
| 27 | 326 | 3.6 | 12.0 |
| 28 | 459 | 5.0 | 17.0 |
| 29 | 472 | 5.1 | 22.1 |
| 30 | 633 | 6.9 | 29.0 |
| 31 | 870 | 9.5 | 38.5 |
| All babies <32 weeks | 3,536 | 38.5 | |
| 32 | 757 | 8.2 | 46.8 |
| 33 | 646 | 7.0 | 53.8 |
| 34 | 665 | 7.2 | 61.0 |
| 35 | 538 | 5.9 | 66.9 |
| 36 | 474 | 5.2 | 72.1 |
| 37 | 475 | 5.2 | 77.2 |
| 38 | 604 | 6.6 | 83.8 |
| 39 | 576 | 6.3 | 90.1 |
| 40 | 543 | 5.9 | 96.0 |
| 41 | 332 | 3.6 | 99.6 |
| 42 | 34 | 0.4 | 100.0 |
| 43 | 2 | 0.0 | 100.0 |
| Total | 9,182 | 100.0 | |

TABLE 2: Level III registrants in each birthweight group, 2011

| Birth weight (grams) | Number of babies | Percent | Cumulative percent |
|--|------------------|--------------|--------------------|
| <500 | 38 | 0.4 | 0.4 |
| 500-599 | 88 | 1.0 | 1.4 |
| 600-699 | 201 | 2.2 | 3.6 |
| 700-799 | 234 | 2.5 | 6.1 |
| 800-899 | 263 | 2.9 | 9.0 |
| 900-999 | 291 | 3.2 | 12.1 |
| 1000-1099 | 292 | 3.2 | 15.3 |
| 1100-1199 | 375 | 4.1 | 19.4 |
| 1200-1299 | 338 | 3.7 | 23.1 |
| 1300-1399 | 390 | 4.2 | 27.3 |
| 1400-1499 | 430 | 4.7 | 32.0 |
| All babies <1,500g birthweight | 2,940 | 32.0 | |
| 1500-1999 | 1648 | 17.9 | 50.0 |
| 2000-2499 | 1304 | 14.2 | 64.2 |
| 2500-2999 | 1064 | 11.6 | 75.8 |
| 3000-3499 | 1087 | 11.8 | 87.6 |
| 3500-3999 | 777 | 8.5 | 96.1 |
| ≥4000 | 362 | 3.9 | 100.0 |
| Total | 9,182 | 100.0 | |

FIGURE 4: Level III registrants by registration criteria, 2002-2011



Note: Data on the ANZNN registrants from two level III NICUs were not included in 2010.

3. Mothers of level III registrants

Maternal age

While there are many determinants of perinatal outcome, an important one is maternal age. In 2011, the age of mothers of neonates registered as high-risk ranged from less than 15 years to just over 50 years. The highest proportion of registrant mothers was aged 30–34 years (29.1%) followed by mothers aged 25–29 years (25.4%). Together they accounted for more than half of the mothers (54.5%) of ANZNN registrants in 2011 (Table 3). In 2011, the proportion of babies born to teenage mothers decreased slightly (0.4%) from 2010, while those born to mothers in the 35–39 age group decreased by 0.6%, from 20.0% in 2010 to 19.4%.

Almost half of the babies born to teenage mothers (45.3%) were born at less than 32 weeks completed gestation, while only 37.0% of babies born to mothers 30–34 years were less than 32 weeks gestation at birth (Table 3).

TABLE 3: Age group of mothers of level III registrants by gestational age group, 2011

| Maternal age (years) | Gestational age group | | | | | | | | Total |
|-------------------------|-----------------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
| | <24 | 24–25 | 26–27 | 28–29 | 30–31 | 32–33 | 34–36 | 37–43 | |
| | Number | | | | | | | | |
| Less than 20 | 5 | 26 | 43 | 52 | 80 | 55 | 87 | 107 | 455 |
| 20–24 | 13 | 79 | 110 | 139 | 217 | 211 | 252 | 388 | 1,409 |
| 25–29 | 8 | 115 | 153 | 236 | 375 | 376 | 422 | 625 | 2,310 |
| 30–34 | 16 | 102 | 163 | 262 | 438 | 394 | 502 | 773 | 2,650 |
| 35–39 | 9 | 79 | 118 | 172 | 301 | 268 | 297 | 519 | 1,763 |
| 40 and over | 4 | 21 | 31 | 69 | 86 | 93 | 97 | 122 | 523 |
| Not stated | 0 | 1 | 6 | 1 | 6 | 6 | 20 | 32 | 72 |
| Total | 55 | 423 | 624 | 931 | 1,503 | 1,403 | 1,677 | 2,566 | 9,182 |
| | Per cent | | | | | | | | |
| Less than 20 | 9.1 | 6.2 | 7.0 | 5.6 | 5.3 | 3.9 | 5.3 | 4.2 | 5.0 |
| 20–24 | 23.6 | 18.7 | 17.8 | 14.9 | 14.5 | 15.1 | 15.2 | 15.3 | 15.5 |
| 25–29 | 14.5 | 27.3 | 24.8 | 25.4 | 25.1 | 26.9 | 25.5 | 24.7 | 25.4 |
| 30–34 | 29.1 | 24.2 | 26.4 | 28.2 | 29.3 | 28.2 | 30.3 | 30.5 | 29.1 |
| 35–39 | 16.4 | 18.7 | 19.1 | 18.5 | 20.1 | 19.2 | 17.9 | 20.5 | 19.4 |
| 40 and over | 7.3 | 5.0 | 5.0 | 7.4 | 5.7 | 6.7 | 5.9 | 4.8 | 5.7 |
| Total | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |

Note: Not stated data are excluded from per cent calculations.

Maternal data for babies of a multiple birth are presented for each registrant.

Previous antenatal history

In 2011, a previous preterm delivery was reported by 1,036 mothers (11.3%) of babies registered to ANZNN while 337 mothers (3.7%) reported a previous perinatal loss.

Assisted conception

Assisted conception refers to any infertility treatment used in this pregnancy. Types of infertility treatment include ovulation induction, *in vitro* fertilisation (IVF), intrauterine insemination and other infertility treatments not already mentioned.

There were 711 (7.7%) pregnancies resulting from assisted conception in the ANZNN 2011 cohort with most (82.1%) the result of IVF treatment. Of the pregnancies resulting from assisted conception, 44.4% of the mothers were more than 34 years of age at the time of giving birth.

Presenting antenatal problem

Many mothers of ANZNN registrants were admitted to hospital with complications prior to the baby's birth. The presenting antenatal problem refers to the antenatal complication that led to the baby's birth and subsequent admission to an NICU. There may be other complications related to this pregnancy but they are not reported here. Information about the presenting antenatal problem was available for 98.7% of 2011 ANZNN registrants. The mothers of one-quarter of registrants (24.4%) presented with preterm labour while preterm pre-labour rupture of membranes was the second highest (13.7%) presenting antenatal problem (Table 4). Overall 87.7% of mothers of registrants had a pregnancy complication recorded.

The maternal antenatal complications for registrants born at 37–43 weeks, 32–36 weeks and less than 32 weeks gestational age are set out in Figure 5. For women who gave birth before 32 weeks gestation and women who gave birth at 34–36 weeks gestation, the most common presenting antenatal problem was preterm labour (37.2% and 29.6% respectively) followed by preterm pre-labour rupture of membranes (21.4% and 14.8% respectively).

Among women who gave birth at term, two in five (38.9%) were recorded as having no maternal presenting antenatal problem.

TABLE 4: Mother's presenting antenatal problem for level III registrants by gestational age group, 2011

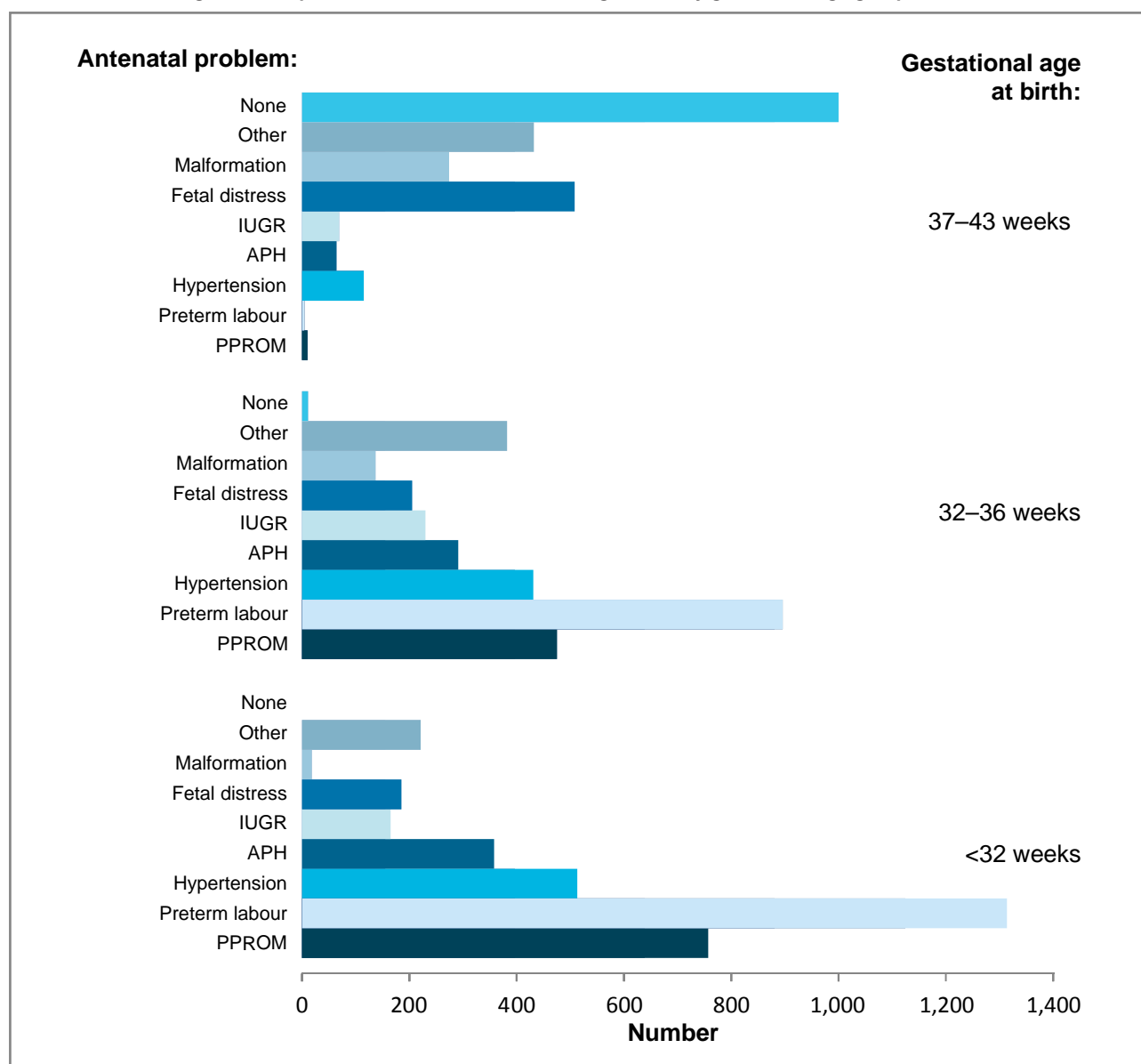
| Presenting antenatal problem | Gestational age group | | | | | | | | Total |
|--|-----------------------|--------------|--------------|--------------|--------------|--------------|--------------|------------------|--------------|
| | <24 | 24–25 | 26–27 | 28–29 | 30–31 | 32–33 | 34–36 | 37–43 | |
| | Number | | | | | | | | |
| No antenatal problems | 0 | 0 | 0 | 0 | 0 | 0 | 11 | 1,000 | 1,011 |
| Preterm pre-labour rupture of membranes (PROM) | 12 | 102 | 164 | 164 | 315 | 230 | 245 | 10 | 1,242 |
| Preterm labour | 41 | 217 | 243 | 329 | 484 | 406 | 490 | 4 ^(a) | 2,214 |
| Hypertension in pregnancy | 0 | 28 | 79 | 146 | 260 | 238 | 193 | 115 | 1,059 |
| Antepartum haemorrhage (APH) | 1 | 53 | 55 | 98 | 151 | 146 | 145 | 64 | 713 |
| Intrauterine growth restriction (IUGR) | 0 | 2 | 19 | 61 | 83 | 117 | 113 | 69 | 464 |
| Fetal distress | 1 | 11 | 23 | 58 | 92 | 90 | 115 | 508 | 898 |
| Other problem | 0 | 6 | 39 | 72 | 104 | 148 | 234 | 432 | 1,035 |
| Congenital anomalies | 0 | 3 | 2 | 3 | 10 | 26 | 111 | 274 | 429 |
| Not stated | 0 | 1 | 0 | 0 | 4 | 2 | 20 | 90 | 117 |
| Total | 55 | 423 | 624 | 931 | 1,503 | 1,403 | 1,677 | 2,566 | 9,182 |
| | Per cent | | | | | | | | |
| No antenatal problems | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.7 | 40.4 | 11.2 |
| Preterm pre-labour rupture of membranes (PROM) | 21.8 | 24.2 | 26.3 | 17.6 | 21.0 | 16.4 | 14.8 | 0.4 | 13.7 |
| Preterm labour | 74.5 | 51.4 | 38.9 | 35.3 | 32.3 | 29.0 | 29.6 | 0.2 | 24.4 |
| Hypertension in pregnancy | 0.0 | 6.6 | 12.7 | 15.7 | 17.3 | 17.0 | 11.6 | 4.6 | 11.7 |
| Antepartum haemorrhage (APH) | 1.8 | 12.6 | 8.8 | 10.5 | 10.1 | 10.4 | 8.8 | 2.6 | 7.9 |
| Intrauterine growth restriction (IUGR) | 0.0 | 0.5 | 3.0 | 6.6 | 5.5 | 8.4 | 6.8 | 2.8 | 5.1 |
| Fetal distress | 1.8 | 2.6 | 3.7 | 6.2 | 6.1 | 6.4 | 6.9 | 20.5 | 9.9 |
| Other problem | 0.0 | 1.4 | 6.3 | 7.7 | 6.9 | 10.6 | 14.1 | 17.4 | 11.4 |
| Congenital anomalies | 0.0 | 0.7 | 0.3 | 0.3 | 0.7 | 1.9 | 6.7 | 11.1 | 4.7 |
| Total | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |

(a) These mothers presented with preterm labour, then went on to deliver at term.

Note: Not stated data are excluded from per cent calculations.

Maternal data for babies of a multiple birth are presented for each registrant.

FIGURE 5: Presenting antenatal problem for mothers of level III registrants by gestational age group, 2011



Antenatal corticosteroid use

Corticosteroids given to the mother during the antenatal period, via any route at a time likely to enhance fetal maturation, are recorded for ANZNN registrants.

Since 1997, consideration has been given to administering maternal antenatal corticosteroids before the 34th completed week of gestation with the aim of improving neonatal outcomes by enhancing newborns' maturation. The preferred regimen is more than one dose of antenatal corticosteroids, with the first dose given more than 24 hours and less than eight days before the baby's birth (Crowley 1995).

Table 5 presents antenatal corticosteroids use for mothers of ANZNN registrants in each gestational age group. In 2011, 86.7% of mothers of ANZNN registrants born before 34 weeks of gestation received one or more doses of antenatal corticosteroids leaving 13.3% of mothers of registrants in this group who did not report receiving any antenatal corticosteroids. Of the mothers who received antenatal corticosteroids, 17.7% received them more than seven days prior to giving birth.

For mothers of ANZNN registrants born before 32 weeks of gestation, 88.4% received one or more doses of antenatal corticosteroids and 11.6% of mothers of registrants in this group did not report receiving any antenatal corticosteroids. Of the mothers who received antenatal corticosteroids, 17.0% received them more than seven days prior to giving birth (Table 5). The 10-year trend (2002–2011) for maternal corticosteroids is represented by Figure 11 in Appendix 1.

TABLE 5: Antenatal corticosteroid use for mothers of level III registrants by gestational age group, 2011

| | Gestational age group | | | | | | | | |
|----------------------------------|-----------------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
| Antenatal corticosteroids | <24 | 24–25 | 26–27 | 28–29 | 30–31 | 32–33 | 34–36 | 37–43 | Total |
| Number | | | | | | | | | |
| None | 16 | 29 | 57 | 89 | 165 | 219 | 937 | 2,109 | 3,621 |
| Incomplete course | 21 | 135 | 161 | 259 | 358 | 363 | 134 | 11 | 1,442 |
| Course completed | 15 | 212 | 320 | 402 | 712 | 566 | 325 | 40 | 2,592 |
| Completed >7 days prior to birth | 0 | 41 | 84 | 165 | 242 | 224 | 188 | 43 | 987 |
| Not stated | 3 | 6 | 2 | 16 | 26 | 31 | 93 | 363 | 540 |
| Total | 55 | 423 | 624 | 931 | 1,503 | 1,403 | 1,677 | 2,566 | 9,182 |
| Per cent | | | | | | | | | |
| None | 30.8 | 7.0 | 9.2 | 9.7 | 11.2 | 16.0 | 59.2 | 95.7 | 41.9 |
| Incomplete course | 40.4 | 32.4 | 25.9 | 28.3 | 24.2 | 26.5 | 8.5 | 0.5 | 16.7 |
| Course completed | 28.8 | 50.8 | 51.4 | 43.9 | 48.2 | 41.3 | 20.5 | 1.8 | 30.0 |
| Completed >7 days prior to birth | 0.0 | 9.8 | 13.5 | 18.0 | 16.4 | 16.3 | 11.9 | 2.0 | 11.4 |
| Total | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |

Note: Not stated data are excluded from per cent calculations.

Maternal data for babies of a multiple birth are presented for each registrant.

Multiple births

Multiple birth pregnancies are often associated with labour and delivery complications, an increased risk of premature birth, low birthweight infants as well as an increased risk of perinatal mortality and morbidity. In 2011, 19.3% of ANZNN registrants were reported as being from a multiple pregnancy with the greatest percentage of multiple births being twins (17.6%). Of the 2011 ANZNN registrants from multiple births, 56.7% were born before 32 weeks gestation and 96.9% were born before 37 weeks gestation (Table 6). The 10-year trend (2002–2011) for multiple births is represented by Figure 12 in Appendix 1.

TABLE 6: Plurality of level III registrants by gestational age group, 2011

| Plurality | Gestational age group | | | | | | | | Total |
|----------------------------|-----------------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
| | <24 | 24–25 | 26–27 | 28–29 | 30–31 | 32–33 | 34–36 | 37–43 | |
| Number | | | | | | | | | |
| Singletons | 40 | 321 | 463 | 652 | 1,057 | 991 | 1,376 | 2,512 | 7,412 |
| Twins | 15 | 91 | 142 | 248 | 401 | 374 | 289 | 54 | 1,614 |
| Triplets and higher orders | 0 | 11 | 19 | 31 | 45 | 38 | 12 | 0 | 156 |
| Total | 55 | 423 | 624 | 931 | 1,503 | 1,403 | 1,677 | 2,566 | 9,182 |
| Per cent | | | | | | | | | |
| Singletons | 72.7 | 75.9 | 74.2 | 70.0 | 70.3 | 70.6 | 82.1 | 97.9 | 80.7 |
| Twins | 27.3 | 21.5 | 22.8 | 26.6 | 26.7 | 26.7 | 17.2 | 2.1 | 17.6 |
| Triplets and higher orders | 0.0 | 2.6 | 3.0 | 3.3 | 3.0 | 2.7 | 0.7 | 0.0 | 1.7 |
| Total | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |

Method of birth

Data on method of birth are presented for each baby. Method of birth can be dependent upon gestational age, presenting part of the baby and maternal factors. For more than half of the 2011 registrants (59.6%) the method of birth was caesarean section with 65.9% of caesarean sections occurring before the onset of labour. One-third of registrants (33.1%) were non-instrumental vaginal births (Table 7). The rate of birth by caesarean section has gradually increased from 49.8%, since the first data collection in 1995, to 58.1% in 2010. The 2011 data show an increase of 1.5% from 2010.

The most common method of birth for registrants born before 24 weeks was vaginal birth (87.3%) with no babies requiring assistance with instruments (Table 7). The 10-year trend (2002–2011) for method of birth is represented by Figure 13 in Appendix 1.

TABLE 7: Method of birth for level III registrants by gestational age group, 2011

| | Gestational age group | | | | | | | | |
|-----------------------------|-----------------------|-------|-------|-------|-------|-------|-------|-------|-------|
| Method of birth | <24 | 24–25 | 26–27 | 28–29 | 30–31 | 32–33 | 34–36 | 37–43 | Total |
| Number | | | | | | | | | |
| Vaginal | 48 | 213 | 186 | 242 | 442 | 348 | 528 | 994 | 3,001 |
| Vaginal instrumental birth | 0 | 19 | 13 | 28 | 56 | 59 | 117 | 370 | 662 |
| Caesarean section in labour | 5 | 94 | 176 | 216 | 287 | 254 | 289 | 521 | 1,842 |
| Caesarean section no labour | 2 | 93 | 245 | 435 | 702 | 729 | 720 | 640 | 3,566 |
| Not stated | 0 | 4 | 4 | 10 | 16 | 13 | 23 | 41 | 111 |
| Total | 55 | 423 | 624 | 931 | 1,503 | 1,403 | 1,677 | 2,566 | 9,182 |
| Per cent | | | | | | | | | |
| Vaginal | 87.3 | 50.8 | 30.0 | 26.3 | 29.7 | 25.0 | 31.9 | 39.4 | 33.1 |
| Vaginal instrumental birth | 0.0 | 4.5 | 2.1 | 3.0 | 3.8 | 4.2 | 7.1 | 14.7 | 7.3 |
| Caesarean section in labour | 9.1 | 22.4 | 28.4 | 23.5 | 19.3 | 18.3 | 17.5 | 20.6 | 20.3 |
| Caesarean section no labour | 3.6 | 22.2 | 39.5 | 47.2 | 47.2 | 52.4 | 43.5 | 25.3 | 39.3 |
| Total | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |

Note: Not stated data are excluded from per cent calculations.

Place of birth

In line with standard clinical practice guidelines, clinicians endeavour to have all births at less than 33 weeks gestation occur in a perinatal centre equipped with an NICU. In 2011, 79.6% of all babies and 88.8% of babies less than 32 weeks gestation at birth were born in a tertiary centre equipped with an NICU; 19.7% of all ANZNN registrants were born in a non-tertiary hospital; while 0.7% of registrants were not born in a hospital (Table 8).

TABLE 8: Level of hospital of birth for level III registrants by gestational age group, 2011

| | Gestational age group | | | | | | | | |
|---------------------------------------|-----------------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
| Level of birth hospital | <24 | 24–25 | 26–27 | 28–29 | 30–31 | 32–33 | 34–36 | 37–43 | Total |
| Number | | | | | | | | | |
| Tertiary hospital | 46 | 380 | 548 | 821 | 1,345 | 1,185 | 1,256 | 1,722 | 7,303 |
| Non-tertiary hospital | 6 | 41 | 72 | 104 | 156 | 211 | 418 | 802 | 1,810 |
| Not born in a hospital ^(a) | 2 | 2 | 4 | 6 | 2 | 7 | 2 | 38 | 63 |
| Not stated | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 4 | 6 |
| Total | 55 | 423 | 624 | 931 | 1,503 | 1,403 | 1,677 | 2,566 | 9,182 |
| Per cent | | | | | | | | | |
| Tertiary hospital | 85.2 | 89.8 | 87.8 | 88.2 | 89.5 | 84.5 | 74.9 | 67.2 | 79.6 |
| Non-tertiary hospital | 11.1 | 9.7 | 11.5 | 11.2 | 10.4 | 15.0 | 24.9 | 31.3 | 19.7 |
| Not born in a hospital ^(a) | 3.7 | 0.5 | 0.6 | 0.6 | 0.1 | 0.5 | 0.1 | 1.5 | 0.7 |
| Total | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |

(a) These babies were either born before arrival to hospital or born at home.

Note: Not stated data are excluded from per cent calculations.

Transport after birth to a level III NICU

Transport after birth to a level III NICU is required if there is insufficient time before birth to allow the mother to be transferred to a tertiary centre; if a cot is not available in the hospital of birth; if a term baby born in a non-tertiary centre has an unexpected need for NICU care; or the baby requires specialised care in a children's hospital.

In 2011, 22.9% of ANZNN registrants were transferred to an NICU after birth. Of these the greatest percentage (80.6%) were transported by a specialist team with 16.1% transported by a non-specialist team (Table 9). The 10-year trend (2002–2011) for mode of transport to level III unit is represented by Figure 15 in Appendix 1.

TABLE 9: Mode of transport to level III NICU after birth for level III registrants by gestational age, 2011

| | Gestational age group | | | | | | | | |
|---------------------------|-----------------------|-------|-------|-------|-------|-------|-------|-------|-------|
| Mode of Transport | <24 | 24–25 | 26–27 | 28–29 | 30–31 | 32–33 | 34–36 | 37–43 | Total |
| Number | | | | | | | | | |
| Not transported | 46 | 372 | 539 | 810 | 1,334 | 1,168 | 1,217 | 1,587 | 7,073 |
| Specialist retrieval team | 6 | 34 | 59 | 93 | 146 | 196 | 402 | 749 | 1,685 |
| Non-specialist team | 2 | 7 | 16 | 21 | 13 | 27 | 47 | 204 | 337 |
| Other | 1 | 9 | 10 | 6 | 10 | 9 | 8 | 16 | 69 |
| Not stated | 0 | 1 | 0 | 1 | 0 | 3 | 3 | 10 | 18 |
| Total | 55 | 423 | 624 | 931 | 1,503 | 1,403 | 1,677 | 2,566 | 9,182 |
| Per cent | | | | | | | | | |
| Not transported | 83.6 | 88.2 | 86.4 | 87.1 | 88.8 | 83.4 | 72.7 | 62.1 | 77.2 |
| Specialist transport team | 10.9 | 8.1 | 9.5 | 10.0 | 9.7 | 14.0 | 24.0 | 29.3 | 18.4 |
| Non-specialist team | 3.6 | 1.7 | 2.6 | 2.3 | 0.9 | 1.9 | 2.8 | 8.0 | 3.7 |
| Other | 1.8 | 2.1 | 1.6 | 0.6 | 0.7 | 0.6 | 0.5 | 0.6 | 0.8 |
| Total | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |

Note: Not stated data are excluded from per cent calculations.

Breastfeeding at discharge

Data on breastfeeding at discharge were available for 7,440 babies (85.4% of the babies who survived to go home). Among registrants who provided data on breastfeeding, 74.8% were breastfed at discharge.

The rate of breastfeeding among surviving very preterm babies at discharge was 69.4% compared to 78.4% for surviving preterm and term babies. Care should be taken with interpretation of these data as breastfeeding status on discharge was not available for 14.6% of the surviving ANZNN registrants.

4. Characteristics of level III registrants

Baby gender

Male births exceeded female births in both Australia and New Zealand and accounted for 51.4% of combined live births in both countries in 2011 (Australian Bureau of Statistics 2011; Statistics New Zealand 2011). The percentage was higher among ANZNN registrants with male births representing 57.7%. Gender was not available for three babies. For births at less than 32 weeks gestation, 54.8% were male; of births at term, 61.7% were male.

Resuscitation in delivery suite

The type of resuscitation given to babies immediately after birth ranges from the least severe, suction to the most severe, external cardiac massage and ventilator support. For the purpose of this audit ANZNN only collected data on babies on whom endotracheal intubation was performed; 24.6% of registrants were intubated in the delivery suite to establish independent respiration and heart rate. For babies born before 32 weeks the percentage was 42.7% and for babies born at term the percentage was 15.8%.

Apgar score at birth

The Apgar score gives a clinical indication of a baby's condition immediately after birth. It is a numerical score based on five characteristics: heart rate, respiratory condition, muscle tone, reflexes and colour with a maximum possible score of 10. A low score (less than 4) at one minute of age indicates a baby requires specialised resuscitation.

An Apgar score of less than 4 at one minute of age was recorded for 18.2% of ANZNN registrants, with 3.9% of registrants recording an Apgar score of less than 4 at five minutes of age. Among the babies who had low Apgar scores at one minute, 43.4% of babies were born at less than 32 weeks and 32.8% were born at term (Table 10).

TABLE 10: Apgar scores at birth for level III registrants by gestational age group, 2011

| TABLE 16: Apgar scores at birth for live-in registrants by gestational age group, 2011 | | | | | | | | | |
|--|-----------------------|-------|-------|-------|-------|-------|-------|-------|-------|
| | Gestational age group | | | | | | | | |
| Apgar score | <24 | 24–25 | 26–27 | 28–29 | 30–31 | 32–33 | 34–36 | 37–43 | Total |
| Number | | | | | | | | | |
| Apgar at 1 minute | | | | | | | | | |
| Apgar < 4 | 27 | 164 | 170 | 171 | 192 | 174 | 223 | 547 | 1,668 |
| Apgar 4-7 | 23 | 223 | 352 | 490 | 709 | 631 | 634 | 863 | 3,925 |
| Apgar ≥ 8 | 5 | 36 | 102 | 270 | 602 | 598 | 820 | 1,155 | 3,588 |
| Not Stated | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 |
| Total | 55 | 423 | 624 | 931 | 1,503 | 1,403 | 1,677 | 2,566 | 9,182 |
| Number | | | | | | | | | |
| Apgar at 5 minutes | | | | | | | | | |
| Apgar < 4 | 9 | 34 | 37 | 28 | 28 | 25 | 43 | 158 | 362 |
| Apgar 4-7 | 25 | 240 | 263 | 257 | 325 | 292 | 365 | 734 | 2,501 |
| Apgar ≥ 8 | 21 | 149 | 324 | 646 | 1,150 | 1,086 | 1,269 | 1,673 | 6,318 |
| Not Stated | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 |
| Total | 55 | 423 | 624 | 931 | 1,503 | 1,403 | 1,677 | 2,566 | 9,182 |

Admission temperature

The temperature at admission to the NICU, or temperature nearest to admission to the registration unit, was reported for all ANZNN registrants in 2011. The rectal temperature is preferred; however, if it is not available the axilla temperature is recorded.

For babies born before 32 weeks gestation the admission temperature together with the base excess is used to calculate the Clinical Risk Index for Babies (CRIB) II score. CRIB II score is a risk-adjustment instrument widely used in NICUs to measure initial illness severity and is a predictor of survival until discharge.

The median temperature at admission to the NICU was 36.4°C; the median temperature increased slightly with increasing gestational age at birth. The lowest median temperature recorded was 35.2° C by the youngest babies, i.e. those born at less than 24 weeks gestation (Table 11).

TABLE 11: Median admission temperature and interquartile ranges for level III registrants by gestational age group, 2011

| Gestational age group | Number of babies | Temperature | |
|-----------------------|------------------|-------------|----------------------|
| | | Median | Inter quartile range |
| <24 | 55 | 35.2 | 34.0–36.0 |
| 24–25 | 423 | 36.1 | 35.4–36.6 |
| 26–27 | 624 | 36.3 | 35.8–36.7 |
| 28–29 | 931 | 36.4 | 35.8–36.8 |
| 30–31 | 1,503 | 36.3 | 35.9–36.7 |
| 32–33 | 1,403 | 36.4 | 36.0–36.7 |
| 34–36 | 1,677 | 36.5 | 36.0–36.8 |
| 37–43 | 2,566 | 36.5 | 35.8–37.0 |
| Total | 9,182 | 36.4 | 35.8–36.8 |

Indication for respiratory support

In 2011, only 5.6% of all ANZNN registrants did not receive any form of respiratory support. For the remaining registrants, hyaline membrane disease (HMD) remained the most common indication for respiratory support at 44.2%. Non-specific respiratory distress accounted for 31.1% of babies, surgery for 4.2%, while congenital anomaly accounted for 3.5% (Table 12).

For babies born before 37 weeks gestation, HMD (57.6%) remained the most common indication for respiratory support. For babies born at term, non-specific respiratory distress (39.4%) was the most common indication followed by meconium aspiration (10.1%) and surgery (9.9%) (Table 12). The 10-year trend (2002–2011) for mode of assisted ventilation is represented by Figure 16 in Appendix 1.

TABLE 12: Indication for respiratory support for level III registrants by gestational age, 2011

| Indication for respiratory support | Gestational age group | | | | | | | | Total |
|------------------------------------|-----------------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
| | <24 | 24–25 | 26–27 | 28–29 | 30–31 | 32–33 | 34–36 | 37–43 | |
| | Number | | | | | | | | |
| No respiratory support | 0 | 0 | 1 | 6 | 209 | 109 | 76 | 105 | 506 |
| Non-specific respiratory distress | 0 | 4 | 24 | 114 | 384 | 564 | 733 | 989 | 2,812 |
| Hyaline membrane disease | 55 | 413 | 579 | 769 | 840 | 622 | 536 | 191 | 4,005 |
| Meconium aspiration syndrome | 0 | 0 | 0 | 0 | 0 | 4 | 13 | 252 | 269 |
| Pneumonia | 0 | 1 | 3 | 3 | 2 | 3 | 13 | 71 | 96 |
| Persistent pulmonary hypertension | 0 | 2 | 4 | 3 | 5 | 5 | 18 | 88 | 125 |
| Apnoea | 0 | 1 | 3 | 10 | 26 | 25 | 26 | 28 | 119 |
| Congenital anomaly | 0 | 0 | 3 | 7 | 9 | 14 | 60 | 221 | 314 |
| Other | 0 | 0 | 2 | 1 | 4 | 14 | 45 | 109 | 175 |
| Peri-surgery | 0 | 0 | 0 | 4 | 4 | 22 | 103 | 249 | 382 |
| Newborn encephalopathy | 0 | 0 | 1 | 3 | 3 | 7 | 31 | 204 | 249 |
| Not stated | 0 | 2 | 4 | 11 | 17 | 14 | 23 | 59 | 130 |
| Total | 55 | 423 | 624 | 931 | 1,503 | 1,403 | 1,677 | 2,566 | 9,182 |
| | Per cent | | | | | | | | |
| No respiratory support | 0.0 | 0.0 | 0.2 | 0.6 | 13.9 | 7.8 | 4.5 | 4.1 | 5.6 |
| Non-specific respiratory distress | 0.0 | 1.0 | 3.9 | 12.4 | 25.8 | 40.6 | 44.3 | 39.4 | 31.1 |
| Hyaline membrane disease | 100.0 | 98.1 | 93.4 | 83.6 | 56.5 | 44.8 | 32.4 | 7.6 | 44.2 |
| Meconium aspiration syndrome | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.3 | 0.8 | 10.1 | 3.0 |
| Pneumonia | 0.0 | 0.2 | 0.5 | 0.3 | 0.1 | 0.2 | 0.8 | 2.8 | 1.1 |
| Persistent pulmonary hypertension | 0.0 | 0.5 | 0.6 | 0.3 | 0.3 | 0.4 | 1.1 | 3.5 | 1.4 |
| Apnoea | 0.0 | 0.2 | 0.5 | 1.1 | 1.7 | 1.8 | 1.6 | 1.1 | 1.3 |
| Congenital anomaly | 0.0 | 0.0 | 0.5 | 0.8 | 0.6 | 1.0 | 3.6 | 8.8 | 3.5 |
| Other | 0.0 | 0.0 | 0.3 | 0.1 | 0.3 | 1.0 | 2.7 | 4.3 | 1.9 |
| Peri-surgery | 0.0 | 0.0 | 0.0 | 0.4 | 0.3 | 1.6 | 6.2 | 9.9 | 4.2 |
| Newborn encephalopathy | 0.0 | 0.0 | 0.2 | 0.3 | 0.2 | 0.5 | 1.9 | 8.1 | 2.8 |
| Total | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |

Note: Not stated data are excluded from per cent calculations.

Exogenous surfactant

Exogenous surfactant administered to babies with moderate to severe HMD has been shown to reduce the severity of the disease, the ventilation requirements and the risk of air leaks. Exogenous surfactant can be administered for both prevention and cure. For babies born at less than 31 weeks gestation most benefit is gained by early administration of exogenous surfactant (within two hours of birth). For babies born at 31 or more weeks gestation exogenous surfactant is usually only administered to those with a confirmed diagnosis of HMD. There is some evidence that a bolus dose of exogenous surfactant given to babies with meconium aspiration syndrome can reduce ventilation requirements.

In 2011, one-third of ANZNN registrants (32.3%) were administered exogenous surfactant (Table 13). There were 2,577 babies who received IPPV for HMD in 2011. Exogenous surfactant was given to 2,461 of these babies (95.5%). There were 116 babies diagnosed with HMD who were not given exogenous surfactant.

TABLE 13: Exogenous surfactant use for level III registrants by gestational age group, 2011

| Exogenous surfactant | Gestational age group | | | | | | | | Total |
|----------------------|-----------------------|-------|-------|-------|-------|-------|-------|-------|-------|
| | <24 | 24–25 | 26–27 | 28–29 | 30–31 | 32–33 | 34–36 | 37–43 | |
| | Number | | | | | | | | |
| None | 1 | 23 | 87 | 322 | 1,015 | 1,065 | 1,364 | 2,324 | 6,201 |
| Curosurf | 44 | 331 | 423 | 467 | 372 | 229 | 223 | 161 | 2,250 |
| Survanta | 8 | 65 | 109 | 135 | 107 | 100 | 83 | 61 | 668 |
| SurvCuro | 1 | 4 | 3 | 3 | 7 | 3 | 4 | 10 | 35 |
| Exosurf | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Other | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 2 |
| Not stated | 1 | 0 | 1 | 4 | 2 | 6 | 3 | 9 | 26 |
| Total | 55 | 423 | 624 | 931 | 1,503 | 1,403 | 1,677 | 2,566 | 9,182 |
| Per cent | | | | | | | | | |
| None | 1.9 | 5.4 | 14.0 | 34.7 | 67.6 | 76.2 | 81.5 | 90.9 | 67.7 |
| Curosurf | 81.5 | 78.3 | 67.9 | 50.4 | 24.8 | 16.4 | 13.3 | 6.3 | 24.6 |
| Survanta | 14.8 | 15.4 | 17.5 | 14.6 | 7.1 | 7.2 | 5.0 | 2.4 | 7.3 |
| SurvCuro | 1.9 | 0.9 | 0.5 | 0.3 | 0.5 | 0.2 | 0.2 | 0.4 | 0.4 |
| Exosurf | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Other | 0.0 | 0.0 | 0.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |

Note: Not stated data are excluded from per cent calculations.

Type of assisted ventilation

Assisted ventilation requires specialised nursing, medical and paramedical care and utilises a large component of the available resources. Of the babies registered to the ANZNN in 2011, 93.2% required assisted ventilation for four or more hours.

The two major forms of assisted ventilation used are intermittent positive pressure ventilation (IPPV) and continuous positive airways pressure (CPAP). IPPV is assisted ventilation given via an endotracheal tube, while CPAP can be administered via an endotracheal tube or via nasopharyngeal prongs (nasal CPAP). For the purposes of this audit CPAP is recorded via any route. The 10-year trend (2002–2011) for assisted ventilation is represented in Figures 16 to 18 in Appendix 1.

In 2011, IPPV was given for a total of 599,218 hours to ANZNN registrants and CPAP was given for 1,553,958 hours. The total number of hours of ventilation equates to each baby receiving 9.8 days of assisted ventilation. The median number of days of assisted ventilation is inversely related to the gestational age at birth (Table 14).

The most common form of ventilation given to ANZNN registrants in 2011 remains CPAP with 48.0% of registrants receiving CPAP only, 13.2% receiving IPPV only and 32.1% receiving both CPAP and IPPV.

In addition to IPPV and CPAP babies may have received high frequency oscillatory ventilation (HFOV), nitric oxide (NO) or extracorporeal membrane oxygenation (ECMO). HFOV without IPPV is very rarely given; therefore the rates of HFOV and NO are given as a percentage of the babies who received IPPV. The use of HFOV had been relatively stable at 12–14% since 1999, with the exception of 2007 (11.2%). In 2011, 15.0% of registrants who received IPPV also received HFOV. The use of HFOV among individual units varied between 0.8% and 20.7% with the highest percentage of babies receiving HFOV born at 24–25 weeks (49.0%) followed by babies born at less than 24 weeks gestation (36.5%) (Table 15). The 10-year trend (2002–2011) for HFOV is represented in Figure 19 in Appendix 1.

TABLE 14: Duration of assisted ventilation and oxygen use by level III registrants by gestational age group, 2011

| Median & Interquartile range (IQR) | Gestational age group | | | | | | | |
|--|-----------------------|-----------|----------|--------|--------|-------|---------|--------|
| | <24 | 24–25 | 26–27 | 28–29 | 30–31 | 32–33 | 34–36 | 37–43 |
| IPPV (hours) | | | | | | | | |
| Median | 440 | 343 | 63 | 24 | 20 | 24 | 42.5 | 53 |
| IQR | 96–863.5 | 102–672 | 18.5–216 | 11–81 | 8–50 | 11–60 | 19–97.5 | 22–102 |
| CPAP (hours) | | | | | | | | |
| Median | 1224 | 1030.5 | 814.5 | 245.5 | 57 | 30 | 24 | 15 |
| IQR | 961–1,436 | 599–1,344 | 406–1105 | 84–635 | 22–121 | 14–72 | 11–52.5 | 7–36 |
| Airway support or oxygen (days) | | | | | | | | |
| Median | 65 | 89 | 53 | 24 | 4 | 3 | 3 | 3 |
| IQR | 5–116 | 37–115 | 30–83 | 5–50 | 2–11 | 2–6 | 2–5 | 2–8 |

Note: IQR = Interquartile range

The percentage of ANZNN registrants who received nitric oxide (NO) was 4.3%. The use of NO continues to have a U-shaped distribution with the highest percentage of babies to receive NO born at term (17.4%) (Table 15). The 10-year trend (2002–2011) for NO is represented in Figure 20 in Appendix 1.

TABLE 15: Assisted ventilation for level III registrants by gestational age group, 2011

| | Gestational age group | | | | | | | | |
|-------------------------------|-----------------------|-------|-------|-------|-------|-------|-------|-------|-------|
| Ventilation type | <24 | 24–25 | 26–27 | 28–29 | 30–31 | 32–33 | 34–36 | 37–43 | Total |
| Number | | | | | | | | | |
| CPAP given | 29 | 342 | 570 | 880 | 1,223 | 1,183 | 1,356 | 1,766 | 7,349 |
| IPPV given | 52 | 406 | 528 | 593 | 493 | 381 | 576 | 1,123 | 4,152 |
| HFOV given | 19 | 199 | 103 | 68 | 40 | 20 | 56 | 119 | 624 |
| NO given | 2 | 43 | 34 | 33 | 22 | 15 | 53 | 195 | 397 |
| ECMO given | 0 | 0 | 1 | 1 | 0 | 0 | 3 | 25 | 30 |
| Total in each age group | 55 | 423 | 624 | 931 | 1,503 | 1,403 | 1,677 | 2,566 | 9,182 |
| Per cent | | | | | | | | | |
| CPAP given | 52.7 | 80.9 | 91.3 | 94.5 | 81.4 | 84.3 | 80.9 | 68.8 | 80.0 |
| IPPV given | 94.5 | 96.0 | 84.6 | 63.7 | 32.8 | 27.2 | 34.3 | 43.8 | 45.2 |
| Per cent of babies given IPPV | | | | | | | | | |
| HFOV given | 36.5 | 49.0 | 19.5 | 11.5 | 8.1 | 5.2 | 9.7 | 10.6 | 15.0 |
| NO given | 3.8 | 10.6 | 6.4 | 5.6 | 4.5 | 3.9 | 9.2 | 17.4 | 9.6 |
| ECMO given | 0.0 | 0.0 | 0.2 | 0.2 | 0.0 | 0.0 | 0.5 | 2.2 | 0.7 |

Note: Groups are not mutually exclusive.

Percentage of babies given HFOV and NO are given as a percentage of babies given IPPV.

Ventilation in babies born at less than 32 weeks gestation

The major indication for assisted ventilation in babies born at less than 32 weeks gestation was hyaline membrane disease. Among the 3,536 babies born before 32 weeks gestation, 93.0% were given assisted ventilation in the form of IPPV or CPAP. For registrants in this age group CPAP was the only form of ventilation for 34.4% and IPPV was the only form of ventilation for 6.9% of registrants. Both IPPV and CPAP were given to 51.7% of registrants.

The total duration of IPPV for these very preterm babies was 397,253 hours (16,552 days), and the duration of CPAP was 1,339,285 hours (55,804 days).

Of the babies born before 32 weeks gestational age and given IPPV in 2011, 20.7% were given high frequency ventilation while 6.5% of these babies were given NO (Table 15).

Among 2011 ANZNN registrants born at less than 32 weeks gestation 44.5% of registrants received respiratory support (airway support or supplemental oxygen therapy) at 28 days of age, with 16.7% of them discharged on home oxygen (Table 16).

Ventilation in babies born at 32 to 36 weeks gestation

Among the babies born at 32–36 weeks gestation, 92.6% received assisted ventilation. Non-specific respiratory distress was the main reason for ventilation. Total duration of CPAP use by registrants in this gestational age group was 139,957 hours (5,832 days) and IPPV use was 88,024 hours (3,668 days).

Of the babies born at 32–36 weeks gestation and given IPPV in 2011, 7.9% were given high frequency ventilation while 7.1% of these babies were given NO (Table 15).

Ventilation in babies born at term

The main indication for respiratory support in term babies was non-specific respiratory distress (39.2%). This group required 113,941 hours of IPPV (4,748 days) and 74,716 hours (3,113 days) of CPAP.

Of the babies born at term and given IPPV in 2011, 10.6% were given high frequency ventilation while 17.4% of these babies were given NO. There were 25 babies born at term who received extracorporeal membrane oxygenation (ECMO) (Table 15).

Respiratory support

Respiratory support is critical for the survival of some babies especially those with respiratory problems and those born prematurely. Babies requiring treatment in a level III unit commonly require long-term respiratory support as part of their specialised care. The duration of respiratory support may vary between babies, from as little as a few hours to several weeks or months. For the ANZNN audit, four consecutive hours in any single 24-hour period of CPAP, nasal high flow, IPPV, HFOV or supplemental oxygen therapy constitutes the use of respiratory support on that day. The continued use of respiratory support at 28 days of age is a predictor of postneonatal morbidity and the need for continued oxygen therapy after discharge.

Among 2011 ANZNN registrants, 21.3% received respiratory support on day 28, and 20.8% of registrants given respiratory support on day 28 were discharged on home oxygen (Table 16).

TABLE 16: Respiratory support (airway support or supplemental oxygen therapy) for level III registrants by gestational age group, 2011

| | Gestational age group | | | | | | | | |
|----------------------------------|-----------------------|-------|-------|-------|-------|-------|-------|-------|-------|
| Oxygen therapy | <24 | 24–25 | 26–27 | 28–29 | 30–31 | 32–33 | 34–36 | 37–43 | Total |
| Number | | | | | | | | | |
| No respiratory support on day 28 | 0 | 11 | 107 | 506 | 1,337 | 1,335 | 1,582 | 2,350 | 7,228 |
| Respiratory support on day 28 | 55 | 412 | 516 | 425 | 166 | 68 | 95 | 216 | 1,953 |
| ▪ survived to discharge home | 29 | 293 | 445 | 384 | 142 | 48 | 47 | 93 | 1,481 |
| ▪ died before discharge | 26 | 119 | 71 | 41 | 24 | 20 | 48 | 123 | 472 |
| Not stated | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| Total in each age group | 55 | 423 | 624 | 931 | 1,503 | 1,403 | 1,677 | 2,566 | 9,182 |
| Number | | | | | | | | | |
| Babies given home oxygen | 16 | 106 | 74 | 50 | 17 | 10 | 5 | 30 | 308 |
| Per cent | | | | | | | | | |
| No respiratory support on day 28 | 0.0 | 2.6 | 17.2 | 54.4 | 89.0 | 95.2 | 94.3 | 91.6 | 78.7 |
| Respiratory support on day 28 | 100.0 | 97.4 | 82.8 | 45.6 | 11.0 | 4.8 | 5.7 | 8.4 | 21.3 |
| ▪ survived to discharge home | 52.7 | 71.1 | 86.2 | 90.4 | 85.5 | 70.6 | 49.5 | 43.1 | 75.8 |
| ▪ died before discharge | 47.3 | 28.9 | 13.8 | 9.6 | 14.5 | 29.4 | 50.5 | 56.9 | 24.2 |
| Per cent | | | | | | | | | |
| Babies given home oxygen | 55.2 | 36.2 | 16.6 | 13.0 | 12.0 | 20.8 | 10.6 | 32.3 | 20.8 |

Note: Not stated data are excluded from per cent calculations.

Nasal high flow therapy

Nasal high flow therapy (NHFT) as a form of non invasive respiratory support for premature babies, is an emerging trend within neonatal units. Humidified blended air and oxygen mix is administered through a high flow device via high flow nasal cannula (HFNC). NHFT may deliver a positive end-expiratory pressure and for this reason can be preferred to nasal CPAP for use in premature infants (Wilkinson et al. 2011).

In 2011 nasal high flow therapy was reported for 1,435 babies (15.6%) of all level III registrants (Table 17). This overall increase of 3.3% from 2010 was observed predominantly in the babies born at between 24 and 29 weeks gestation. In this gestational age group, approximately 38.9% of babies received NHFT. Overall, the minimum flow recorded was 1 litre/min and the maximum 12 litres/min. Of the babies receiving NHFT 71.1% received a minimum rate of 2–4 litres/min while 66.8% received a maximum of 6–8 litres /min.

Care should be taken in interpretation of these data as this is only the third year of collection for ANZNN and NHFT is an emerging trend amongst member units.

TABLE 17: Nasal high flow respiratory support for level III registrants by gestational age group, 2011

| | Gestational age group | | | | | | | | |
|-----------------|-----------------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
| Nasal high flow | <24 | 24–25 | 26–27 | 28–29 | 30–31 | 32–33 | 34–36 | 37–43 | Total |
| Number | | | | | | | | | |
| High flow | 10 | 188 | 277 | 305 | 206 | 117 | 121 | 211 | 1,435 |
| No high flow | 45 | 235 | 347 | 626 | 1,297 | 1,286 | 1,556 | 2,355 | 7,747 |
| Total | 55 | 423 | 624 | 931 | 1,503 | 1,403 | 1,677 | 2,566 | 9,182 |
| Per cent | | | | | | | | | |
| High flow | 18.2 | 44.4 | 44.4 | 32.8 | 13.7 | 8.3 | 7.2 | 8.2 | 15.6 |
| No high flow | 81.8 | 55.6 | 55.6 | 67.2 | 86.3 | 91.7 | 92.8 | 91.8 | 84.4 |
| Total | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |

Chronic lung disease

Chronic lung disease (CLD) is diagnosed in babies born at less than 32 weeks gestation, who receive any form of respiratory support (supplemental oxygen and/or assisted ventilation) for their initial respiratory disease and continue to require respiratory support at 36 weeks post menstrual age (PMA) (Post menstrual age is calculated by adding the baby's age in weeks to the gestational age at birth in weeks). For ANZNN registrants 8.1% of babies in 2011 were reported to have had respiratory support at 36 weeks PMA, indicating the presence of CLD. The prevalence of chronic lung disease continues to be highest in babies born less than 27 weeks gestation. The highest percentage of chronic lung disease was in those babies born at 24 weeks gestation (58.0%) (Table 18). Not all the babies born at earlier gestations survived to 36 weeks PMA. CLD by gestational age is represented by Figure 21 in Appendix 1.

TABLE 18: Chronic lung disease for level III registrants by gestational age group, 2011

| Chronic lung disease (CLD) | Gestational age | | | | | | | | | | Total |
|----------------------------|-----------------|------|------|------|------|------|-------|------|------|-------|-------|
| | <24 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | ≥32 | |
| | Number | | | | | | | | | | |
| No CLD | 29 | 81 | 104 | 172 | 228 | 343 | 405 | 589 | 838 | 5,646 | 8,435 |
| CLD | 26 | 112 | 126 | 126 | 98 | 116 | 67 | 44 | 32 | 0 | 747 |
| ▪ CLD and survived | 26 | 104 | 124 | 121 | 96 | 111 | 67 | 41 | 31 | 0 | 721 |
| ▪ CLD and died | 0 | 8 | 2 | 5 | 2 | 5 | 0 | 3 | 1 | 0 | 26 |
| Total | 55 | 193 | 230 | 298 | 326 | 459 | 472 | 633 | 870 | 5,646 | 9,182 |
| Per cent | | | | | | | | | | | |
| No CLD | 52.7 | 42.0 | 45.2 | 57.7 | 69.9 | 74.7 | 85.8 | 93.0 | 96.3 | 100.0 | 91.9 |
| CLD | 47.3 | 58.0 | 54.8 | 42.3 | 30.1 | 25.3 | 14.2 | 7.0 | 3.7 | 0.0 | 8.1 |
| ▪ CLD and survived | 100.0 | 92.9 | 98.4 | 96.0 | 98.0 | 95.7 | 100.0 | 93.2 | 96.9 | 0.0 | 96.5 |
| ▪ CLD and died | 0.0 | 7.1 | 1.6 | 4.0 | 2.0 | 4.3 | 0.0 | 6.8 | 3.1 | 0.0 | 3.5 |

Note: Survival is assessed to discharge from hospital.

Pulmonary air leak

A pulmonary air leak is a collection of air in the space around the lungs which can cause difficulty in breathing. There are several types of pulmonary air leak and while some produce only minor symptoms a number of them require treatment by the insertion of a drainage tube. For the purposes of this report the presence of any form of air leak that required drainage (either transient or continuous drainage) is reported for ANZNN registrants (Table 19).

TABLE 19: Pulmonary air leak for level III registrants by gestational age group, 2011

| | Gestational age group | | | | | | | | |
|--------------|-----------------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
| Air leak | <24 | 24–25 | 26–27 | 28–29 | 30–31 | 32–33 | 34–36 | 37–43 | Total |
| Number | | | | | | | | | |
| Air leak | 4 | 43 | 22 | 29 | 40 | 42 | 74 | 129 | 383 |
| No air leak | 50 | 378 | 601 | 902 | 1,462 | 1,360 | 1,601 | 2,436 | 8,790 |
| Not stated | 1 | 2 | 1 | 0 | 1 | 1 | 2 | 1 | 9 |
| Total | 55 | 423 | 624 | 931 | 1,503 | 1,403 | 1,677 | 2,566 | 9,182 |
| Per cent | | | | | | | | | |
| Air leak | 7.4 | 10.2 | 3.5 | 3.1 | 2.7 | 3.0 | 4.4 | 5.0 | 4.2 |
| No air leak | 92.6 | 89.8 | 96.5 | 96.9 | 97.3 | 97.0 | 95.6 | 95.0 | 95.8 |
| Total | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |

Note: Not stated data are excluded from per cent calculations.

Neonatal sepsis

Each episode of sepsis is recorded as either early or late onset. Early onset sepsis is defined as the presence of at least one episode of systemic sepsis where the initial symptoms occurred within the first 48 hours after birth that is, in babies aged from 0 to 47 hours. Late onset sepsis is the presence of at least one episode of systemic sepsis with the initial symptoms occurring among babies aged 48 or more hours. Episodes of sepsis involving the same organism separated by at least 14 days are considered to be new episodes of infection. Symptomatic, blood culture positive septicaemia was reported in 6.3% of ANZNN registrants in 2011. Of these babies, 49.5% were born at less than 28 weeks gestation, 72.6% were born at less than 32 weeks gestation and 98.8% of registrants survived up to 2 days of life (Table 19). The 5-year trends (2007–2011) for early and late sepsis are represented by Figure 24 and Figure 25 respectively in Appendix 1.

TABLE 20: Neonatal sepsis for level III registrants by gestational age group, 2011

| Sepsis | Gestational age group | | | | | | | | Total |
|---------------------------------------|-----------------------|-------|-------|-------|-------|-------|-------|-------|-------|
| | <24 | 24–25 | 26–27 | 28–29 | 30–31 | 32–33 | 34–36 | 37–43 | |
| Number | | | | | | | | | |
| No sepsis | 36 | 285 | 494 | 838 | 1,462 | 1,370 | 1,632 | 2,485 | 8,602 |
| Sepsis | 19 | 138 | 130 | 93 | 41 | 33 | 45 | 81 | 580 |
| ▪ <48 hrs | 3 | 7 | 10 | 7 | 6 | 5 | 11 | 35 | 84 |
| ▪ ≥48 hrs | 14 | 128 | 116 | 85 | 33 | 27 | 32 | 44 | 479 |
| ▪ both <48 and ≥48 hrs | 2 | 3 | 4 | 1 | 2 | 1 | 2 | 2 | 17 |
| Babies alive on day 2 | 46 | 393 | 609 | 919 | 1,495 | 1,398 | 1,666 | 2,548 | 9,074 |
| Babies who did not survive to day 2 | 9 | 30 | 15 | 12 | 8 | 5 | 11 | 18 | 108 |
| Total in each age group | 55 | 423 | 624 | 931 | 1,503 | 1,403 | 1,677 | 2,566 | 9,182 |
| Per cent | | | | | | | | | |
| No sepsis ^(a) | 65.5 | 67.4 | 79.2 | 90.0 | 97.3 | 97.6 | 97.3 | 96.8 | 93.7 |
| Sepsis ^(a) | 34.5 | 32.6 | 20.8 | 10.0 | 2.7 | 2.4 | 2.7 | 3.2 | 6.3 |
| ▪ <48 hrs ^(a) | 5.5 | 1.7 | 1.6 | 0.8 | 0.4 | 0.4 | 0.7 | 1.4 | 0.9 |
| ▪ ≥48 hrs ^(b) | 30.4 | 32.6 | 19.0 | 9.2 | 2.2 | 1.9 | 1.9 | 1.7 | 5.3 |
| ▪ both <48 and ≥48 hrs ^(a) | 3.6 | 0.7 | 0.6 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.2 |

(a) Denominator is all registrants.

(b) Denominator is registrants alive at 48 hours.

Retinopathy of prematurity

The classification of retinopathy of prematurity (ROP) for ANZNN registrants are those recommended by the Committee for the Classification of Retinopathy of Prematurity (1984). The examination criteria for ROP vary between units within ANZNN. As in previous reports, the prevalence of ROP screening in 2010 was assessed among registrants with a gestational age of less than 31 weeks and/or a birthweight of less than 1,250 grams. Among the 2011 registrants, 31.7% were eligible for ROP examination and of these eligible registrants, 73.8% were examined and had the results of their eye examination recorded.

Of those ANZNN registrants who were eligible for an eye examination, 251 died before their ROP status could be determined. Of those examined, 6.3% had stage 3 or 4 eye disease and of these babies 55.6% received treatment (Table 21, Figure 6). The 7-year trend (2005–2011) for stages 3 and 4 ROP and treatment are represented by Figure 22 in Appendix 1.

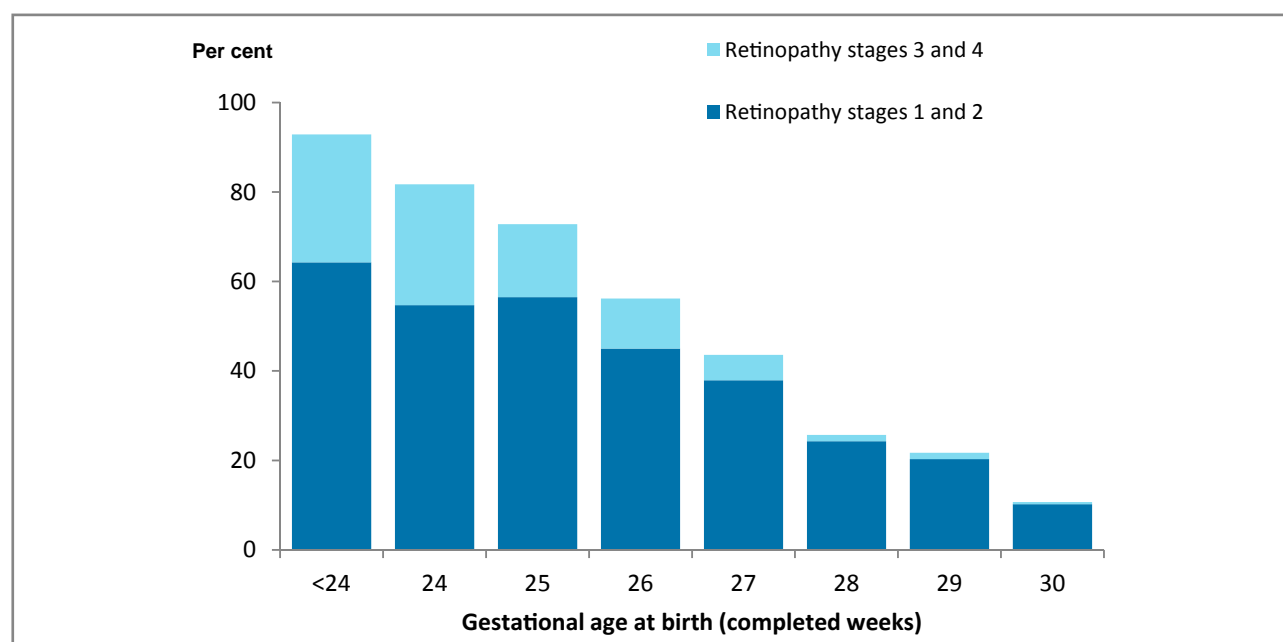
TABLE 21: Retinopathy of prematurity for level III registrants by gestational age, 2011

| Retinopathy of prematurity (ROP) | Gestational age | | | | | | | | | Total |
|----------------------------------|-----------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|------------|--------------|
| | <24 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | >30 | |
| | Number | | | | | | | | | |
| No ROP | 2 | 25 | 50 | 113 | 168 | 309 | 324 | 368 | 0 | 1,359 |
| Stage 1 | 9 | 27 | 40 | 61 | 60 | 55 | 43 | 23 | 0 | 318 |
| Stage 2 | 9 | 48 | 64 | 55 | 53 | 46 | 41 | 19 | 0 | 335 |
| Stage 3 | 8 | 36 | 29 | 28 | 15 | 6 | 6 | 2 | 0 | 130 |
| Stage 4 | 0 | 1 | 1 | 1 | 2 | 0 | 0 | 0 | 0 | 5 |
| Not examined | 26 | 56 | 44 | 39 | 27 | 43 | 57 | 219 | 0 | 511 |
| Not stated | 1 | 0 | 2 | 1 | 1 | 0 | 1 | 2 | 242 | 250 |
| Total | 55 | 193 | 230 | 298 | 326 | 459 | 472 | 633 | 242 | 2,908 |
| Number | | | | | | | | | | |
| Treatment for ROP | 6 | 23 | 22 | 14 | 8 | 1 | 1 | 0 | 0 | 75 |
| Per cent | | | | | | | | | | |
| No ROP | 7.1 | 18.2 | 27.2 | 43.8 | 56.4 | 74.3 | 78.3 | 89.3 | 0.0 | 63.3 |
| Stage 1 | 32.1 | 19.7 | 21.7 | 23.6 | 20.1 | 13.2 | 10.4 | 5.6 | 0.0 | 14.8 |
| Stage 2 | 32.1 | 35.0 | 34.8 | 21.3 | 17.8 | 11.1 | 9.9 | 4.6 | 0.0 | 15.6 |
| Stage 3 | 28.6 | 26.3 | 15.8 | 10.9 | 5.0 | 1.4 | 1.4 | 0.5 | 0.0 | 6.1 |
| Stage 4 | 0.0 | 0.7 | 0.5 | 0.4 | 0.7 | 0.0 | 0.0 | 0.0 | 0.0 | 0.2 |
| Total | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 0.0 | 100.0 |
| Per cent | | | | | | | | | | |
| Treatment for ROP ^(a) | 75.0 | 62.2 | 73.3 | 48.3 | 47.1 | 16.7 | 16.7 | 0.0 | n/a | 55.6 |

(a) Percentages for babies with retinopathy of prematurity who received treatment have been calculated using as the denominator the total number in each age group who had stages 3 and 4 ROP.

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

FIGURE 6: Retinopathy of prematurity for level III registrants by gestational age, 2011



Intraventricular haemorrhage

An initial head ultrasound is generally performed during the first week of life to detect signs of intraventricular haemorrhage (IVH) which is graded according to an internationally recognised method in which severity increases with higher grade (Papile et al. 1978).

There were 3,536 babies born at less than 32 weeks gestation eligible for a cerebral ultrasound, 3,438 survived to day 3 and 92.4% had an examination recorded. A normal report was recorded for 78.3% of these 2011 ANZNN registrants.

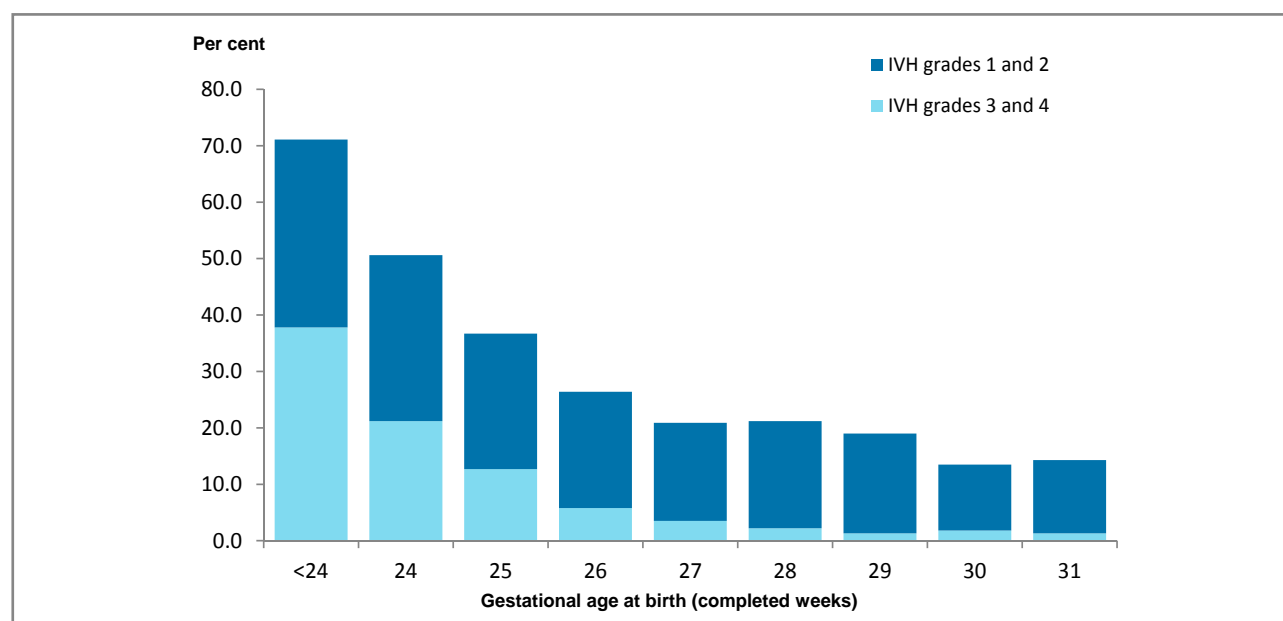
There were 141 babies reported to have grade 3 or 4 IVH representing 4.0% of the babies born before 32 weeks gestation. The highest percentage of babies who had severe IVH (grade 4) were born before 27 weeks gestational age, with the majority (63.4%) of the babies born before 26 weeks gestation (Table 22). The 10-year trend (2002–2011) for registrants with grades 3 and 4 IVH who survived to day 3 is represented in Figure 23 in Appendix 1.

TABLE 22: Intraventricular haemorrhage for level III registrants born before 32 weeks and survived to day 3 by gestational age, 2011

| Intraventricular haemorrhage | Gestational age | | | | | | | | | Total |
|---------------------------------|-----------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
| | <24 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | |
| | Number | | | | | | | | | |
| None | 13 | 84 | 129 | 204 | 251 | 353 | 365 | 475 | 613 | 2,487 |
| Grade 1 | 5 | 23 | 33 | 39 | 40 | 69 | 66 | 56 | 80 | 411 |
| Grade 2 | 10 | 27 | 16 | 18 | 15 | 16 | 14 | 8 | 13 | 137 |
| Grade 3 | 6 | 5 | 9 | 7 | 7 | 2 | 5 | 6 | 1 | 48 |
| Grade 4 | 11 | 31 | 17 | 9 | 4 | 8 | 1 | 4 | 8 | 93 |
| Not examined | 0 | 3 | 2 | 1 | 1 | 3 | 12 | 76 | 140 | 238 |
| Not stated | 1 | 0 | 1 | 3 | 2 | 1 | 2 | 6 | 8 | 24 |
| Total | 46 | 173 | 207 | 281 | 320 | 452 | 465 | 631 | 863 | 3,438 |
| Per cent | | | | | | | | | | |
| None | 28.9 | 49.4 | 63.2 | 73.6 | 79.2 | 78.8 | 80.9 | 86.5 | 85.7 | 78.3 |
| Grade 1 | 11.1 | 13.5 | 16.2 | 14.1 | 12.6 | 15.4 | 14.6 | 10.2 | 11.2 | 12.9 |
| Grade 2 | 22.2 | 15.9 | 7.8 | 6.5 | 4.7 | 3.6 | 3.1 | 1.5 | 1.8 | 4.3 |
| Grade 3 | 13.3 | 2.9 | 4.4 | 2.5 | 2.2 | 0.4 | 1.1 | 1.1 | 0.1 | 1.5 |
| Grade 4 | 24.4 | 18.2 | 8.3 | 3.2 | 1.3 | 1.8 | 0.2 | 0.7 | 1.1 | 2.9 |
| Total | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |

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

FIGURE 7: Intraventricular haemorrhage in level III registrants born at less than 32 weeks gestation and survived to day 3, by gestational age, 2011



Late cerebral ultrasound

Late cerebral ultrasound data are based on changes seen in brain tissue at the cerebral ultrasound scan nearest to six weeks of age. As noted above there were 3,536 babies born at less than 32 weeks gestation eligible for a cerebral ultrasound, 3,438 survived until day 3 and late ultrasound results were available for 2,474 of these babies. A normal report of no cysts was recorded for 97.5% of these registrants, 0.8% reported porencephalic cysts, 1.7% reported periventricular leukomalacia (PVL) and there were no reports of encephaloclastic porencephaly. Hydrocephalus was reported for 0.9% of these registrants in 2011 (Table 23).

TABLE 23: Late cerebral ultrasound results for level III registrants born before 32 weeks by gestational age, 2011

| | Gestational age | | | | | | | | | |
|-------------------------------|-----------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
| Cerebral ultrasound results | <24 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | Total |
| | Number | | | | | | | | | |
| No cysts | 28 | 132 | 179 | 246 | 284 | 387 | 369 | 392 | 396 | 2,413 |
| Porencephalic cysts | 0 | 6 | 2 | 2 | 3 | 2 | 1 | 1 | 3 | 20 |
| Periventricular leukomalacia | 2 | 6 | 2 | 4 | 4 | 3 | 9 | 5 | 6 | 41 |
| Encephaloclastic porencephaly | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Not stated | 25 | 49 | 47 | 46 | 35 | 67 | 93 | 235 | 465 | 1,062 |
| Total | 55 | 193 | 230 | 298 | 326 | 459 | 472 | 633 | 870 | 3,536 |
| Hydrocephalus | 0 | 4 | 3 | 1 | 4 | 2 | 3 | 2 | 4 | 23 |
| | Per cent | | | | | | | | | |
| No cysts | 93.3 | 91.7 | 97.8 | 97.6 | 97.6 | 98.7 | 97.4 | 98.5 | 97.8 | 97.5 |
| Porencephalic cysts | 0.0 | 4.2 | 1.1 | 0.8 | 1.0 | 0.5 | 0.3 | 0.3 | 0.7 | 0.8 |
| Periventricular leukomalacia | 6.7 | 4.2 | 1.1 | 1.6 | 1.4 | 0.8 | 2.4 | 1.3 | 1.5 | 1.7 |
| Encephaloclastic porencephaly | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |
| Hydrocephalus | 0.0 | 2.8 | 1.6 | 0.4 | 1.4 | 0.5 | 0.8 | 0.5 | 1.0 | 0.9 |

Note: Not stated data are excluded from per cent calculations.

Necrotising enterocolitis

Necrotising enterocolitis (NEC) is a gastrointestinal disease affecting premature infants that can be life threatening and is a leading cause of mortality and morbidity among infants in NICUs. There is no definitive cause identified for NEC although infection, empirical use of antibiotics for more than five days and enteral feeding are thought to be involved. With an early diagnosis, NEC can be treated medically through cessation of feeds, use of parenteral nutrition and antibiotic treatment. If medical treatment is unsuccessful surgery may be required to remove the affected bowel.

For ANZNN registrants in 2011 the percentage of babies with confirmed NEC was 1.3%. Of these babies, 58.2% were born before 28 weeks gestation with 64.8% of them undergoing surgery, and 41.8% were born after 27 weeks gestation; surgery was required for 47.1% of them. In total 41 registrants died from NEC. The number of registrants with confirmed NEC is less than in 2010 (Table 24).

TABLE 24: Necrotising enterocolitis in level III registrants by year of birth, 2002–2011

| Necrotising enterocolitis | Year of birth | | | | | | | | | |
|---------------------------|---------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
| | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 |
| NEC at <28 weeks | 75 | 78 | 85 | 85 | 95 | 80 | 118 | 97 | 111 | 71 |
| ▪ No NEC at <28 weeks | 1,042 | 943 | 941 | 951 | 944 | 1,005 | 1,052 | 1,032 | 952 | 1,026 |
| ▪ Not stated | 0 | 2 | 0 | 0 | 20 | 24 | 15 | 2 | 4 | 5 |
| NEC at ≥28 weeks | 65 | 77 | 63 | 50 | 72 | 50 | 74 | 50 | 68 | 51 |
| ▪ No NEC at ≥28 weeks | 5,861 | 6,091 | 6,316 | 6,560 | 6,428 | 6,773 | 7,339 | 7,801 | 7,093 | 8,028 |
| ▪ Not stated | 2 | 4 | 2 | 0 | 32 | 70 | 27 | 3 | 8 | 1 |
| Total | 7,045 | 7,195 | 7,407 | 7,646 | 7,591 | 8,002 | 8,628 | 8,986 | 8,236 | 9,182 |
| NEC <28 weeks | 6.7 | 7.6 | 8.3 | 8.2 | 9.1 | 7.4 | 10.1 | 8.6 | 10.4 | 6.5 |
| NEC ≥28 weeks | 1.1 | 1.2 | 1.0 | 0.8 | 1.1 | 0.7 | 1.0 | 0.6 | 0.9 | 0.6 |

Note: Not stated data are excluded from per cent calculations.

Neonatal surgery

The information given in this report includes the registrant's first admission to an NICU before their first discharge home after birth. Babies who were discharged home and re-admitted for surgery during the neonatal period are not included in this audit.

In 2011, there were 972 ANZNN registrants who had major surgery, of whom almost half (45.4%) were born at term. Of registrants born in a hospital, 77.5% were born in a hospital with tertiary care facilities. Of registrants who had major surgery, 69.5% also had a congenital anomaly present with 55.5% of these diagnosed during the antenatal period. 7.2% had surgery for proven NEC. The median length of stay (LOS) for survivors was 37 days (Table 25).

TABLE 25: Characteristics of level III registrants who underwent surgery by gestational age group, 2011

| | Gestational age group | | | | | | | | |
|--|-----------------------|-------|-------|-------|-------|-------|-------|-------|-------|
| Characteristics | <24 | 24–25 | 26–27 | 28–29 | 30–31 | 32–33 | 34–36 | 37–43 | Total |
| Number | | | | | | | | | |
| Male | 3 | 56 | 51 | 38 | 32 | 32 | 99 | 247 | 558 |
| Female | 5 | 57 | 31 | 19 | 12 | 21 | 74 | 194 | 413 |
| Congenital anomaly present | 2 | 12 | 21 | 16 | 25 | 42 | 154 | 404 | 676 |
| Congenital anomaly diagnosed antenatally | 0 | 2 | 2 | 5 | 12 | 24 | 111 | 219 | 375 |
| Proven NEC | 1 | 26 | 19 | 14 | 3 | 3 | 3 | 1 | 70 |
| Hospital of birth: | | | | | | | | | |
| ▪ Tertiary | 7 | 102 | 73 | 52 | 39 | 36 | 136 | 298 | 743 |
| ▪ Non-tertiary | 0 | 11 | 7 | 5 | 6 | 16 | 36 | 135 | 216 |
| Median LOS for survivors (days) | 142 | 133 | 120 | 86 | 61 | 44 | 29 | 21 | 37 |
| Died before discharge home | 1 | 19 | 9 | 6 | 5 | 2 | 10 | 17 | 69 |
| Total in each age group | 8 | 113 | 82 | 57 | 45 | 53 | 173 | 441 | 972 |
| Per cent | | | | | | | | | |
| Male | 37.5 | 49.6 | 62.2 | 66.7 | 71.1 | 60.4 | 57.2 | 56.0 | 57.4 |
| Female | 62.5 | 50.4 | 37.8 | 33.3 | 26.7 | 39.6 | 42.8 | 44.0 | 42.5 |
| Congenital anomaly present | 25.0 | 10.6 | 25.6 | 28.1 | 55.6 | 79.2 | 89.0 | 91.6 | 69.5 |
| Congenital anomaly diagnosed antenatally | 0.0 | 1.8 | 2.4 | 8.8 | 26.7 | 45.3 | 64.2 | 49.7 | 38.6 |
| Hospital of birth: | | | | | | | | | |
| ▪ Tertiary | 87.5 | 90.3 | 89.0 | 91.2 | 86.7 | 67.9 | 78.6 | 67.6 | 76.4 |
| ▪ Non-tertiary | 0.0 | 9.7 | 8.5 | 8.8 | 13.3 | 30.2 | 20.8 | 30.6 | 22.2 |
| Proven NEC | 12.5 | 23.0 | 23.2 | 24.6 | 6.7 | 5.7 | 1.7 | 0.2 | 7.2 |
| Died before discharge home | 12.5 | 16.8 | 11.0 | 10.5 | 11.1 | 3.8 | 5.8 | 3.9 | 7.1 |
| Total in each age group | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |

Congenital anomalies

In 2011, 1,330 ANZNN registrants (14.5%) had one or more congenital anomalies. For registrants who had a congenital anomaly, 19.2% were born before 32 weeks gestation, 29.7% were born between 32 and 36 weeks gestation and more than half of registrants (51.1%) were born at term.

Over half of ANZNN registrants (51.3%) with congenital anomalies were diagnosed during the antenatal period with 9.2% of babies recorded as having a fatal congenital anomaly. A higher percentage of babies with congenital anomalies were male (59.0%).

Transfer from level III NICUs to other units

Once intensive care is no longer required babies are often transferred to a level II unit, sometimes referred to as a 'special care baby unit', either within the same hospital or to another hospital for convalescence before discharge home. In 2011, two in five of ANZNN registrants (39.1%) were transferred from a level III unit to a level II unit before discharge home. Almost half of the registrants (48.0%) transferred from level III to level II units were born at less than 32 weeks gestation compared to 13.3% born at term.

Some level III registrants required transfer to a specialist children's hospital and in 2011 these accounted for 3.9% of transfers from level III units. Overall 54.1% of level III registrants were not transferred after registration (Table 26).

TABLE 26: Transfer after registration of level III registrants by level of destination hospital and gestational age group, 2011

| | Gestational age group | | | | | | | | |
|---------------------|-----------------------|-------|-------|-------|-------|-------|-------|-------|-------|
| Transfer status | <24 | 24–25 | 26–27 | 28–29 | 30–31 | 32–33 | 34–36 | 37–43 | Total |
| Number | | | | | | | | | |
| Not transferred | 41 | 257 | 275 | 412 | 520 | 543 | 967 | 1,881 | 4,896 |
| Level III hospital | 2 | 28 | 40 | 36 | 42 | 35 | 30 | 41 | 254 |
| Level II hospital | 4 | 105 | 262 | 441 | 888 | 776 | 595 | 471 | 3,542 |
| Children's hospital | 6 | 29 | 34 | 27 | 23 | 28 | 60 | 149 | 356 |
| Not stated | 2 | 4 | 13 | 15 | 30 | 21 | 25 | 24 | 134 |
| Total | 55 | 423 | 624 | 931 | 1,503 | 1,403 | 1,677 | 2,566 | 9,182 |
| Per cent | | | | | | | | | |
| Not transferred | 77.4 | 61.3 | 45.0 | 45.0 | 35.3 | 39.3 | 58.5 | 74.0 | 54.1 |
| Level III hospital | 3.8 | 6.7 | 6.5 | 3.9 | 2.9 | 2.5 | 1.8 | 1.6 | 2.8 |
| Level II hospital | 7.5 | 25.1 | 42.9 | 48.1 | 60.3 | 56.2 | 36.0 | 18.5 | 39.1 |
| Children's hospital | 11.3 | 6.9 | 5.6 | 2.9 | 1.6 | 2.0 | 3.6 | 5.9 | 3.9 |
| Total | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |

Note: Not stated data are excluded from per cent calculations

Length of stay until discharge home

Factors that influence a baby's length of stay (LOS) in hospital are gestational age, birthweight and plurality. Preterm and low birthweight babies require more intensive care, lengthening their hospital stay. Extremely preterm babies are usually discharged home by the time they reach 40 weeks corrected age.

In ANZNN the LOS includes all the time the baby spends in hospital from the first day of their first admission up until and including the day of their discharge home. The LOS has added together the time spent in all hospitals. It does not include the time spent in hospital in any subsequent admissions from home, nor does it include periods spent in 'Hospital in the Home' programs. Discharge information was available for 94.0% of ANZNN registrants in 2011. The median length of stay was 29 days with an interquartile range of 12–53 days (Table 27). LOS is inversely related to gestational age with the very preterm and extremely preterm babies having a longer stay in hospital than those babies born at or near term.

Babies born at less than 32 weeks gestation spent approximately 203,042 days in hospital, babies born between 32 and 36 weeks spent 73,328 days and babies born at term spent 34,910 days in hospital.

TABLE 27: Median length of stay for level III registrants who survived until discharge home by gestational age, 2011

| Gestational age (completed weeks) | Number of babies | Median LOS (in days) | Interquartile range (in days) |
|--|-------------------------|-----------------------------|--|
| <24 | 29 | 125.5 | 115–143.5 |
| 24 | 123 | 129 | 106–150 |
| 25 | 181 | 107.5 | 94–127 |
| 26 | 250 | 93 | 82–110 |
| 27 | 302 | 78 | 69–91 |
| 28 | 430 | 69 | 62–80 |
| 29 | 460 | 59 | 51–69 |
| 30 | 621 | 47 | 41–56 |
| 31 | 858 | 39 | 33–47 |
| 32 | 747 | 32 | 26–41 |
| 33 | 636 | 25 | 19–31 |
| 34 | 648 | 20 | 15–26 |
| 35 | 527 | 15 | 10–23 |
| 36 | 454 | 11 | 7–20 |
| 37 | 453 | 9 | 5–19 |
| 38 | 570 | 9 | 5–18 |
| 39 | 547 | 9 | 4–17 |
| 40 | 514 | 7 | 4–15 |
| 41 | 324 | 6 | 4–11 |
| 42 | 33 | 7 | 4–14 |
| 43 | 2 | 12 | 2–22 |
| Total | 8,709 | 29 | 12–53 |

Note: Death status was not provided for one baby.

Survival of the ANZNN registrants

In 2011, 94.8% of ANZNN registrants survived to go home. These data include babies who were transferred to level I or level II units, those transferred to another level III unit and those babies transferred to a children's hospital. The survival rate to discharge home as shown in Table 28 does not encompass the following: fetal deaths; neonatal deaths that occurred on a labour ward; babies born in level II hospitals; and babies not transferred to an NICU or children's hospital.

During 2011, there were 472 neonatal deaths, of which 264 occurred in the early neonatal period that is within seven days of birth (Table 28). Mortality was highest among babies born before 27 weeks gestation with a survival rate at discharge increasing week on week from 52.7% for babies born before 24 weeks to 93.7% for babies born at 28 weeks (Table 28 and Figure 8). A similar pattern of increasing survival with increasing birthweight is seen in Figure 9.

Lethal congenital anomaly was the cause of death for 1.3% of registrants, with most occurring in babies born between 36–40 weeks gestation (Table 28).

TABLE 28: Survival to discharge home for level III registrants by gestational age at birth, 2011

| Gestational age (completed weeks) | Number of babies | Lethal congenital anomalies | Babies alive on day 7 | Babies alive on day 28 | Survived to go home | Per cent survival at discharge home |
|--|-------------------------|------------------------------------|------------------------------|-------------------------------|----------------------------|--|
| <24 | 55 | 1 | 35 | 29 | 29 | 52.7 |
| 24 | 193 | 1 | 162 | 140 | 123 | 63.7 |
| 25 | 230 | 0 | 199 | 188 | 181 | 78.7 |
| 26 | 298 | 6 | 273 | 264 | 250 | 83.9 |
| 27 | 326 | 1 | 314 | 309 | 302 | 92.6 |
| 28 | 459 | 6 | 448 | 437 | 430 | 93.7 |
| 29 | 472 | 5 | 462 | 460 | 460 | 97.5 |
| 30 | 633 | 5 | 629 | 626 | 621 | 98.1 |
| 31 | 870 | 5 | 861 | 861 | 858 | 98.6 |
| 32 | 757 | 6 | 751 | 749 | 747 | 98.7 |
| 33 | 646 | 6 | 640 | 637 | 636 | 98.5 |
| 34 | 665 | 10 | 654 | 652 | 648 | 97.4 |
| 35 | 538 | 5 | 532 | 530 | 527 | 98.0 |
| 36 | 474 | 9 | 464 | 456 | 454 | 95.8 |
| 37 | 475 | 13 | 462 | 457 | 453 | 95.4 |
| 38 | 604 | 19 | 587 | 576 | 570 | 94.4 |
| 39 | 576 | 13 | 561 | 555 | 547 | 95.0 |
| 40 | 543 | 8 | 525 | 518 | 514 | 94.7 |
| 41 | 332 | 3 | 324 | 324 | 324 | 97.6 |
| 42 | 34 | 0 | 33 | 33 | 33 | 97.1 |
| 43 | 2 | 0 | 2 | 2 | 2 | 100.0 |
| Total | 9,182 | 122 | 8,918 | 8,803 | 8,709 | 94.8 |

Note: Death status was not provided for one baby.

FIGURE 8: Survival of level III registrants to discharge home (with 95% CI) by gestational age, 2011

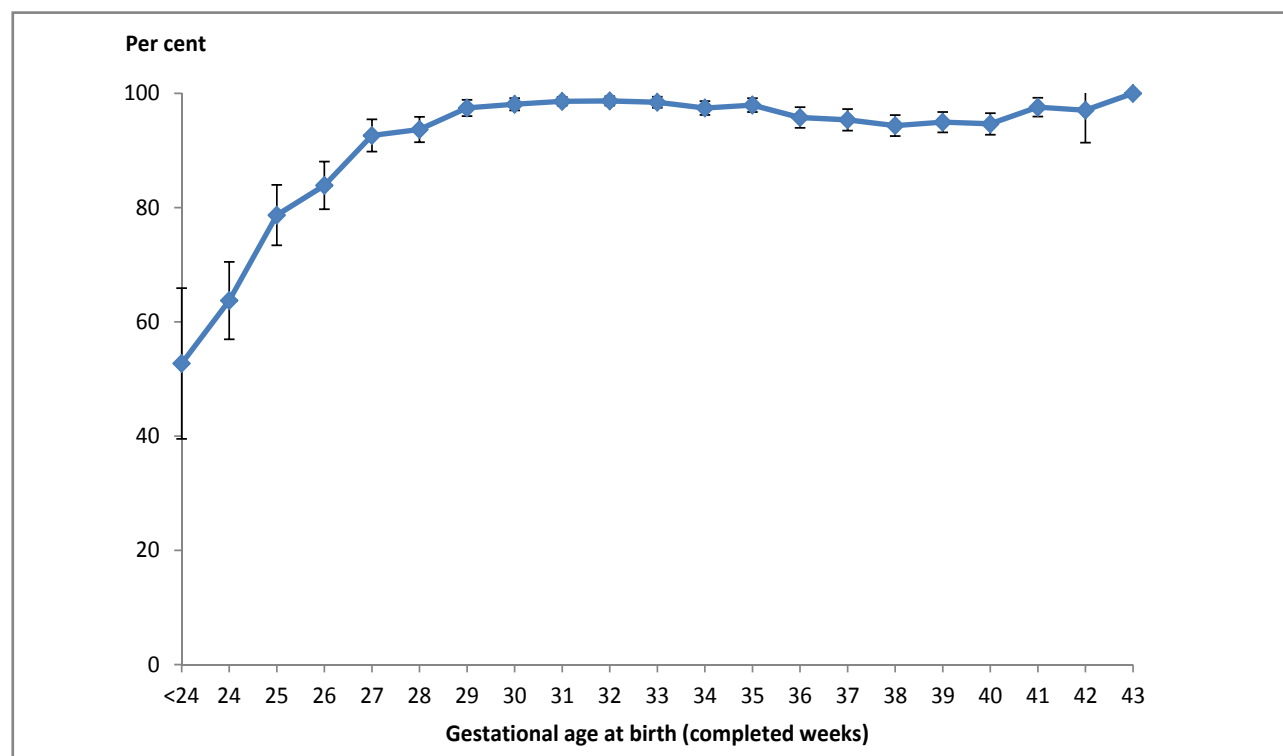
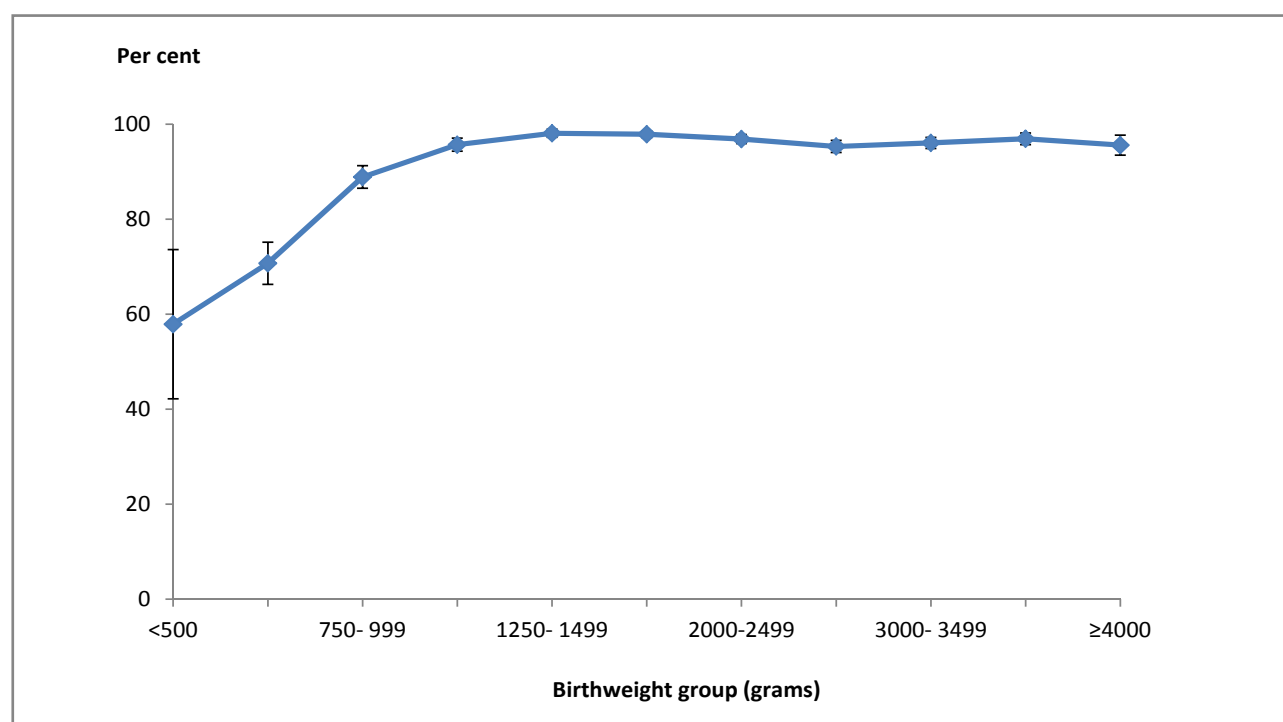


FIGURE 9: Survival of level III registrants to discharge home (with 95% CI) by birthweight group, 2011



5. Babies registered to level II units

Overview

Nurseries with facilities to manage mild or moderately ill babies are known as 'level II units' or 'special care baby units'. Individual nurseries may have varying levels of resources for giving special care. The ANZNN registration criteria for level II and level III units are the same. Babies born in a level II unit and transferred to a level III unit within 28 days of birth are registered to that level III unit. Babies are registered to a level II unit if their hospital stay was entirely within non-tertiary centre nurseries, or if they were transferred to a level III NICU after 28 days, or they were transferred to a level II nursery from a children's hospital without first having been admitted to a level III unit.

There are 16 level II units in New Zealand and ten in Australia that are members of the ANZNN. Altogether, 22 level II units contributed data for this 2011 report.

In 2011, 769 babies fulfilled the ANZNN criteria for registration to a level II unit. Of those babies, 10.7% were born at less than 32 weeks gestation and 9.0% weighed less than 1,500 grams at birth (Table 29 and Table 30). The highest number of babies registered to a level II unit in 2011 was 92.

TABLE 29: Level II registrants born at each completed week of gestation, 2011

| Gestational age group | Number of babies | Per cent | Cumulative per cent |
|--|------------------|--------------|---------------------|
| <28 | 7 | 0.9 | 0.9 |
| 28–29 | 14 | 1.8 | 2.7 |
| 30–31 | 61 | 7.9 | 10.7 |
| All babies <32 weeks gestation | 82 | 10.7 | |
| 32–33 | 147 | 19.1 | 29.8 |
| 34–36 | 218 | 28.4 | 58.2 |
| 37–43 | 321 | 41.8 | 100.0 |
| Total | 768 | 100.0 | |

Note: Gestational age groups below 28 weeks have been combined to maintain confidentiality of small numbers. Gestational age was not provided for one baby.

TABLE 30: Level II registrants by birthweight group, 2011

| Birthweight group (grams) | Number of babies | Per cent | Cumulative per cent |
|--|------------------|--------------|---------------------|
| <1,100 | 11 | 1.5 | 1.5 |
| 1,100–1,199 | 8 | 1.0 | 2.5 |
| 1,200–1,299 | 13 | 1.7 | 4.2 |
| 1,300–1,399 | 15 | 2.0 | 6.1 |
| 1,400–1,499 | 22 | 2.9 | 9.0 |
| All babies <1,500g birthweight | 69 | 9.0 | |
| 1,500–1,999 | 125 | 16.3 | 25.2 |
| 2,000–2,499 | 159 | 20.7 | 45.9 |
| 2,500–2,999 | 124 | 16.1 | 62.0 |
| 3,000–3,499 | 131 | 17.0 | 79.1 |
| 3,500–3,999 | 108 | 14.0 | 93.1 |
| ≥4,000 | 53 | 6.9 | 100.0 |
| Total | 769 | 100.0 | |

Note: Birthweight groups below 1,100g have been combined to maintain confidentiality of small numbers.

More than half of the level II registrants, 427 babies (55.5%), were born to Caucasian mothers, 56.0% of whom were born preterm. The number of registrants born to Maori mothers was 109 (14.2%), and 64 (58.7%) were born preterm. There were 19 babies (2.5%) born to Pacific Islander mothers.

There were 487 male (63.3%) and 274 female (35.6%) registrants in the audit. No gender was recorded for eight registrants (1.0%). Non-specific respiratory distress was the major reason for assisted ventilation for level II registrants.

Maternal, pregnancy and birth characteristics

Of the mothers of level II registrants, 21.1% did not present with any maternal complications. Among babies born before 37 weeks, 40.2% of mothers had presented with preterm labour (Table 31).

TABLE 31: Mothers of level II registrants presenting antenatal problem by gestational age group, 2011

| Presenting antenatal problem | Gestational age group | | | | | | Total |
|---|-----------------------|--------------|--------------|--------------|--------------|--------------|--------------|
| | <28 | 28–29 | 30–31 | 32–33 | 34–36 | 37–43 | |
| | Number | | | | | | |
| No antenatal problems | 0 | 0 | 0 | 0 | n.p. | n.p. | 160 |
| Preterm pre-labour rupture of membranes | 0 | n.p. | 7 | 22 | 50 | n.p. | 82 |
| Preterm labour | n.p. | n.p. | 32 | 56 | 80 | n.p. | 183 |
| Hypertension in pregnancy | n.p. | n.p. | 9 | 20 | 28 | 9 | 68 |
| Antepartum haemorrhage | n.p. | 0 | n.p. | 27 | 16 | 7 | 57 |
| Intrauterine growth restriction | 0 | n.p. | n.p. | 9 | 20 | 13 | 45 |
| Fetal distress | 0 | 0 | 5 | 6 | 7 | 75 | 93 |
| Other problem | 0 | 0 | n.p. | n.p. | 14 | 41 | 62 |
| Congenital anomalies | 0 | 0 | n.p. | n.p. | n.p. | n.p. | 8 |
| Not stated | 0 | 2 | 0 | 0 | 0 | 8 | 10 |
| Total | 7 | 14 | 61 | 147 | 218 | 321 | 769 |
| Per cent | | | | | | | |
| No antenatal problems | 0.0 | 0.0 | 0.0 | 0.0 | n.p. | n.p. | 21.1 |
| Preterm pre-labour rupture of membranes | 0.0 | n.p. | 11.5 | 15.0 | 22.9 | n.p. | 10.8 |
| Preterm labour | n.p. | n.p. | 52.5 | 38.1 | 36.7 | n.p. | 24.1 |
| Hypertension in pregnancy | n.p. | n.p. | 14.8 | 13.6 | 12.8 | 2.9 | 9.0 |
| Antepartum haemorrhage | n.p. | 0.0 | n.p. | 18.4 | 7.3 | 2.2 | 7.5 |
| Intrauterine growth restriction | 0.0 | n.p. | n.p. | 6.1 | 9.2 | 4.2 | 5.9 |
| Fetal distress | 0.0 | 0.0 | 8.2 | 4.1 | 3.2 | 24.0 | 12.3 |
| Other problem | 0.0 | 0.0 | n.p. | n.p. | 6.4 | 13.1 | 8.2 |
| Congenital anomalies | 0.0 | 0.0 | n.p. | n.p. | n.p. | n.p. | 1.1 |
| Total | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |

n.p. Data not published to maintain confidentiality of small numbers.

Note: Not stated data are excluded from per cent calculations.

Gestational age was not provided for one baby.

Previous preterm births were reported by 92 (12.0%) of the mothers of level II registrants and 20 mothers (2.6%) had had a previous perinatal death(s).

Most mothers (85.2%) of level II registrants had booked into a level II hospital for delivery. Of the level II registrants born before 34 weeks gestation, 65.1% of the mothers were given antenatal corticosteroids within seven days of the birth (Table 32).

TABLE 32: Antenatal corticosteroid use by mothers of level II registrants by gestational age group, 2011

| Antenatal corticosteroids | Gestational age group | | | | | | Total |
|---------------------------|-----------------------|--------------|--------------|--------------|--------------|--------------|--------------|
| | <28 | 28–29 | 30–31 | 32–33 | 34–36 | 37–43 | |
| | Number | | | | | | |
| None | n.p. | n.p. | n.p. | 40 | 154 | 306 | 515 |
| Incomplete course | n.p. | n.p. | 23 | 46 | 12 | 0 | 90 |
| Complete course | 0 | n.p. | 21 | 44 | 27 | n.p. | 101 |
| Completed >7 days | 0 | 0 | n.p. | 12 | 10 | n.p. | 27 |
| Not stated | 0 | 3 | 1 | 5 | 15 | 11 | 35 |
| Total | 7 | 14 | 61 | 147 | 218 | 321 | 769 |
| Per cent | | | | | | | |
| None | n.p. | n.p. | n.p. | 28.2 | 75.9 | 98.7 | 70.3 |
| Incomplete course | n.p. | n.p. | 38.3 | 32.4 | 5.9 | 0.0 | 12.3 |
| Complete course | 0.0 | n.p. | 35.0 | 31.0 | 13.3 | n.p. | 13.8 |
| Completed >7 days | 0.0 | 0.0 | n.p. | 8.5 | 4.9 | n.p. | 3.7 |
| Total | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |

n.p. Data not published to maintain confidentiality of small numbers.

Note: Not stated data are excluded from per cent calculations.

Gestational age was not provided for one baby.

Caesarean section was the most common method of birth for 51.3% of level II registrants, with just over half (54.0%) of these occurring before the onset of labour (Table 33).

TABLE 33: Method of delivery for level II registrants by gestational age group, 2011

| | Gestational age group | | | | | | |
|--------------------------|-----------------------|--------------|--------------|--------------|--------------|--------------|--------------|
| Method of delivery | <28 | 28–29 | 30–31 | 32–33 | 34–36 | 37–43 | Total |
| Number | | | | | | | |
| Vaginal ^(a) | n.p. | n.p. | 28 | 63 | 91 | 178 | 371 |
| Caesarean ^(b) | n.p. | n.p. | 33 | 84 | 126 | 139 | 391 |
| Not stated | 0 | 1 | 0 | 0 | 1 | 4 | 6 |
| Total | 7 | 14 | 61 | 147 | 218 | 321 | 769 |
| Per cent | | | | | | | |
| Vaginal | n.p. | n.p. | 45.9 | 42.9 | 41.9 | 56.2 | 48.7 |
| Caesarean | n.p. | n.p. | 54.1 | 57.1 | 58.1 | 43.8 | 51.3 |
| Total | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |

n.p. Data not published to maintain confidentiality of small numbers.

^(a) Vaginal and assisted births have been combined to maintain confidentiality of small numbers.

^(b) Caesarean section deliveries in labour and no labour have been combined to maintain confidentiality of small numbers.

Note: Not stated data are excluded from per cent calculations.

Gestational age was not provided for one baby.

Characteristics of level II babies

Among the 769 babies registered to level II units, 89 were from multiple births (11.6%). There were 487 male births and eight babies whose gender was not recorded.

A low Apgar score of less than 4 at one minute of age was recorded for 14.4% of babies and 51.4% of them required endotracheal intubation in the labour ward to assist in their adaptation to extrauterine life.

Non-specific respiratory distress (54.1%) was the major reason for assisted ventilation for level II registrants, followed by hyaline membrane disease (25.6%) (Table 34).

For level II registrants, the median duration of assisted ventilation by IPPV was 21.5 hours and 18 hours by CPAP. The median duration of respiratory support (airway support or supplemental oxygen therapy) was 2 days (Table 35).

TABLE 34: Indication for respiratory support for level II registrants by gestational age group, 2011

| Indication for respiratory support for term neonates by gestational age group, 2011 | | | | | | | |
|---|-----------------------|--------------|--------------|--------------|--------------|--------------|--------------|
| Indication for respiratory support | Gestational age group | | | | | | Total |
| | <28 | 28–29 | 30–31 | 32–33 | 34–36 | 37–43 | |
| | Number | | | | | | |
| No support | n.p. | 0 | 8 | 11 | 11 | n.p. | 32 |
| Non specific distress | 0 | 0 | 23 | 61 | 125 | 197 | 406 |
| Hyaline membrane disease | n.p. | n.p. | 24 | 63 | 62 | 27 | 192 |
| Meconium aspiration syndrome | 0 | 0 | 0 | n.p. | n.p. | 39 | 42 |
| Pneumonia | 0 | 0 | 0 | n.p. | n.p. | 24 | 28 |
| Persistent pulmonary hypertension | 0 | 0 | 0 | n.p. | n.p. | n.p. | 6 |
| Apnoea | 0 | n.p. | n.p. | n.p. | 5 | 6 | 18 |
| Congenital anomaly | n.p. | 0 | n.p. | n.p. | n.p. | n.p. | 7 |
| Other | 0 | 0 | 0 | 0 | n.p. | n.p. | 3 |
| Peri-surgery | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Newborn encephalopathy | 0 | 0 | 0 | n.p. | n.p. | 13 | 16 |
| Not stated | 0 | 2 | 1 | 4 | 6 | 5 | 18 |
| Total | 7 | 14 | 61 | 147 | 218 | 321 | 769 |
| Per cent | | | | | | | |
| No support | n.p. | 0.0 | 13.3 | 7.7 | 5.2 | n.p. | 4.3 |
| Non specific distress | 0.0 | 0.0 | 38.3 | 42.7 | 59.0 | 62.3 | 54.1 |
| Hyaline membrane disease | n.p. | n.p. | 40.0 | 44.1 | 29.2 | 8.5 | 25.6 |
| Meconium aspiration syndrome | 0.0 | 0.0 | 0.0 | n.p. | n.p. | 12.3 | 5.6 |
| Pneumonia | 0.0 | 0.0 | 0.0 | n.p. | n.p. | 7.6 | 3.7 |
| Persistent pulmonary hypertension | 0.0 | 0.0 | 0.0 | n.p. | n.p. | n.p. | 0.8 |
| Apnoea | 0.0 | n.p. | n.p. | n.p. | 2.4 | 1.9 | 2.4 |
| Congenital anomaly | n.p. | 0.0 | n.p. | n.p. | n.p. | n.p. | 0.9 |
| Other | 0.0 | 0.0 | 0.0 | 0.0 | n.p. | n.p. | 0.4 |
| Peri-surgery | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Newborn encephalopathy | 0.0 | 0.0 | 0.0 | n.p. | n.p. | 4.1 | 2.1 |
| Total | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |

n.p. Data not published to maintain confidentiality of small numbers.

Note: Not stated data are excluded from per cent calculations.

Gestational age was not provided for one baby.

TABLE 35: Duration of assisted ventilation and oxygen use by level II registrants by gestational age group, 2011

| Median & Interquartile range (IQR) | Gestational age group | | | | | | Total |
|--|-----------------------|------------|---------|-------|---------|-------|-------|
| | <28 | 28–29 | 30–31 | 32–33 | 34–36 | 37–43 | |
| IPPV (hours) | | | | | | | |
| Median | 2.5 | 51.5 | 49 | 36 | 33.5 | 13 | 21.5 |
| IQR | 2–4.5 | 30.5–106.5 | 42–49 | 14–65 | 14.5–46 | 4–30 | 6–47 |
| CPAP (hours) | | | | | | | |
| Median | 2 | 118 | 42.5 | 25 | 18.5 | 14 | 18 |
| IQR | 2–2 | 44–278 | 18–88.5 | 13–55 | 10–39.5 | 8–27 | 10–41 |
| Airway support or supplemental oxygen (days) | | | | | | | |
| Median | 1 | 4 | 2 | 2 | 2 | 2 | 2 |
| IQR | 1–1 | 1–9 | 2–4 | 1–3 | 1–4 | 1–3 | 1–3 |

Note: IQR = Interquartile range.

Eye examination

Screening for retinopathy of prematurity (ROP) was reported for 26 of the 51 eligible babies born at less than 31 weeks gestational age and/or weighing less than 1,250 grams at birth. Most were reported as normal except for four babies who had stage 1 and one baby who had stage 2 ROP.

Cerebral ultrasound

Of the 82 babies born at less than 32 weeks, 57 (70.4%) had a cerebral ultrasound in the first week after birth. Forty-six of them were reported as normal, that is no intraventricular haemorrhage (IVH), nine reported a grade 1 IVH, one reported a grade 2 IVH and one reported a grade 4 IVH. Most babies who did not have an early cerebral ultrasound reported at this time were born at 30 or 31 weeks gestation. A late cerebral ultrasound was reported for 36 babies, all of whom had normal reports except for one baby with reported cysts.

Other morbidities

Septicaemia was proven in 25 babies, including 18 before day two, that is less than 48 hours. There were three cases of necrotising enterocolitis and two of these babies required surgery. Major congenital anomalies were reported for 19 babies, three required surgery, and six registrants died due to congenital anomalies.

Level II transfers

In total 85 level II registrants were transferred to other units, 46 were transferred to a level I or II unit, 35 were transferred to a level III unit and the remaining four to a children's hospital.

Survival

There were 752 level II registrants who survived to discharge home (97.8%). Ten babies died within the first seven days of birth and a further seven babies died before discharge home. Six babies were reported to have had a lethal congenital anomaly (Table 36).

TABLE 36: Survival to discharge home for level II registrants by gestational age group, 2011

| Gestational age group | All babies | Lethal congenital anomalies | Babies alive on day 7 | Babies alive on day 28 | Survived to go home | Per cent |
|------------------------------|-------------------|------------------------------------|------------------------------|-------------------------------|----------------------------|-----------------|
| <28 | 7 | n.p. | n.p. | n.p. | n.p. | 42.9 |
| 28-29 | 14 | 0 | 14 | 14 | 14 | 100.0 |
| 30-31 | 61 | n.p. | 60 | 60 | 58 | 95.1 |
| 32-33 | 147 | n.p. | 146 | 146 | 144 | 98.0 |
| 34-36 | 218 | n.p. | 217 | 217 | 216 | 99.1 |
| 37-43 | 321 | n.p. | 317 | 317 | 316 | 98.4 |
| All babies | 769 | 6 | 759 | 759 | 752 | 97.8 |

n.p. Data not published to maintain confidentiality of small numbers.

Note: Gestational age groups below 28 weeks have been combined to maintain confidentiality of small numbers.

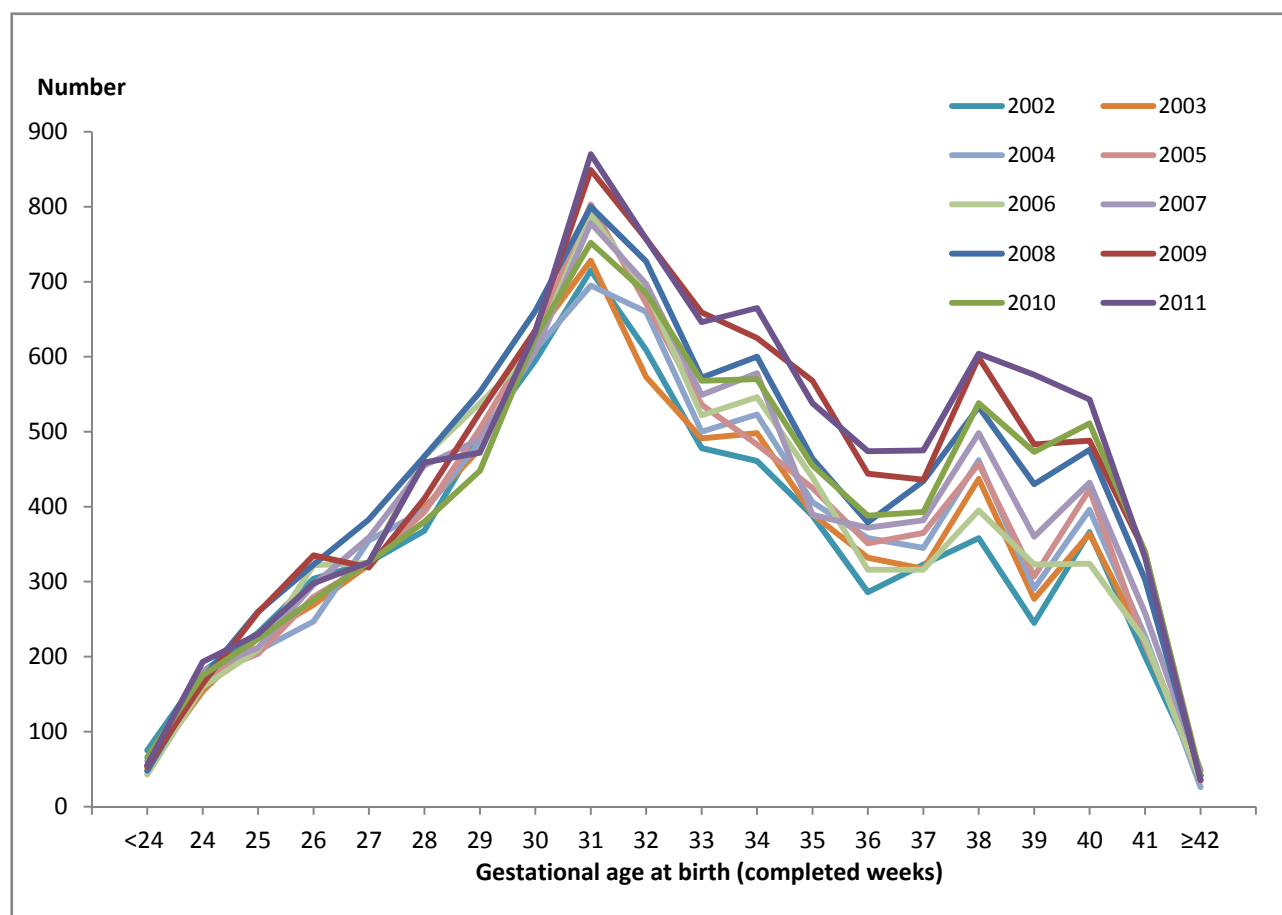
Gestational age was not provided for one baby.

Death status was not provided for six babies.

APPENDICES

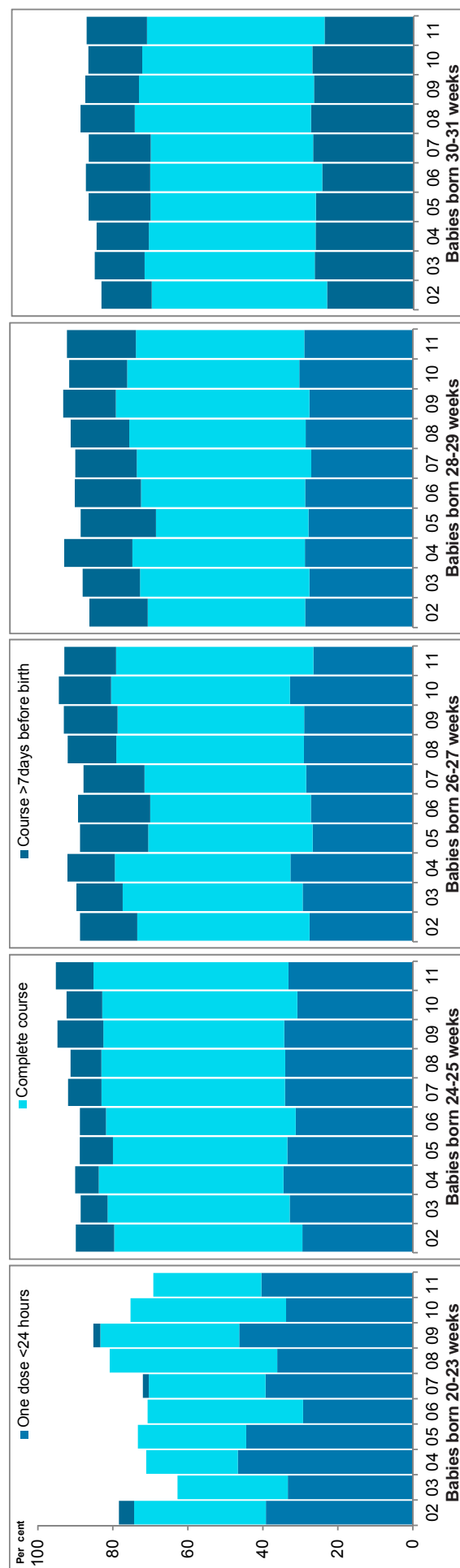
Appendix 1: Trends

FIGURE 10: Trends in gestational age at birth of level III registrants, 2002–2011



Note: Data on the ANZNN registrants from two level III NICUs were not included in 2010.

FIGURE 11: Trends in the use of corticosteroids for mothers of babies less than 32 weeks gestation, 2002–2011



Note: Corticosteroid treatment to enhance fetal lung maturation is considered 'complete' when two doses are given, the first dose more than 24 hours and less than 8 days before the baby's birth. Stacked bars represent annual cumulative percentages

FIGURE 12: Trends in multiple births of level III registrants by gestational age group, 2002–2011

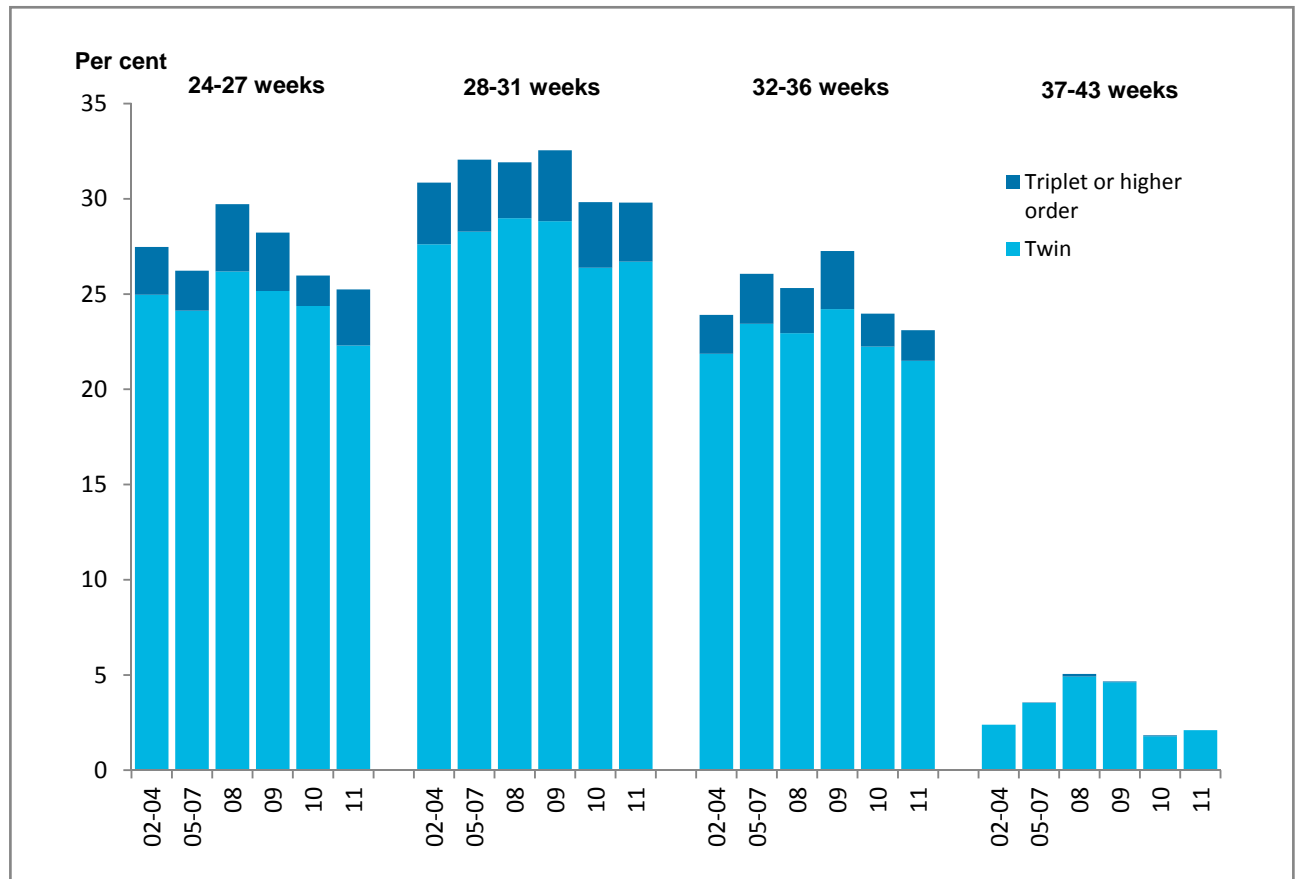


FIGURE 13: Trends in method of birth for level III registrants by year of birth, 2002–2011

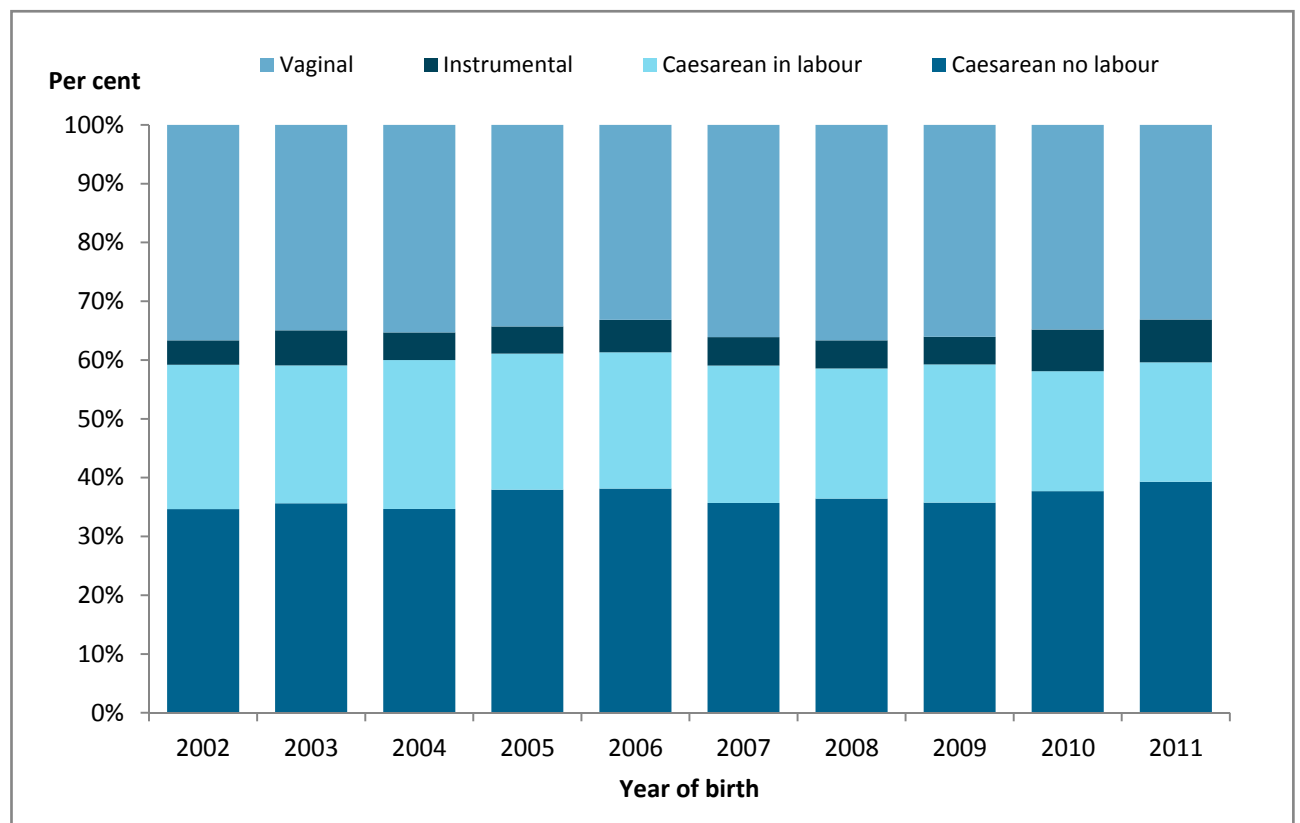


FIGURE 14: Trends in referral source to level III NICU by year of birth, 2002–2011

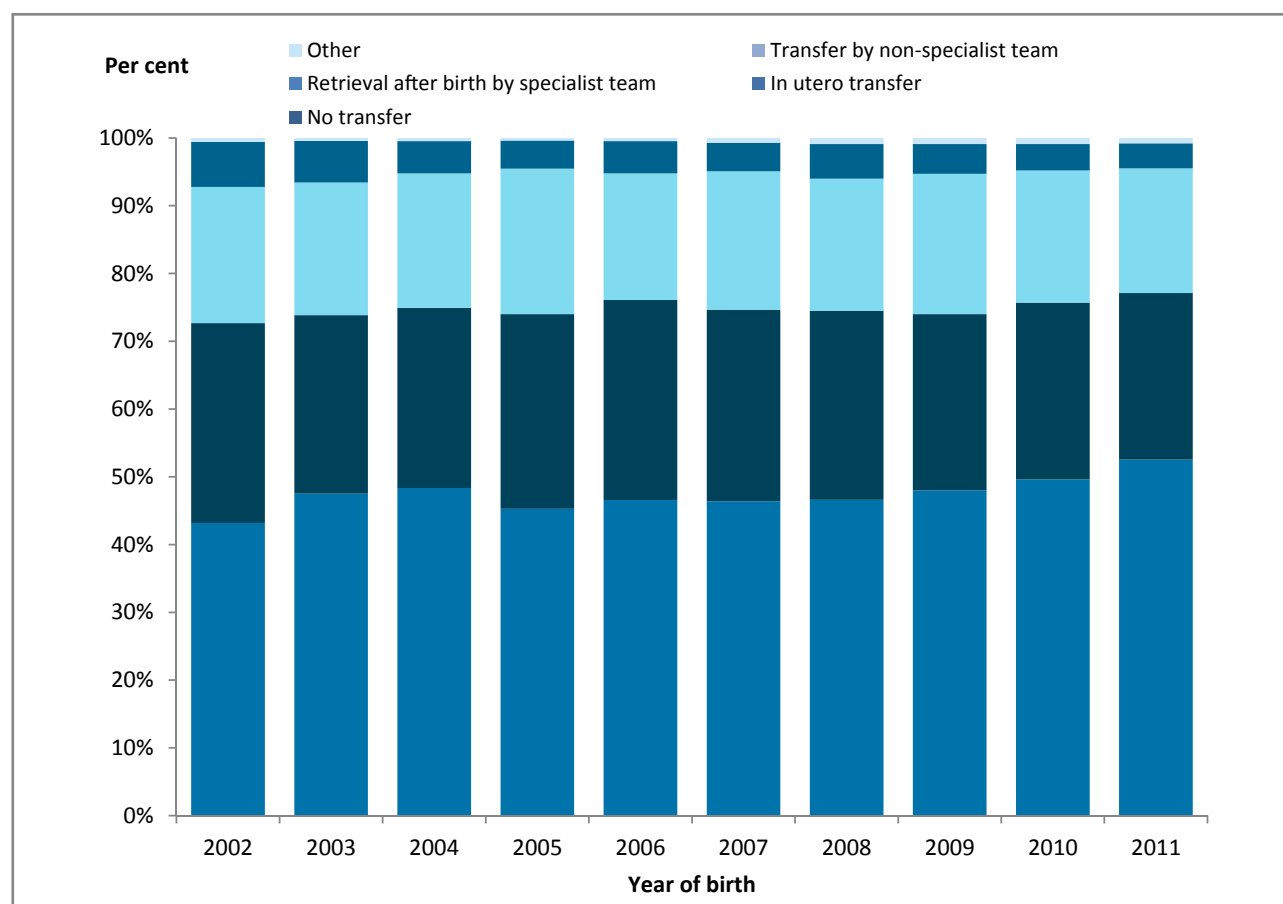


FIGURE 15: Trends in mode of transport to level III NICU, 2002-2011

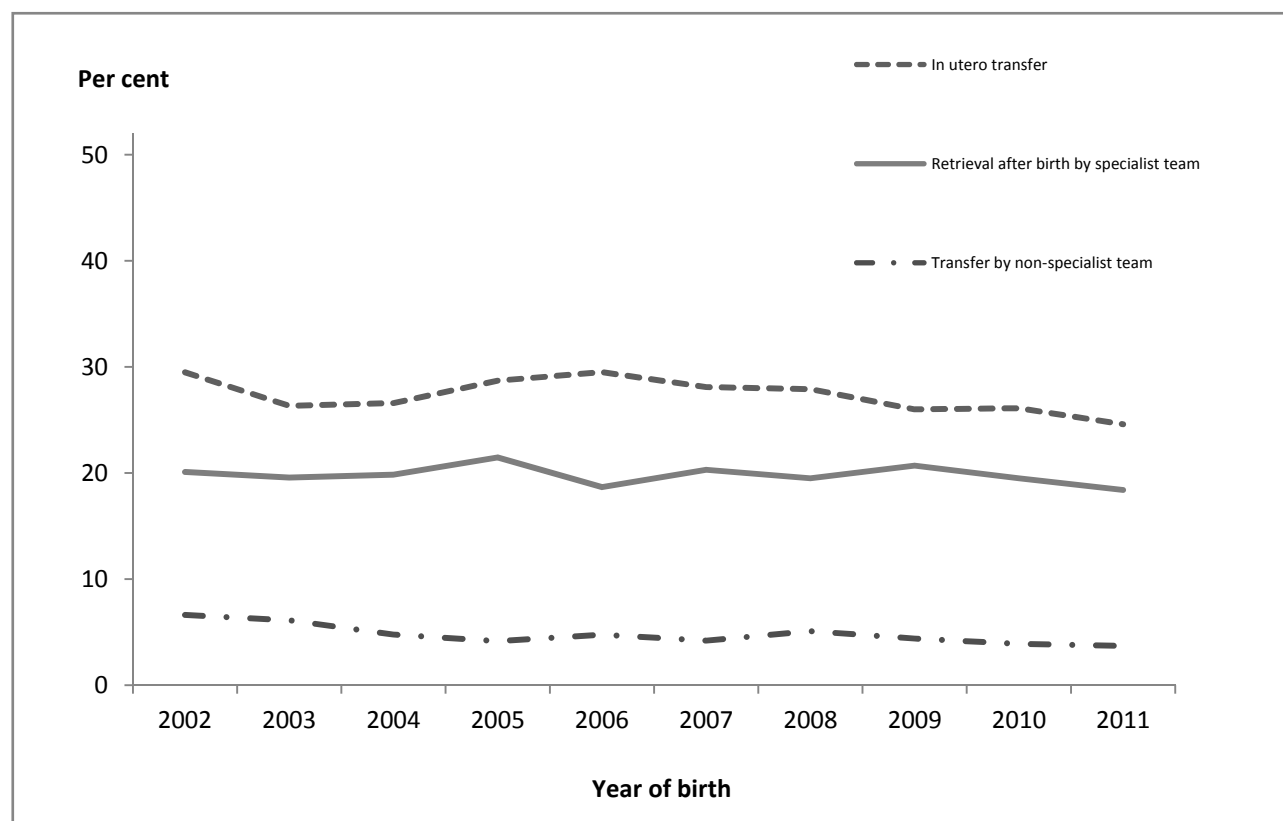


FIGURE 16: Trends in mode of assisted ventilation for level III registrants, 2002–2011

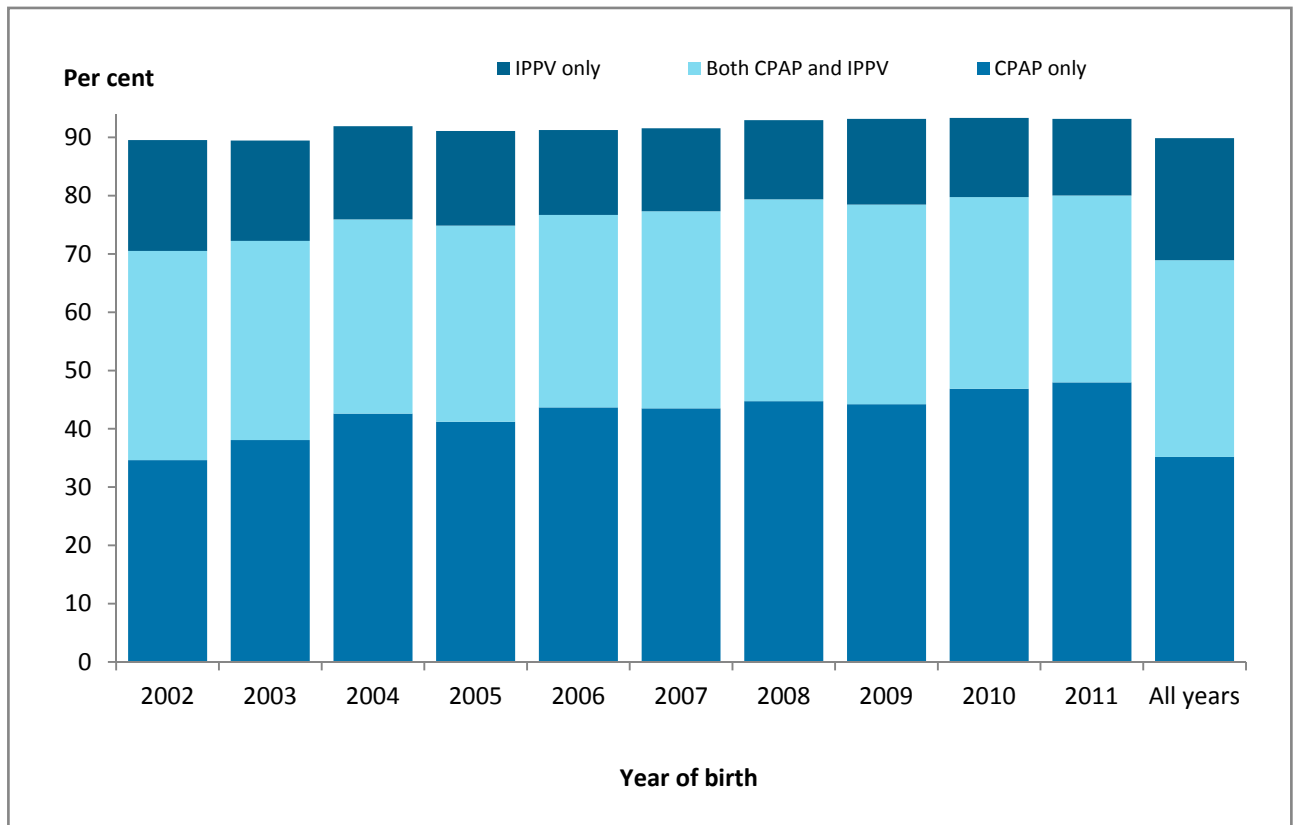


FIGURE 17: Trends in provision of intermittent positive pressure ventilation and continuous positive pressure ventilation by year of birth for level III registrants ventilated, 2002–2011

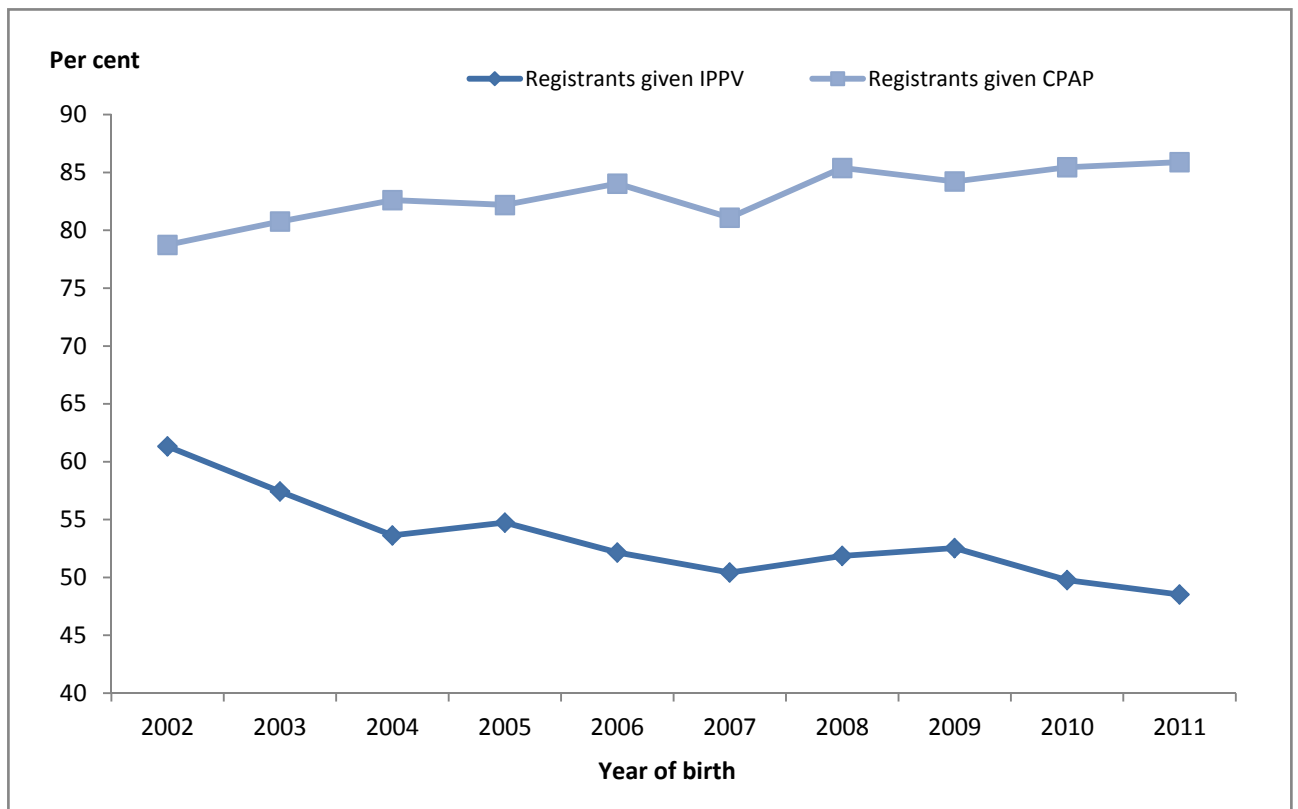


FIGURE 18: Trends in the use of CPAP as the only form of ventilation by gestational age for level III registrants, 2002, 2005, 2008–2011

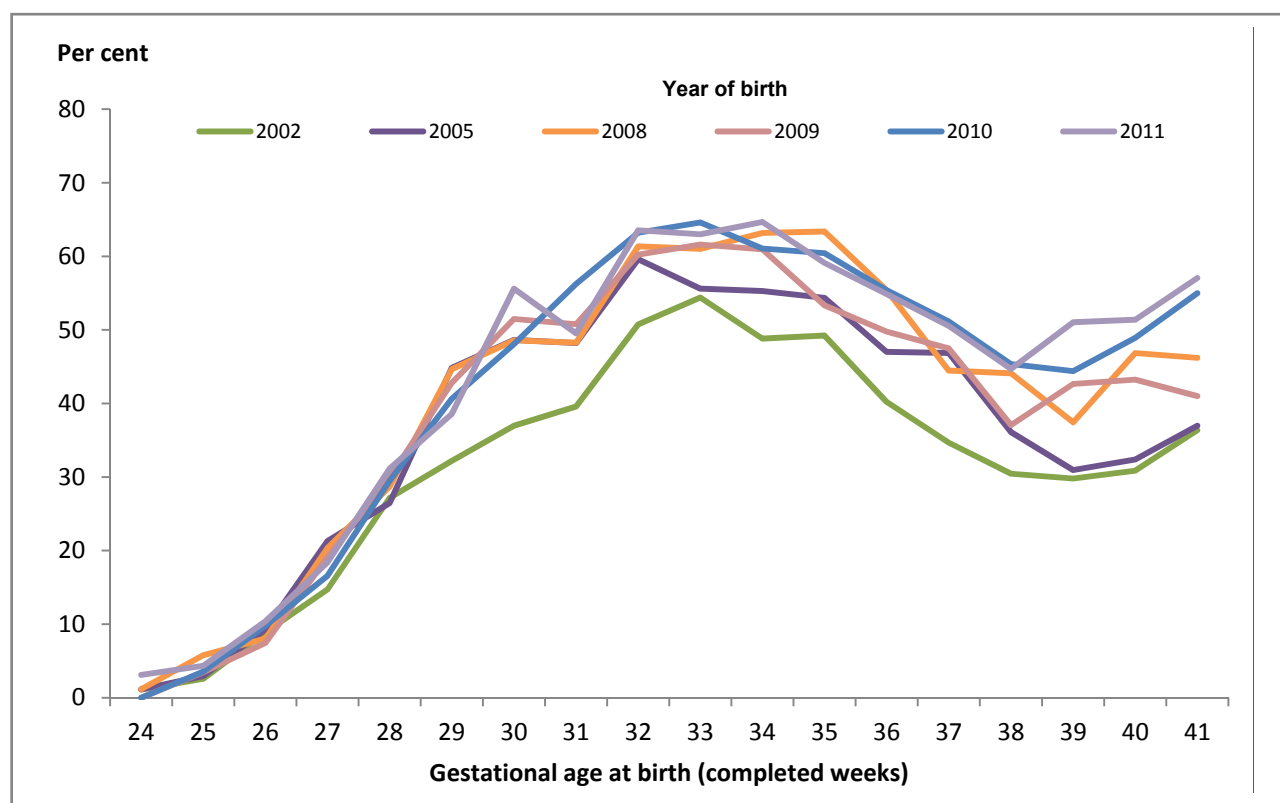
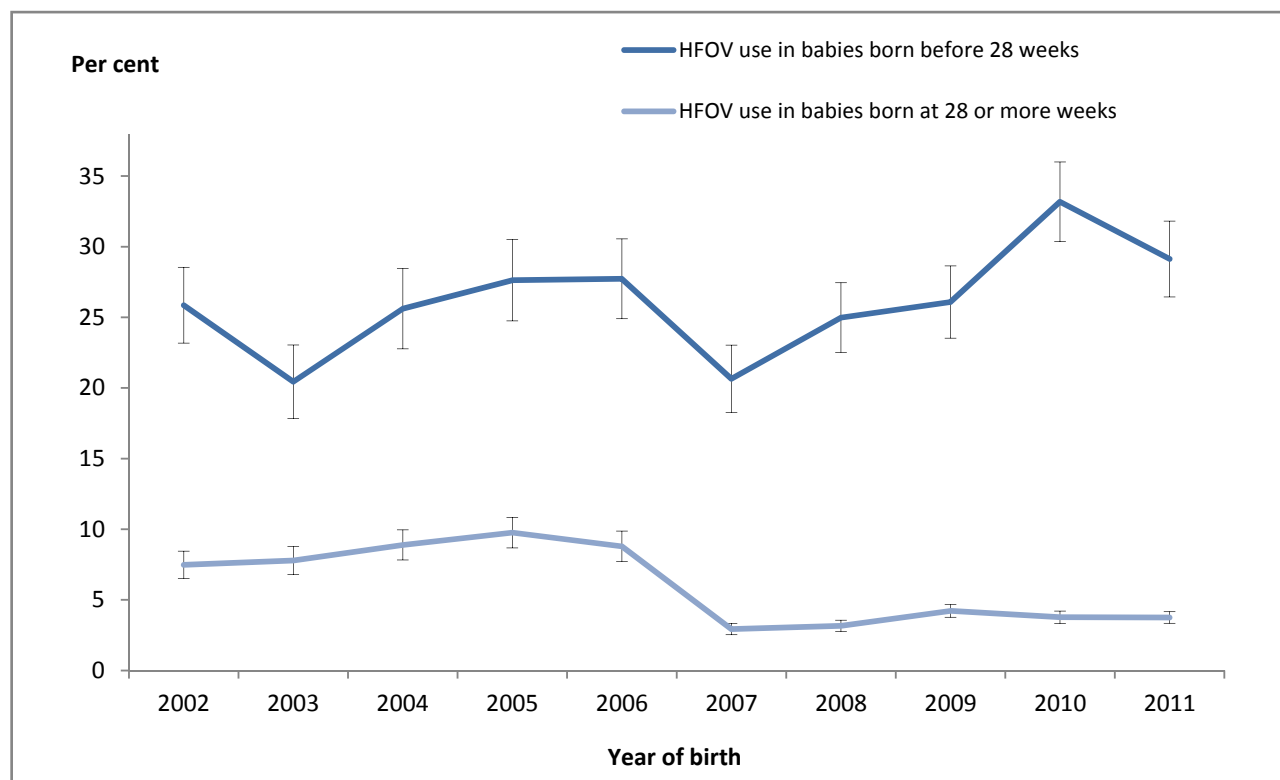
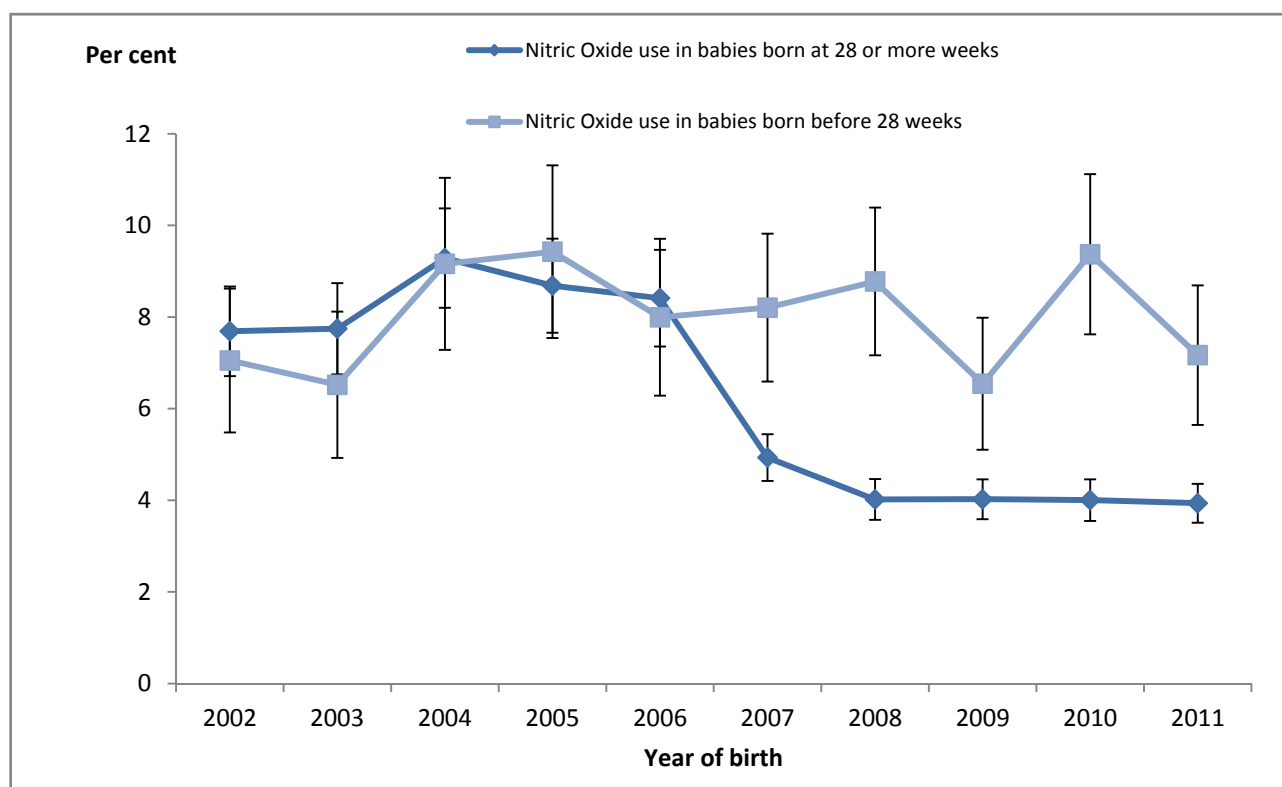


FIGURE 19: Trends in provision of high frequency oscillatory ventilation (with 95% CI) for level III registrants born before 28 weeks and at 28 or more weeks gestation, 2002–2011



Note: The results are given as the percentage of babies given IPPV.

FIGURE 20: Trends in nitric oxide (with 95% CI) provision for level III registrants born before 28 weeks and 28 or more weeks gestation, 2002–2011



Note: Results are given as the percentage of babies given IPPV.

FIGURE 21: Incidence of chronic lung disease (with 95% CI) for level III registrants by gestational age, 2011

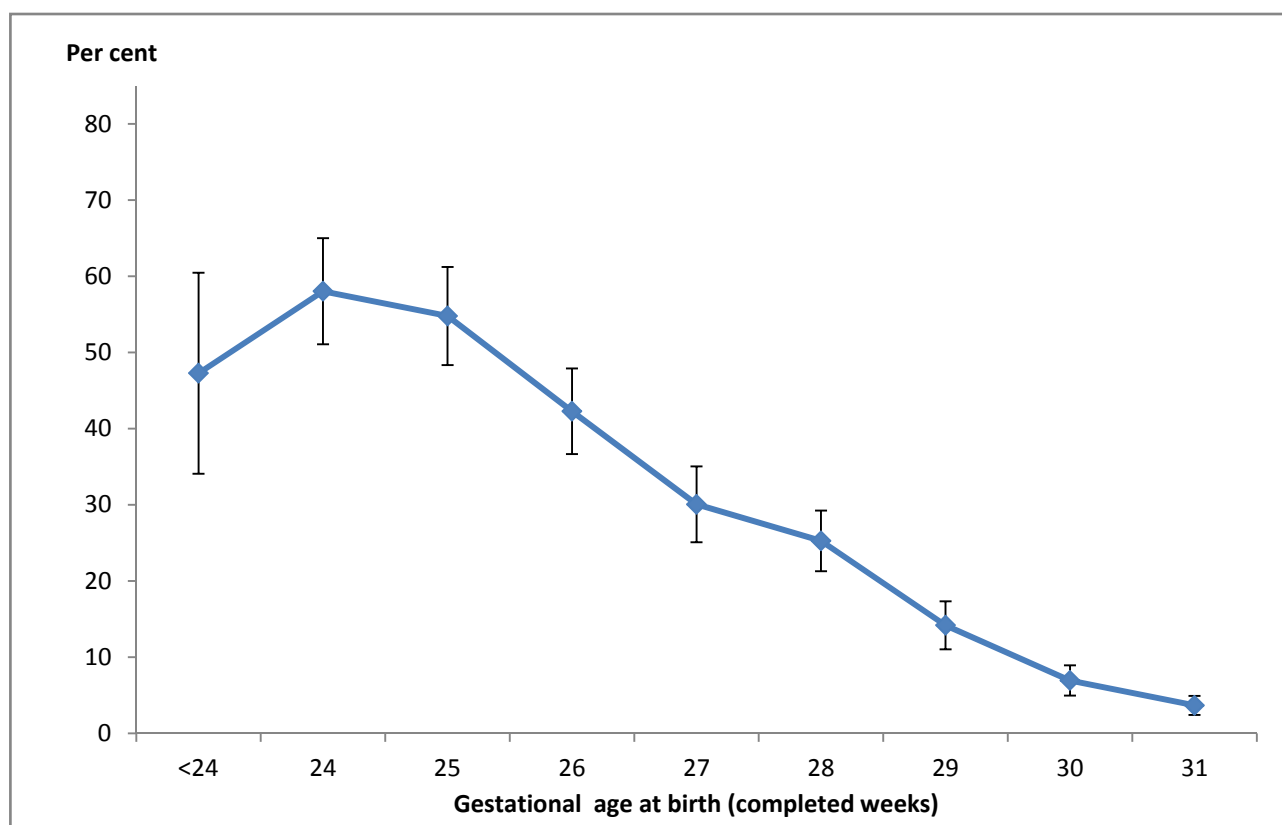


FIGURE 22: Stage 3 or 4 retinopathy of prematurity and treated retinopathy among babies born before 31 weeks gestation and/or birthweight of less than 1,250 grams who survived to 36 weeks corrected age for level III registrants, 2005–2011

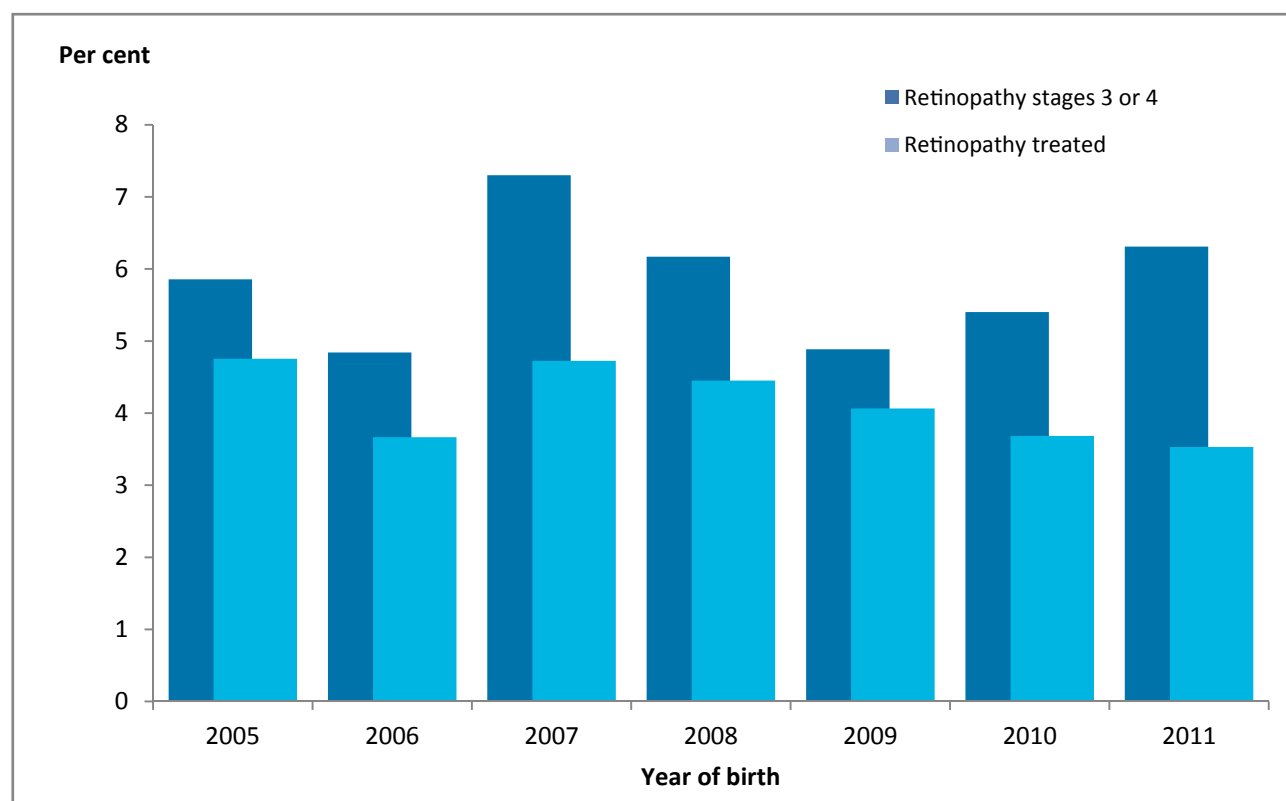


FIGURE 23: Trends in grade 3 or 4 intraventricular haemorrhage (with 95% CI) in babies born at less than 32 weeks gestation who survived to day 3 for level III registrants, 2002–2011

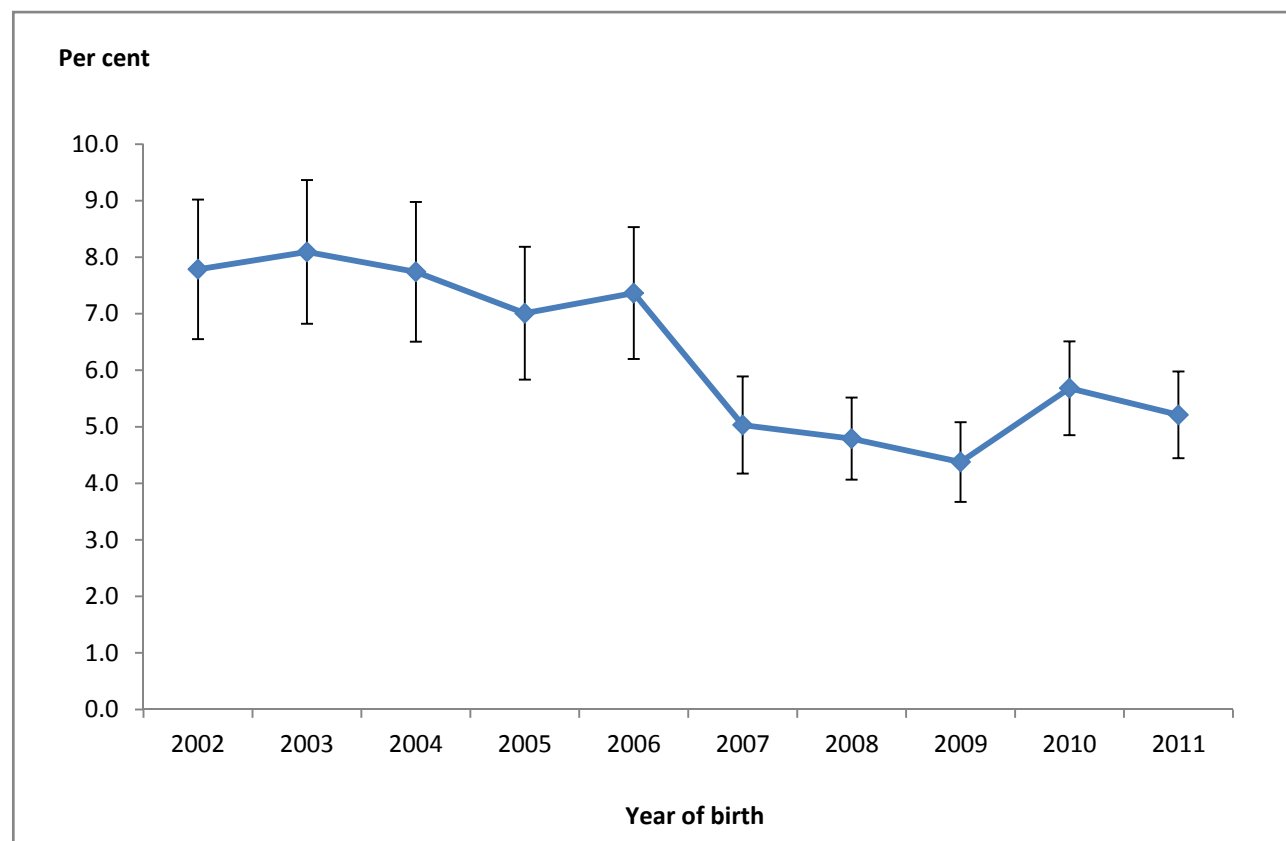


FIGURE 24: Incidence of early sepsis for level III registrants by gestational age group, 2007–2011

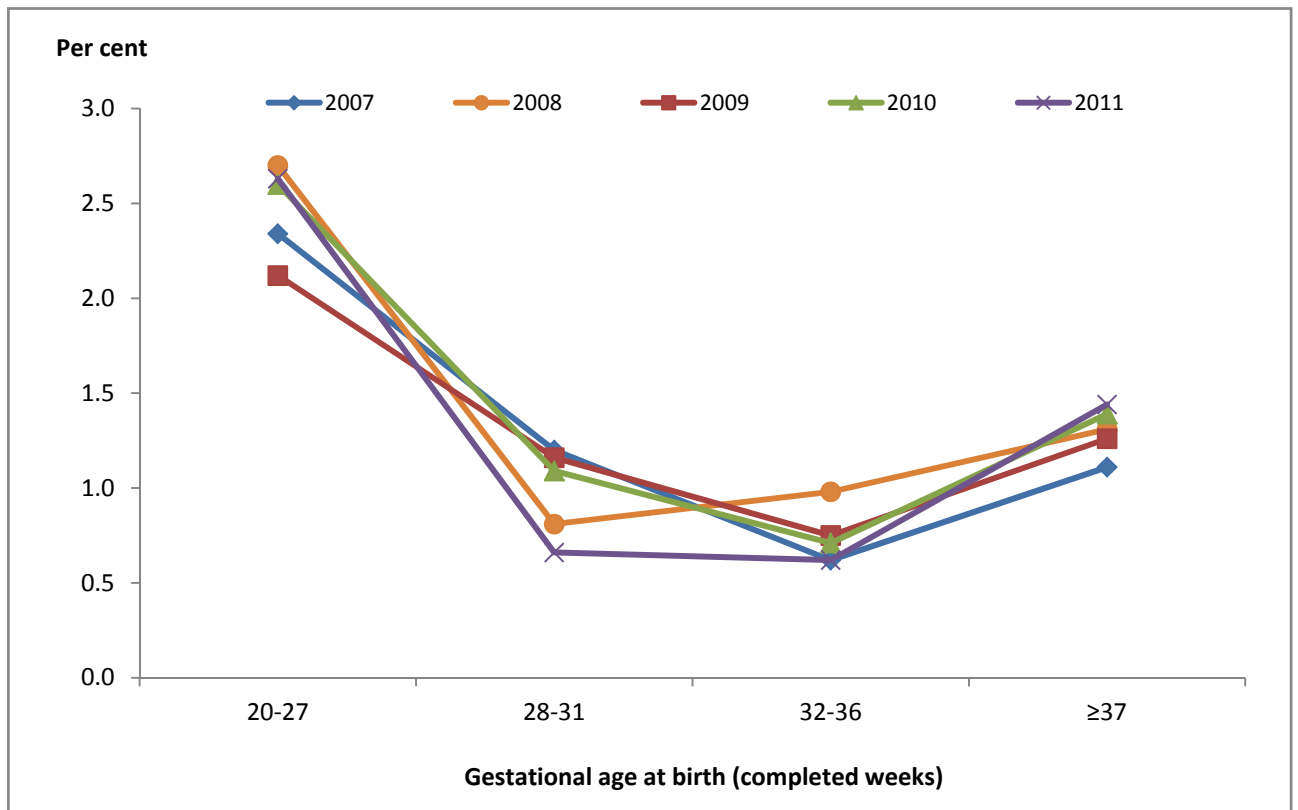
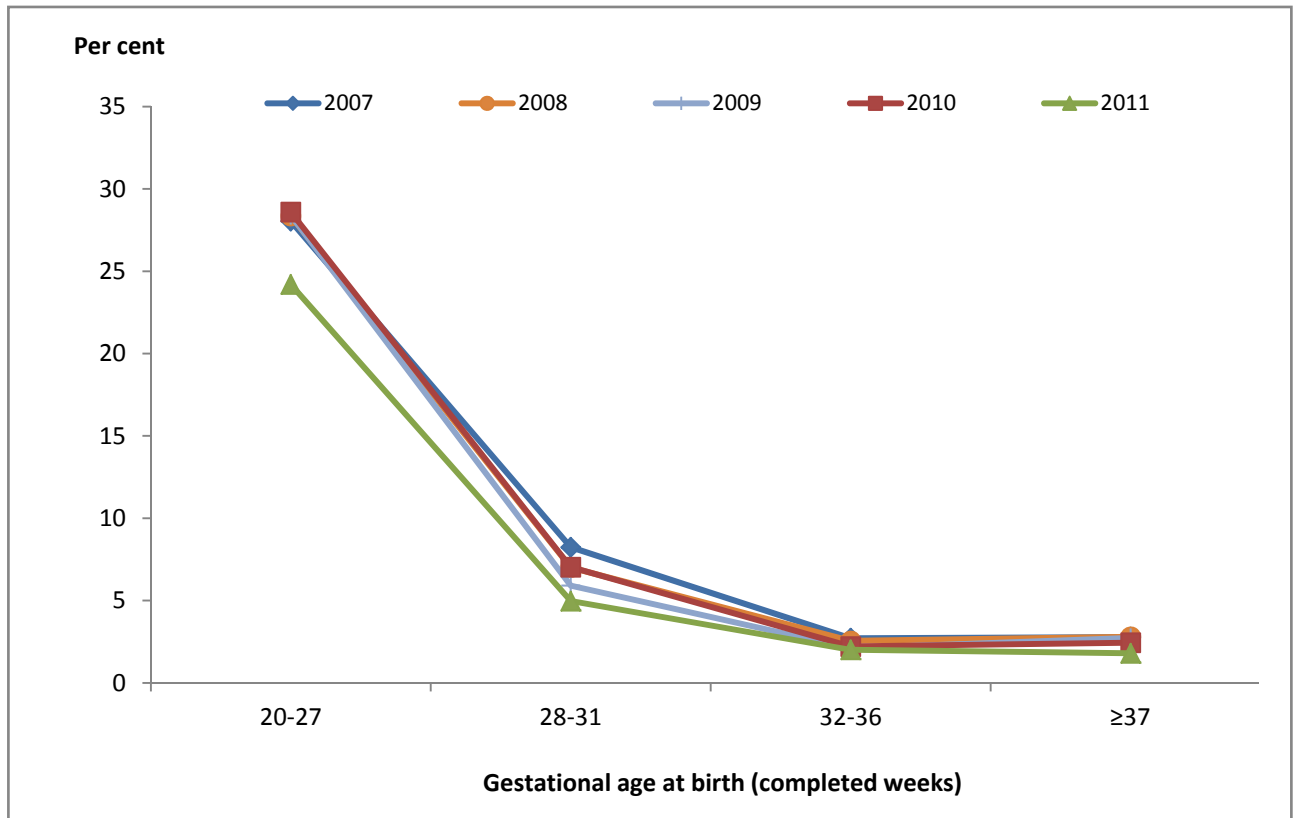


FIGURE 25: Incidence of late sepsis for level III registrants by gestational age group, 2007–2011



Appendix 2: Data tables by birthweight

TABLE 37: Antenatal corticosteroid use for level III registrants by birthweight group, 2011

| Antenatal corticosteroids | Birthweight group (grams) | | | | | | | | | | | Total |
|---------------------------|---------------------------|---------|---------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-------|-------|
| | <500 | 500-749 | 750-999 | 1000-1249 | 1250-1499 | 1500-1999 | 2000-2499 | 2500-2999 | 3000-3499 | 3500-3999 | ≥4000 | |
| Number | | | | | | | | | | | | |
| None | 4 | 29 | 61 | 99 | 111 | 279 | 521 | 712 | 852 | 651 | 302 | 3,621 |
| Incomplete course | 4 | 121 | 165 | 196 | 231 | 391 | 244 | 62 | 19 | 3 | 6 | 1,442 |
| Course completed | 24 | 203 | 344 | 401 | 447 | 702 | 308 | 101 | 41 | 16 | 5 | 2,592 |
| Completed > 7 days | 6 | 43 | 100 | 127 | 184 | 237 | 169 | 73 | 27 | 15 | 6 | 987 |
| Not stated | 0 | 7 | 4 | 11 | 18 | 39 | 62 | 116 | 148 | 92 | 43 | 540 |
| Total | 38 | 403 | 674 | 834 | 991 | 1,648 | 1,304 | 1,064 | 1,087 | 777 | 362 | 9,182 |
| Per cent | | | | | | | | | | | | |
| None | 10.5 | 7.3 | 9.1 | 12.0 | 11.4 | 17.3 | 41.9 | 75.1 | 90.7 | 95.0 | 94.7 | 41.9 |
| Incomplete course | 10.5 | 30.6 | 24.6 | 23.8 | 23.7 | 24.3 | 19.6 | 6.5 | 2.0 | 0.4 | 1.9 | 16.7 |
| Course completed | 63.2 | 51.3 | 51.3 | 48.7 | 45.9 | 43.6 | 24.8 | 10.7 | 4.4 | 2.3 | 1.6 | 30.0 |
| Completed > 7 days | 15.8 | 10.9 | 14.9 | 15.4 | 18.9 | 14.7 | 13.6 | 7.7 | 2.9 | 2.2 | 1.9 | 11.4 |
| Total | 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 stated data are excluded from per cent calculations.

TABLE 38: Plurality of level III registrants by birthweight group, 2011

| Plurality | Birthweight group (grams) | | | | | | | | | | | Total |
|----------------------------|---------------------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
| | <500 | 500-749 | 750-999 | 1000-1249 | 1250-1499 | 1500-1999 | 2000-2499 | 2500-2999 | 3000-3499 | 3500-3999 | ≥4000 | |
| Number | | | | | | | | | | | | |
| Singleton | 27 | 297 | 495 | 573 | 667 | 1,156 | 1,032 | 964 | 1,065 | 774 | 362 | 7,412 |
| Twins | 10 | 91 | 152 | 236 | 290 | 453 | 258 | 99 | 22 | 3 | 0 | 1,614 |
| Triplets and higher orders | 1 | 15 | 27 | 25 | 34 | 39 | 14 | 1 | 0 | 0 | 0 | 156 |
| Total | 38 | 403 | 674 | 834 | 991 | 1,648 | 1,304 | 1,064 | 1,087 | 777 | 362 | 9,182 |
| Per cent | | | | | | | | | | | | |
| Singleton | 71.1 | 73.7 | 73.4 | 68.7 | 67.3 | 70.1 | 79.1 | 90.6 | 98.0 | 99.6 | 100.0 | 80.7 |
| Twins | 26.3 | 22.6 | 22.6 | 28.3 | 29.3 | 27.5 | 19.8 | 9.3 | 2.0 | 0.4 | 0.0 | 17.6 |
| Triplets and higher orders | 2.6 | 3.7 | 4.0 | 3.0 | 3.4 | 2.4 | 1.1 | 0.1 | 0.0 | 0.0 | 0.0 | 1.7 |
| Total | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |

TABLE 39: Method of delivery for level III registrants by birthweight group, 2011

| Method of Delivery | Birthweight group (grams) | | | | | | | | | | | Total |
|----------------------------|---------------------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
| | <500 | 500-749 | 750-999 | 1000-1249 | 1250-1499 | 1500-1999 | 2000-2499 | 2500-2999 | 3000-3499 | 3500-3999 | ≥4000 | |
| | Number | | | | | | | | | | | |
| Vaginal | 5 | 163 | 194 | 190 | 241 | 533 | 423 | 417 | 396 | 290 | 149 | 3,001 |
| Vaginal instrumental birth | 0 | 9 | 17 | 15 | 30 | 77 | 99 | 98 | 159 | 117 | 41 | 662 |
| Caesarean in labour | 3 | 70 | 146 | 178 | 204 | 327 | 272 | 191 | 208 | 169 | 74 | 1,842 |
| Caesarean no labour | 30 | 159 | 309 | 437 | 501 | 704 | 494 | 351 | 306 | 188 | 87 | 3,566 |
| Not stated | 0 | 2 | 8 | 14 | 15 | 7 | 16 | 7 | 18 | 13 | 11 | 111 |
| Total | 38 | 403 | 674 | 834 | 991 | 1,648 | 1,304 | 1,064 | 1,087 | 777 | 362 | 9,182 |
| | Per cent | | | | | | | | | | | |
| Vaginal | 13.2 | 40.6 | 29.1 | 23.2 | 24.7 | 32.5 | 32.8 | 39.5 | 37.0 | 38.0 | 42.5 | 33.1 |
| Vaginal instrumental birth | 0.0 | 2.2 | 2.6 | 1.8 | 3.1 | 4.7 | 7.7 | 9.3 | 14.9 | 15.3 | 11.7 | 7.3 |
| Caesarean in labour | 7.9 | 17.5 | 21.9 | 21.7 | 20.9 | 19.9 | 21.1 | 18.1 | 19.5 | 22.1 | 21.1 | 20.3 |
| Caesarean no labour | 78.9 | 39.7 | 46.4 | 53.3 | 51.3 | 42.9 | 38.4 | 33.2 | 28.6 | 24.6 | 24.8 | 39.3 |
| Total | 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 stated data are excluded from per cent calculations.

TABLE 40: Level of hospital of birth for level III registrants by birthweight group, 2011

| Level of hospital | Birthweight group (grams) | | | | | | | | | | | Total |
|---------------------|---------------------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
| | <500 | 500-749 | 750-999 | 1000-1249 | 1250-1499 | 1500-1999 | 2000-2499 | 2500-2999 | 3000-3499 | 3500-3999 | ≥4000 | |
| | Number | | | | | | | | | | | |
| Tertiary | 35 | 370 | 609 | 739 | 894 | 1,408 | 1,022 | 745 | 702 | 519 | 260 | 7,303 |
| Non-tertiary | 3 | 30 | 61 | 90 | 93 | 233 | 275 | 312 | 371 | 248 | 94 | 1,810 |
| Born before arrival | 0 | 2 | 4 | 5 | 4 | 7 | 7 | 6 | 12 | 8 | 8 | 63 |
| Not stated | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 2 | 0 | 6 |
| Total | 38 | 403 | 674 | 834 | 991 | 1,648 | 1,304 | 1,064 | 1,087 | 777 | 362 | 9,182 |
| | Per cent | | | | | | | | | | | |
| Tertiary | 92.1 | 92.0 | 90.4 | 88.6 | 90.2 | 85.4 | 78.4 | 70.1 | 64.7 | 67.0 | 71.8 | 79.6 |
| Non-tertiary | 7.9 | 7.5 | 9.1 | 10.8 | 9.4 | 14.1 | 21.1 | 29.4 | 34.2 | 32.0 | 26.0 | 19.7 |
| Born before arrival | 0.0 | 0.5 | 0.6 | 0.6 | 0.4 | 0.4 | 0.5 | 0.6 | 1.1 | 1.0 | 2.2 | 0.7 |
| Total | 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 stated data are excluded from per cent calculations.

TABLE 41: Mode of transport for level III registrants to level III unit after birth by birthweight group, 2011

| Mode of transport | Birthweight group (grams) | | | | | | | | | | | Total |
|---------------------------|---------------------------|---------|---------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-------|-------|
| | <500 | 500-749 | 750-999 | 1000-1249 | 1250-1499 | 1500-1999 | 2000-2499 | 2500-2999 | 3000-3499 | 3500-3999 | ≥4000 | |
| Number | | | | | | | | | | | | |
| Not transported | 35 | 364 | 601 | 729 | 879 | 1,385 | 988 | 702 | 656 | 484 | 250 | 7,073 |
| Specialist retrieval team | 2 | 24 | 50 | 81 | 88 | 219 | 256 | 295 | 349 | 239 | 82 | 1,685 |
| Non-specialist retrieval | 1 | 8 | 15 | 14 | 14 | 30 | 48 | 59 | 72 | 50 | 26 | 337 |
| Other | 0 | 7 | 7 | 10 | 8 | 12 | 9 | 5 | 6 | 2 | 3 | 69 |
| Not stated | 0 | 0 | 1 | 0 | 2 | 2 | 3 | 3 | 4 | 2 | 1 | 18 |
| Total | 38 | 403 | 674 | 834 | 991 | 1,648 | 1,304 | 1,064 | 1,087 | 777 | 362 | 9,182 |
| Per cent | | | | | | | | | | | | |
| Not transported | 92.1 | 90.3 | 89.3 | 87.4 | 88.9 | 84.1 | 75.9 | 66.2 | 60.6 | 62.5 | 69.3 | 77.2 |
| Specialist retrieval team | 5.3 | 6.0 | 7.4 | 9.7 | 8.9 | 13.3 | 19.7 | 27.8 | 32.2 | 30.8 | 22.7 | 18.4 |
| Non-specialist retrieval | 2.6 | 2.0 | 2.2 | 1.7 | 1.4 | 1.8 | 3.7 | 5.6 | 6.6 | 6.5 | 7.2 | 3.7 |
| Other | 0.0 | 1.7 | 1.0 | 1.2 | 0.8 | 0.7 | 0.7 | 0.5 | 0.6 | 0.3 | 0.8 | 0.8 |
| Total | 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 stated data are excluded from per cent calculations.

TABLE 42: Exogenous surfactant use by level III registrants by birthweight group, 2011

| Exogenous surfactant | Birthweight group (grams) | | | | | | | | | | | Total |
|----------------------|---------------------------|---------|---------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-------|-------|
| | <500 | 500-749 | 750-999 | 1000-1249 | 1250-1499 | 1500-1999 | 2000-2499 | 2500-2999 | 3000-3499 | 3500-3999 | ≥4000 | |
| | Number | | | | | | | | | | | |
| None | 2 | 34 | 153 | 341 | 634 | 1,177 | 1,014 | 881 | 949 | 689 | 327 | 6,201 |
| Curosurf | 31 | 301 | 422 | 372 | 263 | 359 | 193 | 133 | 89 | 62 | 25 | 2,250 |
| Survanta | 4 | 62 | 93 | 118 | 88 | 103 | 91 | 43 | 35 | 23 | 8 | 668 |
| SurvCuro | 1 | 4 | 5 | 1 | 1 | 7 | 2 | 2 | 11 | 1 | 0 | 35 |
| Exosurf | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Other | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 2 |
| Not stated | 0 | 2 | 0 | 2 | 5 | 2 | 4 | 5 | 3 | 2 | 1 | 26 |
| Total | 38 | 403 | 674 | 834 | 991 | 1,648 | 1,304 | 1,064 | 1,087 | 777 | 362 | 9,182 |
| Per cent | | | | | | | | | | | | |
| None | 5.3 | 8.5 | 22.7 | 41.0 | 64.3 | 71.5 | 78.0 | 83.2 | 87.5 | 88.9 | 90.6 | 67.7 |
| Curosurf | 81.6 | 75.1 | 62.6 | 44.7 | 26.7 | 21.8 | 14.8 | 12.6 | 8.2 | 8.0 | 6.9 | 24.6 |
| Survanta | 10.5 | 15.5 | 13.8 | 14.2 | 8.9 | 6.3 | 7.0 | 4.1 | 3.2 | 3.0 | 2.2 | 7.3 |
| SurvCuro | 2.6 | 1.0 | 0.7 | 0.1 | 0.1 | 0.4 | 0.2 | 0.2 | 1.0 | 0.1 | 0.0 | 0.4 |
| Exosurf | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Other | 0.0 | 0.0 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.3 | 0.0 |
| Total | 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 stated data are excluded from per cent calculations.

TABLE 43: Assisted ventilation for level III registrants by birthweight group, 2011

| Assisted ventilation | Birthweight group (grams) | | | | | | | | | | | Total |
|---------------------------------|---------------------------|---------|---------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-------|-------|
| | <500 | 500-749 | 750-999 | 1000-1249 | 1250-1499 | 1500-1999 | 2000-2499 | 2500-2999 | 3000-3499 | 3500-3999 | ≥4000 | |
| Number | | | | | | | | | | | | |
| CPAP given | 23 | 317 | 611 | 741 | 778 | 1,386 | 1,080 | 787 | 780 | 564 | 282 | 7,349 |
| IPPV given | 34 | 372 | 524 | 489 | 346 | 550 | 467 | 480 | 468 | 307 | 115 | 4,152 |
| HFOV given | 22 | 171 | 131 | 51 | 21 | 51 | 26 | 46 | 50 | 39 | 16 | 624 |
| NO given | 6 | 38 | 34 | 27 | 13 | 28 | 27 | 62 | 67 | 65 | 30 | 397 |
| ECMO given | 0 | 0 | 0 | 2 | 0 | 0 | 1 | 7 | 11 | 7 | 2 | 30 |
| Total in each birthweight group | 38 | 403 | 674 | 834 | 991 | 1,648 | 1,304 | 1,064 | 1,087 | 777 | 362 | 9,182 |
| Per cent | | | | | | | | | | | | |
| CPAP given | 60.5 | 78.7 | 90.7 | 88.8 | 78.5 | 84.1 | 82.8 | 74.0 | 71.8 | 72.6 | 77.9 | 80.0 |
| IPPV given | 89.5 | 92.3 | 77.7 | 58.6 | 34.9 | 33.4 | 35.8 | 45.1 | 43.1 | 39.5 | 31.8 | 45.2 |
| Per cent of babies given IPPV | | | | | | | | | | | | |
| HFOV given | 64.7 | 46.0 | 25.0 | 10.4 | 6.1 | 9.3 | 5.6 | 9.6 | 10.7 | 12.7 | 13.9 | 15.0 |
| NO given | 17.6 | 10.2 | 6.5 | 5.5 | 3.8 | 5.1 | 5.8 | 12.9 | 14.3 | 21.2 | 26.1 | 9.6 |
| ECMO given | 0.0 | 0.0 | 0.0 | 0.4 | 0.0 | 0.0 | 0.2 | 1.5 | 2.4 | 2.3 | 1.7 | 0.7 |

TABLE 44: Medians and interquartile ranges of assisted ventilation for level III registrants by birthweight group, 2011

| Median & interquartile range (IQR) | Birthweight group (grams) | | | | | | | | | | |
|------------------------------------|---------------------------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-------|
| | <500 | 500-749 | 750-999 | 1000-1249 | 1250-1499 | 1500-1999 | 2000-2499 | 2500-2999 | 3000-3499 | 3500-3999 | ≥4000 |
| | IPPV (hours) | | | | | | | | | | |
| Median | 197.5 | 298.5 | 81 | 27 | 24 | 23 | 35 | 48 | 50 | 53 | 46 |
| IQR | 77–581 | 88–695.5 | 17–299 | 12–104 | 10–66 | 10–59 | 14–85 | 22–95 | 24–100 | 19–107 | 18–91 |
| | CPAP (hours) | | | | | | | | | | |
| Median | 1,229 | 1,039 | 723 | 258 | 85.5 | 41 | 26 | 22 | 18 | 14 | 14 |
| IQR | 312–1,669 | 576–1,337 | 238–1,092 | 58–715 | 28–236 | 16–95 | 11–62 | 10–55 | 7–44 | 7–33 | 7–29 |
| | Airway support or oxygen (days) | | | | | | | | | | |
| Median | 78 | 81 | 55.5 | 26.5 | 6 | 3 | 3 | 3 | 3 | 3 | 2 |
| IQR | 5–115 | 21–116 | 25–87 | 4–54 | 2–27 | 2–7 | 2–5 | 2–6 | 2–7 | 2–7 | 1–5 |

TABLE 45: Chronic lung disease for level III registrants by birthweight group, 2011

| Chronic lung disease (CLD) | Birthweight group (grams) | | | | | | | Total |
|----------------------------|---------------------------|---------|---------|-----------|-----------|-----------|-------|-------|
| | <500 | 500-749 | 750-999 | 1000-1249 | 1250-1499 | 1500-1999 | ≥2000 | |
| Number | | | | | | | | |
| No CLD | 16 | 188 | 415 | 689 | 923 | 1,613 | 4,591 | 8,435 |
| CLD | 22 | 215 | 259 | 145 | 68 | 35 | 3 | 747 |
| ▪ CLD and survived | 20 | 205 | 255 | 137 | 68 | 33 | 3 | 721 |
| ▪ CLD and died | 2 | 10 | 4 | 8 | 0 | 2 | 0 | 26 |
| Total | 38 | 403 | 674 | 834 | 991 | 1,648 | 4,594 | 9,182 |
| Per cent | | | | | | | | |
| No CLD | 42.1 | 46.7 | 61.6 | 82.6 | 93.1 | 97.9 | 99.9 | 91.9 |
| CLD | 57.9 | 53.3 | 38.4 | 17.4 | 6.9 | 2.1 | 0.1 | 8.1 |
| ▪ CLD and survived | 90.9 | 95.3 | 98.5 | 94.5 | 100.0 | 94.3 | 100.0 | 96.5 |
| ▪ CLD and died | 9.1 | 4.7 | 1.5 | 5.5 | 0.0 | 5.7 | 0.0 | 3.5 |

TABLE 46: Respiratory support (airway support or supplemental oxygen therapy) for level III registrants by birthweight group, 2011

| Oxygen therapy | Birthweight group (grams) | | | | | | | | | | | Total |
|----------------------------------|---------------------------|---------|---------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-------|-------|
| | <500 | 500-749 | 750-999 | 1000-1249 | 1250-1499 | 1500-1999 | 2000-2499 | 2500-2999 | 3000-3499 | 3500-3999 | ≥4000 | |
| Number | | | | | | | | | | | | |
| No respiratory support on day 28 | 1 | 28 | 155 | 458 | 804 | 1,509 | 1,223 | 970 | 1,014 | 725 | 341 | 7,228 |
| Respiratory support on day 28 | 37 | 374 | 519 | 376 | 187 | 139 | 81 | 94 | 73 | 52 | 21 | 1,953 |
| ▪ survived to discharge home | 21 | 257 | 444 | 340 | 168 | 104 | 40 | 44 | 30 | 28 | 5 | 1,481 |
| ▪ died before discharge | 16 | 117 | 75 | 36 | 19 | 35 | 41 | 50 | 43 | 24 | 16 | 472 |
| Not stated | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| Total | 38 | 403 | 674 | 834 | 991 | 1,648 | 1,304 | 1,064 | 1,087 | 777 | 362 | 9,182 |
| Number | | | | | | | | | | | | |
| Babies given home oxygen | 12 | 97 | 87 | 45 | 19 | 11 | 2 | 13 | 7 | 10 | 5 | 308 |
| Per cent | | | | | | | | | | | | |
| No respiratory support on day 28 | 2.6 | 7.0 | 23.0 | 54.9 | 81.1 | 91.6 | 93.8 | 91.2 | 93.3 | 93.3 | 94.2 | 78.7 |
| Respiratory support on day 28 | 97.4 | 93.0 | 77.0 | 45.1 | 18.9 | 8.4 | 6.2 | 8.8 | 6.7 | 6.7 | 5.8 | 21.3 |
| ▪ survived to discharge home | 56.8 | 68.7 | 85.5 | 90.4 | 89.8 | 74.8 | 49.4 | 46.8 | 41.1 | 53.8 | 23.8 | 75.8 |
| ▪ died before discharge | 43.2 | 31.3 | 14.5 | 9.6 | 10.2 | 25.2 | 50.6 | 53.2 | 58.9 | 46.2 | 76.2 | 24.2 |
| Per cent | | | | | | | | | | | | |
| Babies given home oxygen | 57.1 | 37.7 | 19.6 | 13.2 | 11.3 | 10.6 | 5.0 | 29.5 | 23.3 | 35.7 | 100.0 | 20.8 |

Note: Not stated data are excluded from per cent calculations.

TABLE 47: Transfer after registration of level III registrants by level of destination hospital by birthweight group, 2011

| Transfer status | Birthweight group (grams) | | | | | | | | | | | Total |
|---------------------|---------------------------|---------|---------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-------|-------|
| | <500 | 500-749 | 750-999 | 1000-1249 | 1250-1499 | 1500-1999 | 2000-2499 | 2500-2999 | 3000-3499 | 3500-3999 | ≥4000 | |
| | Number | | | | | | | | | | | |
| Not transferred | 27 | 242 | 300 | 338 | 388 | 632 | 686 | 648 | 775 | 571 | 289 | 4,896 |
| Level III hospital | 2 | 24 | 42 | 42 | 20 | 40 | 31 | 27 | 14 | 8 | 4 | 254 |
| Level II hospital | 7 | 99 | 285 | 409 | 547 | 917 | 525 | 316 | 239 | 145 | 53 | 3,542 |
| Children's hospital | 1 | 31 | 36 | 27 | 18 | 38 | 41 | 57 | 51 | 45 | 11 | 356 |
| Not stated | 1 | 7 | 11 | 18 | 18 | 21 | 21 | 16 | 8 | 8 | 5 | 134 |
| Total | 38 | 403 | 674 | 834 | 991 | 1,648 | 1,304 | 1,064 | 1,087 | 777 | 362 | 9,182 |
| Per cent | | | | | | | | | | | | |
| Not transferred | 73.0 | 61.1 | 45.2 | 41.4 | 39.9 | 38.8 | 53.5 | 61.8 | 71.8 | 74.3 | 81.0 | 54.1 |
| Level III hospital | 5.4 | 6.1 | 6.3 | 5.1 | 2.1 | 2.5 | 2.4 | 2.6 | 1.3 | 1.0 | 1.1 | 2.8 |
| Level II hospital | 18.9 | 25.0 | 43.0 | 50.1 | 56.2 | 56.4 | 40.9 | 30.2 | 22.2 | 18.9 | 14.8 | 39.1 |
| Children's hospital | 2.7 | 7.8 | 5.4 | 3.3 | 1.8 | 2.3 | 3.2 | 5.4 | 4.7 | 5.9 | 3.1 | 3.9 |
| Total | 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 stated data are excluded from per cent calculations.

TABLE 48: Retinopathy of prematurity for level III registrants by birthweight group, 2011

| Retinopathy of prematurity (ROP) | Birthweight group (grams) | | | | | | Total |
|----------------------------------|---------------------------|--------------|--------------|--------------|--------------|--------------|--------------|
| | <500 | 500-749 | 750-999 | 1000-1249 | 1250-1499 | ≥1500 | |
| Number | | | | | | | |
| No ROP | 2 | 82 | 283 | 406 | 355 | 231 | 1,359 |
| Stage 1 ROP | 4 | 54 | 121 | 90 | 36 | 13 | 318 |
| Stage 2 ROP | 9 | 89 | 120 | 73 | 33 | 11 | 335 |
| Stage 3 ROP | 8 | 69 | 31 | 14 | 5 | 3 | 130 |
| Stage 4 ROP | 0 | 2 | 2 | 1 | 0 | 0 | 5 |
| Not examined | 14 | 102 | 73 | 61 | 114 | 147 | 511 |
| Not stated | 1 | 5 | 44 | 189 | 448 | 5,837 | 6,524 |
| Total | 38 | 403 | 674 | 834 | 991 | 6,242 | 9,182 |
| Number | | | | | | | |
| Treatment for ROP | 4 | 41 | 25 | 4 | 1 | 0 | 75 |
| Per cent | | | | | | | |
| No ROP | 8.7 | 27.7 | 50.8 | 69.5 | 82.8 | 89.5 | 63.3 |
| Stage 1 ROP | 17.4 | 18.2 | 21.7 | 15.4 | 8.4 | 5.0 | 14.8 |
| Stage 2 ROP | 39.1 | 30.1 | 21.5 | 12.5 | 7.7 | 4.3 | 15.6 |
| Stage 3 ROP | 34.8 | 23.3 | 5.6 | 2.4 | 1.2 | 1.2 | 6.1 |
| Stage 4 ROP | 0.0 | 0.7 | 0.4 | 0.2 | 0.0 | 0.0 | 0.2 |
| Total | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |
| Per cent | | | | | | | |
| Treatment for ROP | 50.0 | 57.7 | 75.8 | 26.7 | 20.0 | 0.0 | 55.6 |

Note: Weight criterion less than 1,250 grams for ANZNN but 1,500 grams for some individual units.

Percentages for babies with ROP who received treatment have been calculated using as the denominator the total number in each birthweight group who had stages 3-4.

Not stated and not examined data are excluded from per cent calculations.

TABLE 49: Intraventricular haemorrhage for level III registrants survived to day 3 by birthweight group, 2011^(a)

| Intraventricular haemorrhage | Birthweight group (grams) | | | | | | Total |
|---------------------------------|---------------------------|--------------|--------------|--------------|--------------|--------------|--------------|
| | <500 | 500-749 | 750-999 | 1000-1249 | 1250-1499 | ≥1500 | |
| | Number | | | | | | |
| None | 22 | 225 | 453 | 572 | 535 | 680 | 2,487 |
| Grade 1 IVH | 5 | 48 | 91 | 90 | 92 | 85 | 411 |
| Grade 2 IVH | 1 | 39 | 36 | 23 | 24 | 14 | 137 |
| Grade 3 IVH | 2 | 9 | 17 | 9 | 6 | 5 | 48 |
| Grade 4 IVH | 1 | 42 | 23 | 14 | 5 | 8 | 93 |
| Not examined | 0 | 4 | 4 | 13 | 44 | 173 | 238 |
| Not stated | 0 | 3 | 21 | 102 | 278 | 5,208 | 5,612 |
| Total | 31 | 370 | 645 | 823 | 984 | 6,173 | 9,026 |
| Per cent | | | | | | | |
| None | 71.0 | 62.0 | 73.1 | 80.8 | 80.8 | 85.9 | 78.3 |
| Grade 1 IVH | 16.1 | 13.2 | 14.7 | 12.7 | 13.9 | 10.7 | 12.9 |
| Grade 2 IVH | 3.2 | 10.7 | 5.8 | 3.2 | 3.6 | 1.8 | 4.3 |
| Grade 3 IVH | 6.5 | 2.5 | 2.7 | 1.3 | 0.9 | 0.6 | 1.5 |
| Grade 4 IVH | 3.2 | 11.6 | 3.7 | 2.0 | 0.8 | 1.0 | 2.9 |
| Total | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |

(a) Weight criterion for IVH is a birthweight of less than 1,500 grams.

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

TABLE 50: Neonatal sepsis for level III registrants by birthweight group, 2011

| Sepsis | Birthweight group (grams) | | | | | | | | | | | Total |
|---------------------------------------|---------------------------|---------|---------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-------|-------|
| | <500 | 500-749 | 750-999 | 1000-1249 | 1250-1499 | 1500-1999 | 2000-2499 | 2500-2999 | 3000-3499 | 3500-3999 | ≥4000 | |
| | Number | | | | | | | | | | | |
| No sepsis | 26 | 270 | 543 | 750 | 947 | 1,602 | 1,273 | 1,037 | 1,053 | 748 | 353 | 8,602 |
| Sepsis | 12 | 133 | 131 | 84 | 44 | 46 | 31 | 27 | 34 | 29 | 9 | 580 |
| ▪ <48 hrs | 0 | 6 | 10 | 7 | 6 | 6 | 7 | 6 | 17 | 14 | 5 | 84 |
| ▪ ≥48 hrs | 11 | 124 | 118 | 74 | 38 | 39 | 22 | 19 | 16 | 14 | 4 | 479 |
| ▪ both <48 and ≥48 hrs | 1 | 3 | 3 | 3 | 0 | 1 | 2 | 2 | 1 | 1 | 0 | 17 |
| Babies alive on day 2 | 35 | 377 | 652 | 828 | 986 | 1,636 | 1,293 | 1,055 | 1,081 | 773 | 358 | 9,074 |
| Babies who did not survive to day 2 | 3 | 26 | 22 | 6 | 5 | 12 | 11 | 9 | 6 | 4 | 4 | 108 |
| Total in each birthweight group | 38 | 403 | 674 | 834 | 991 | 1,648 | 1,304 | 1,064 | 1,087 | 777 | 362 | 9,182 |
| Per cent | | | | | | | | | | | | |
| No sepsis ^(a) | 68.4 | 67.0 | 80.6 | 89.9 | 95.6 | 97.2 | 97.6 | 97.5 | 96.9 | 96.3 | 97.5 | 93.7 |
| Sepsis ^(a) | 31.6 | 33.0 | 19.4 | 10.1 | 4.4 | 2.8 | 2.4 | 2.5 | 3.1 | 3.7 | 2.5 | 6.3 |
| ▪ <48 hrs ^(a) | 0.0 | 1.5 | 1.5 | 0.8 | 0.6 | 0.4 | 0.5 | 0.6 | 1.6 | 1.8 | 1.4 | 0.9 |
| ▪ ≥48 hrs ^(b) | 31.4 | 32.9 | 18.1 | 8.9 | 3.9 | 2.4 | 1.7 | 1.8 | 1.5 | 1.8 | 1.1 | 5.3 |
| ▪ both <48 and ≥48 hrs ^(a) | 2.6 | 0.7 | 0.4 | 0.4 | 0.0 | 0.1 | 0.2 | 0.2 | 0.1 | 0.1 | 0.0 | 0.2 |

(a) Denominator is all registrants

(b) Denominator is registrants alive at 48 hours

TABLE 51: Median length of stay for level III registrants who survived until discharge home by birthweight group, 2011

| Birthweight group (grams) | Number of babies | Median LOS (days) | Interquartile range (days) |
|---------------------------|------------------|-------------------|----------------------------|
| <500 | 22 | 119 | 99–147 |
| 500-749 | 285 | 115 | 95–138 |
| 750-999 | 599 | 86 | 70–103 |
| 1000-1249 | 798 | 64 | 52–77 |
| 1250-1499 | 972 | 47 | 38–60 |
| 1500-1999 | 1,613 | 35 | 28–45 |
| 2000-2499 | 1,263 | 21 | 15–29 |
| 2500-2999 | 1,014 | 13 | 7–21 |
| 3000-3499 | 1,044 | 8 | 5–16 |
| 3500-3999 | 753 | 8 | 4–15 |
| ≥4000 | 346 | 6 | 4–12 |
| Total | 8,709 | 29 | 12–53 |

Note: Death status was not provided for one baby.

TABLE 52: Survival to discharge home for level III registrants by birthweight group, 2011

| | Birthweight group (grams) | | | | | | | | | | | |
|---------------------------------|---------------------------|---------|---------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-------|-------|
| Survival until discharge home | <500 | 500-749 | 750-999 | 1000-1249 | 1250-1499 | 1500-1999 | 2000-2499 | 2500-2999 | 3000-3499 | 3500-3999 | ≥4000 | Total |
| Number | | | | | | | | | | | | |
| Lethal congenital anomalies | 0 | 4 | 6 | 7 | 8 | 20 | 22 | 23 | 17 | 6 | 9 | 122 |
| Babies alive on day 7 | 29 | 341 | 635 | 816 | 980 | 1,627 | 1,281 | 1,036 | 1,064 | 760 | 349 | 8,918 |
| Babies alive on day 28 | 24 | 309 | 617 | 809 | 975 | 1,619 | 1,270 | 1,024 | 1,052 | 756 | 348 | 8,803 |
| Survived to go home | 22 | 285 | 599 | 798 | 972 | 1,613 | 1,263 | 1,014 | 1,044 | 753 | 346 | 8,709 |
| Total in each birthweight group | 38 | 403 | 674 | 834 | 991 | 1,648 | 1,304 | 1,064 | 1,087 | 777 | 362 | 9,182 |
| Per cent | | | | | | | | | | | | |
| Survived to go home | 57.9 | 70.7 | 88.9 | 95.7 | 98.1 | 97.9 | 96.9 | 95.3 | 96.0 | 96.9 | 95.6 | 94.8 |

Note: Death status was not provided for one baby.

Appendix 3: Methods used in this report

The ANZNN data collection was moved to the Perinatal & Reproductive Epidemiology Research Unit, School of Women's & Children's Health, University of New South Wales in June 2008.

The historical ANZNN data were received as a Microsoft Access database. Updated data for the ANZNN audit of babies born in 2011 who qualified as high-risk neonates were requested from each participating unit in June 2012 with a deadline of August 2012. The data submitted were checked for consistency and completeness using a newly developed validation program, run sequentially on each batch of data entered. Exception reports were returned to units with details of missing and inconsistent data values in records identified as problematic. Most, but not all, units returned corrected records in time for the production of this report.

An extract from the database was made in March 2013. Apart from grouping, the data presented in the report reflect the database at that time with one exception: a series of derived data items were generated. These are listed below.

Derived data items:

| | |
|--|--|
| Survival to day n | The number of days between the date of birth and the date of death was calculated and records flagged if this was less than n days. |
| Survival to 36 weeks post menstrual age | This item is for babies born at less than 36 weeks gestation only. The day the baby reaches 36 weeks post menstrual age is considered to be the infant's gestational age (completed weeks) plus chronological age in days. For example, a baby born at '28 weeks and four days' gestation on 1 January is 36 weeks post menstrual age on 26 February. |
| Chronic lung disease (CLD) | This item is for babies born at less than 32 weeks gestation only. The baby received any respiratory support (supplemental oxygen or intermittent positive pressure ventilation (IPPV) or continuous positive airways pressure (CPAP) for a chronic pulmonary disorder on the day the baby reached 36 weeks post menstrual age. Date of final added respiratory support must be: > Date of birth or $\{[(\text{Hours of IPPV} + \text{Hours of CPAP})/168] + \text{Gestational age}\} > 35.9$ weeks |
| Length of stay | The total number of days a baby spent in hospital during their first admission from birth. The total may include stays in more than one hospital. |

All data manipulations and analysis for the 2011 report were carried out using Statistical Analysis Systems (SAS) software, and tabulations and figures were produced using Microsoft Excel.

Appendix 4: Confidentiality guidelines

Confidentiality guidelines provide an unambiguous framework for the handling of data that met the strict criteria of governing bodies. Confidentiality guidelines for the collection, processing and analysis of data from the minimum data collection of ANZNN were devised and agreed to by the Advisory Committee at the ANZNN Advisory Committee Meeting, Auckland, New Zealand on 2 April 1995. The summary below incorporates modifications agreed in the Memorandum of Understanding (MOU) between ANZNN and the Perinatal & Reproductive Epidemiology Research Unit (PRERU), School of Women's and Children's Health, the University of New South Wales.

The purpose of these guidelines is to set out the principles under which the National Minimum Data Collection (NMDC) for neonatal intensive care units (NICUs) is formulated and the conditions that apply to the use of these data and release to parties internal and external to the ANZNN.

The essential purpose of the NMDC is to provide national unit record tabulations on babies meeting specified criteria who have been admitted to NICUs 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 or 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
- as NICU 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 data retrospectively from 1 January 1994.

Principles of ownership and maintenance of data

- The Perinatal & Reproductive Epidemiology Research Unit (PRERU) agrees to house and maintain the ANZNN Data Collection through electronic data submission from neonatal intensive care units and special care nurseries during the period 1 January 2008 to 31 December 2012. A renewed agreement extends this period from 1 January 2013 to 31 December 2017.
- The ANZNN Data Collection will be housed at PRERU. It will be managed according to existing data security procedures as for other data collections at PRERU. The Data Custodian is the Director of PRERU.

The ANZNN Data Collection Operation Committee ("ANZNN DCOC") was established in June 2008 to make decisions concerning the management, operation, data provision and reporting of the ANZNN Data Collection. The ANZNN DCOC is comprised of: three members appointed by the ANZNN Executive Committee and the ANZNN Advisory Council; two members appointed by the PRERU; and the Chairperson appointed by the ANZNN Executive Committee. The operations and progress of ANZNN Data Collection will be reported quarterly by ANZNN DCOC to the ANZNN Executive Committee.

PRERU will ensure that the data structure of the ANZNN Data Collection will remain the same as the existing data collection. Any modification to the data structure will be a joint decision between ANZNN Executive Committee and PRERU. Issues such as data entry, collation, retrieval and analysis will be considered.

The ANZNN will be responsible for collection and maintenance of the data set and decision-making with respect to its use.

All queries related to the NMDC should be referred to the Data Custodian at PRERU who will address them personally or refer them to the appropriate source person.

Conditions for data collection

It is expected that all participating NICUs will collect the agreed-upon minimum set of data in a standardised format for eligible babies registered to the ANZNN audit in their unit. Data will be transferred securely to the ANZNN coordinator.

Conditions for data security

The electronic version of these data is maintained in a secure partition at the University of New South Wales. Access to the server is limited to authorised named staff and further protected by the use of a high-level password. Attempted security breaches are monitored and investigated. Hard copy patient identifiable data and electronic backup files are kept in secured and locked safe cabinets. Master lists of code material and source record identifiers are kept away from the database in a separate locked area. All rooms and offices used by the ANZNN are locked when not in use. Filing cabinets containing data are locked when not in use. Computerised data on the server are protected by high-level passwords known only to each person who has access to computerised data. Potentially identifiable data will not leave the site of the ANZNN. Security disposal of data is available through use of designated bags or a shredding machine and must be witnessed by at least two staff members. A destruction certificate stating the name of the data and the date on which they are destroyed is to be issued and retained in the records.

Appendix 5: Minimum Data Set variables

Registration hospital

Definition: The hospital of registration is the first level III NICU that the baby remained in for four or more hours during the first 28 days of life. Babies who received their entire care in a level II hospital, or who were not transferred to a level III NICU during the first 28 days are registered to the first level II centre that they remain in for four or more hours.

Coding: Numeric code representing registration hospital

Guide for use: If a baby dies within four hours, they are registered to the unit where they died.

Maternal age

Definition: Age in completed years of the woman giving birth on the date of the baby's birth.

Coding: 2-digit number representing maternal age in completed years

Previous preterm birth

Definition: This mother has had a previous birth that was at less than 37 weeks gestation and more than 20 completed weeks, regardless of outcome.

Coding: 99: unknown.

0: no previous preterm birth.

-1: yes, there was a previous preterm birth.

Previous perinatal death

Definition: Mother has had a previous perinatal loss.

Coding: 99: unknown

0: no previous perinatal death.

-1: yes, has had a previous perinatal death.

Guide for use: A perinatal loss is when a baby with a birthweight of more than 400 grams or a gestational age of more than 20 completed weeks died during the first 28 days of life.

Assisted conception in this pregnancy

Definition: The type of infertility treatment used during conception or used to conceive this pregnancy.

Coding: 0: unknown.

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. Including in vitro fertilisation, gamete intrafallopian transfer, zygote intrafallopian transfer and IC sperm injection.

4: other – infertility treatment used that is not mentioned above, including artificial insemination.

Guide for use: Disregard any treatment for any previous pregnancies.

Ethnicity of mother

Definition: Ethnic origin of the mother of baby, as identified by the mother.

Coding: 0: unknown.

- 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.
- 2: Asian – all whose ethnic background originates from countries of Asia, South East Asia and Indian subcontinent (eg. Fijian Indian).
- 3: Caucasian – all of Caucasoid heritage, including, European, Russian, Middle Eastern and Arabic.
- 4: Other – includes African Negroes, Inuit, American Blacks and Indians, Melanesian.
- 5: Pacific Islander – all from Pacific Islander background, including Samoan, Cook Islands Maori, Niuean, Tokelauan, and other Pacific Islands groups (eg. Hawaiian, Tahitian). Excludes Maori.
- 6: Maori – a person of New Zealand Maori descent who identifies as Maori.

Source of referral

Definition: Source of referral to registration unit.

Coding: 0: unknown.

- 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 transferred from any hospital by a specialist retrieval team.
- 4: ex utero transfer – baby transferred from any hospital by non-specialist team, includes transport by ambulance.
- 5: other – born in transit or not booked.
- 6: booked at this level II unit – mother booked into this hospital, no NICU.
- 7: in utero transfer to this level II unit – mother transferred, baby in utero.
- 8: ex utero retrieval to this level II unit – baby 'retrieved' from any other hospital.
- 9: ex utero transfer to this level II unit.

Guide for use: Use most recent referral.

Presenting antenatal problem

Definition: The antenatal complication that the mother presented with in this pregnancy.

Coding: 0: unknown.

- 1: preterm pre-labour rupture of membranes – confirmed spontaneous rupture of membranes occurring prior to the onset of labour and before 37 weeks gestation.
- 2: preterm labour.
- 3: hypertension in pregnancy.
- 4: antepartum haemorrhage.
- 5: suspected intrauterine growth restriction.
- 6: fetal distress.
- 7: other.
- 8: none – no presenting problem. Born at term.
- 9: antenatal diagnosis of fetal malformation.

Other antenatal complications

Definition: Any other antenatal complication.

Coding: 99: unknown.

0: no other antenatal complication present.

-1: yes, other antenatal complication present.

Prolonged rupture of membranes (ROM)

Definition: Confirmed spontaneous ROM.

An obvious gush of clear amniotic fluid from vagina or if fluid available, by differentiation with urine or vaginal secretions, for more than 24 hours before birth.

Coding: 99: unknown.

0: no, membranes intact/ruptured for < 24 hrs.

-1: yes, membranes ruptured for \geq 24 hours.

Preterm labour

Definition: Regular painful contractions, leading to progressive effacement and dilatation of the cervix, eventually leading to the birth of the baby, and commencing before 37 weeks gestation.

Coding: 99: unknown.

0: no, labour did not commence before term.

-1: yes, labour commenced in preterm period.

Hypertension in pregnancy

Definition: A systolic blood pressure (BP) > 140 mmHg and/or diastolic BP > 90 mmHg, or a rise in systolic BP > 25 mmHg and/or a rise in diastolic BP > 15 mmHg from a reading before conception or in 1st trimester; confirmed by 2 readings 6 hours apart

Coding: 99: unknown.

0: no hypertension in pregnancy detected.

-1: yes, hypertension in pregnancy diagnosed.

Antepartum haemorrhage

Definition: Significant haemorrhage in the time from 20 weeks gestation to the end of second stage of labour (excludes a 'show').

Coding: 99: unknown.

0: no antepartum haemorrhage noted.

-1: yes, antepartum haemorrhage.

Suspected intrauterine growth restriction

Definition: A condition of the fetus in which it fails to reach its genetically predetermined full growth potential due to intrinsic or extrinsic factors based on more than one obstetric ultrasound.

Coding: 99: unknown.

0: no intrauterine growth restriction.

-1: yes, intrauterine growth restriction suspected.

Fetal distress

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

Coding: 99: unknown.

0: no intervention necessary.

-1: yes, obstetric intervention required.

Antenatal diagnosis of fetal malformation

Definition: A fetal malformation is diagnosed prior to the baby's birth, by any method.

Coding: 99: unknown.

0: no.

-1: yes, malformation detected prior to birth.

Guide for use: The diagnosis of the malformation may or may not be confirmed after birth.

Other antenatal complication

Definition: Complication, not specified.

Coding: 99: unknown.

0: no other significant antenatal complication.

-1: yes, other antenatal complication present.

Sex

Definition: The sex of the patient.

Coding: 0: unknown.

1: male.

2: female.

3: ambiguous or indeterminate.

Infant weight

Definition: The first weight of the baby after birth.

Coding: A 4-digit number representing birthweight in grams.

Guide for use: The weight is usually measured to the nearest five grams and is obtained within one hour of birth, or shortly after the infant has been admitted.

Gestational age

Definition: The estimated gestational age of the baby in completed weeks.

Coding: A 2-digit number representing the number of completed weeks of gestation.

Guide for use: Derived from a clinical assessment of the baby when accurate information is not stated.

Place of birth

Definition: Place of baby's birth.

Coding: 0: unknown.

1: non-tertiary hospital – born in a hospital with no level III NICU.

2: tertiary hospital – born in a hospital with a level III NICU.

- 3: homebirth – planned.
- 4: born before arrival – unplanned birth at home, or in an ambulance, a car etc.

Presentation at birth

Definition: Presenting part of the fetus (at lower segment of the uterus) at birth.

Coding: 0: unknown.

- 1: cephalic – including face and brow.
- 2: breech – legs or feet were facing the cervix.
- 3: other – includes transverse.

Mode of birth

Definition: The method of complete expulsion or extraction from its mother of a product of conception.

Coding: 0: unknown.

- 1: vaginal – vaginal birth, includes breech.
- 2: instrument – vaginal birth using an instrument – forceps, rotations, vacuum extraction.
- 3: Caesarean section in labour – caesarean performed after the commencement of labour.
- 4: Caesarean section, no labour – caesarean section performed prior to labour commencing.

Antenatal corticosteroids

Definition: Corticosteroids given during the antenatal period via any route to the mother at a time likely to enhance fetal lung maturation.

Coding: 0: unknown.

- 1: none – steroids not given.
- 2: less than 24 hours – first dose given less than 24 hours prior to this baby's birth.
- 3: complete – more than 1 dose of steroids given, and 1st dose at more than 24 hours and less than 8 days before birth.
- 4: given at more than 7 days before baby's birth.

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

Plurality

Definition: The total number of births resulting from this pregnancy.

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: Determined by the number of live births or by the number of fetuses that remain in utero at 20 weeks gestation. If gestational age is unknown, only live births of any birthweight or gestation, or fetuses weighing ≥ 400 grams are taken into account. Fetuses aborted at < 20 weeks or fetuses compressed in the placenta at or more than 20 weeks are excluded.

Birth order

Definition: Order of each baby of a multiple birth.

Coding: Single-digit number representing birth order.

0: singleton.

1: first of a multiple birth.

2: second of a multiple birth.

3: third of a multiple birth etc.

4: other.

Date of birth

Definition: Date of birth of the patient.

Coding: DD / MM / YYYY

Admission date

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

Coding: DD / MM / YYYY

Apgar score (1 minute)

Definition: Numerical score to evaluate the baby's condition at one minute after birth.

Coding: 2-digit number representing Apgar score.

Guide for use: The score is based on the five characteristics of heart rate, respiratory condition, muscle tone, reflexes and colour.

Apgar score (5 minute)

Definition: Numerical score to evaluate the baby's condition at five minutes after birth.

Coding: 2 digit number.

Guide for use: As for Apgar score (1 minute).

Intubated at resuscitation

Definition: An active measure taken shortly after birth to establish independent respiration and heart rate, or to treat depressed respiratory effort by endotracheal intubation.

Coding: 99: unknown.

0: no, intubation was not necessary in labour ward.

-1: yes, intubation necessary in labour ward.

Guide for use: Does not include intubation for tracheal aspiration or intubation in the NICU after resuscitation is complete.

Congenital anomalies

Definition: Structural abnormalities (including deformations) present at birth and diagnosed prior to separation from care (discharge home).

Coding: 99: unknown.

0: no major congenital malformations noted.

-1: yes, major congenital malformation noted.

Specified congenital anomalies

Definition: Detail of the major congenital malformation.

Coding: Free text field representing congenital malformation coded by ICD-10-AM.

Temperature on admission

Definition: Temperature on admission to the NICU or closest to admission to registration unit. Use rectal temperature or, if not available, per axilla.

Coding: A 4-digit number representing temperature measured in degrees Celsius to 1 decimal place.

Guide for use: If the baby is transported by a specialist neonatal retrieval team, admission is considered to commence when the team arrive at the baby's bedside. If the baby is more than 12 hours of age when NICU care started, or if an admission temperature is not recorded, use '0' to denote missing.

Worst base excess

Definition: Worst base deficit recorded between admission to NICU and 12 hours after birth.

Coding: 3 digit numbered field representing base excess measured in mmol/l. May be negative.

Guide for use: Use '99' to denote missing.

Main respiratory diagnosis

Definition: Main indication for respiratory support.

Coding: 0: unknown.

- 1: normal – no respiratory support.
- 2: non-specific – any non-specific respiratory distress (RD) in an infant requiring respiratory support (combines previous items transient tachypnoea of newborn and immature lung).
- 3: hyaline membrane disease – increasing RD or oxygen (O₂) requirements, or the need for ventilator support from the first six hours of life with a chest x-ray showing generalised reticulogranular pattern, plus or minus air bronchogram.
- 4: meconium aspiration – RD presenting from immediately after birth to 12 hours of age. Hypoxia, tachypnoea and gasping respirations are often signs of underlying asphyxia. Chest x-ray shows over-expansion of lungs with wide spread coarse, fluffy infiltrates.
- 5: pneumonia – RD with proven or suspected infection (toxic blood count), and chest x-ray showing persisting opacities.
- 6: persistent pulmonary hypertension – echocardiatic (shunting) or clinical evidence – O₂ need unexplained by chest x-ray or loud P₂, or differential pre /post ductal TCPO₂.
- 8: apnoea – recurrent pauses in breathing for more than 20 seconds, or for less than 20 seconds associated with bradycardia or any desaturation requiring intervention.
- 9: congenital malformation – malformation is the primary reason for RD, e.g. diaphragmatic hernia (list malformation in appropriate field).
- 10: other – unspecified other RD.
- 11: peri surgical – no RD, support given for surgical intervention.
- 12: newborn encephalopathy – a syndrome of disturbed neurological function in an infant with difficulties initiating or maintaining respiration, depression of tone reflexes or consciousness and often with seizures.

Guide for use: For a diagnosis other than 'normal' the baby must receive respiratory support. If more than one diagnosis is possible, use the most serious condition.

Exogenous surfactant

Definition: Any treatment with exogenous surfactant.

Coding: 0: unknown.

- 1: none – no exogenous surfactant ever given.
- 2: Exosurf – any treatment using 'Exosurf'.
- 3: Survanta – any treatment using 'Survanta'.
- 4: any combination – any combination of surfactant.
- 5: Curosurf – any treatment using 'Curosurf'.
- 6: Curosurf and Survanta.

Guide for use: Includes incomplete use.

Air leak requiring drainage

Definition: Any form of pulmonary air leak requiring drainage (transient or continuous).

Coding: 99: unknown.

- 0: no air leak requiring drainage present.
- 1: yes, air leak requiring drainage.

Hours of intermittent positive pressure ventilation (IPPV)

Definition: Total number of hours of IPPV given via an endotracheal tube, at any rate.

Coding: 4– digit number – IPPV hours.

Guide for use: The hours of all forms of assisted ventilation via an endotracheal tube are summed. The usual rounding up applies.

Hours of continuous positive airways pressure (CPAP)

Definition: Total number of hours of CPAP via any route, and nasopharyngeal ventilation.

Coding: 4–digit number – CPAP hours

Guide for use: As for hours of IPPV.

High frequency oscillatory ventilation (HFOV)

Definition: Mechanical ventilation presented at high frequencies (small tidal volumes with frequencies > 4Hz) initiated for this baby.

Coding: 99: unknown.

- 0: no high frequency oscillatory ventilation initiated.
- 1: yes, high frequency oscillatory ventilation was initiated.

Nitric oxide

Definition: Nitric oxide was used in any form or dose for respiratory support of the baby.

Coding: 99: unknown.

- 0: no, nitric oxide therapy never used.
- 1: yes, nitric oxide therapy used.

Extracorporeal membrane oxygenation

Definition: An extracorporeal circuit was established to divert baby's blood to a membrane lung for oxygenation, was initiated for this baby.

Coding: 99: unknown.

0: no ECMO initiated.

-1: yes, ECMO initiated.

Date of final added respiratory support

Definition: Date supplemental oxygen (O2), high flow, CPAP or mechanical ventilation ceased appropriately.

Coding: DD / MM / YYYY

Guide for use: Four consecutive hours in any 24-hour period constitutes a 'day'.

Nasal high flow therapy

Definition: Blended air and oxygen mix with a delivery flow of greater than 1 litre/min through any high flow device with humidification.

Coding: 99: unknown.

0: nasal high flow was never initiated.

-1: yes, nasal high flow was used for more than four hours.

Chronic lung disease

Definition: The baby received respiratory support (supplemental O2 or any form of assisted ventilation) for a chronic pulmonary disorder at 36 weeks post menstrual age.

Coding: 99: unknown.

0: no chronic lung disease.

-1: yes, chronic lung disease.

Guide for use: Four consecutive hours in any one 24-hour period constitutes respiratory support on that day.

Home oxygen therapy

Definition: Supplemental oxygen therapy was used at home after discharge from hospital.

Coding: 99: unknown.

0: no supplemental oxygen used at home.

-1: yes, home oxygen therapy given.

Guide for use: Must have required supplemental oxygen in hospital.

Neonatal surgery

Definition: Did this baby have major surgery that involved opening a body cavity?

Coding: 99: unknown.

0: no.

-1: yes.

Proven necrotising enterocolitis (NEC)

Definition: Diagnosis of proven necrotising enterocolitis (NEC) is definite.

Coding: 99: unknown.

0: no necrotising enterocolitis proven.

-1: yes, necrotising enterocolitis proven.

Guide for use: Has at least four of the following symptoms:

1. At least one systemic sign: temperature instability, apnoea, bradycardia or lethargy; and one intestinal sign: a residual of more than 25% of the previous feed on 2 consecutive occasions, abdominal distension, vomiting or faecal blood.
2. Has profile consistent with definite NEC including 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 x-rays, or a surgical or post mortem diagnosis.
3. Plus the baby warranted treatment for NEC, which included nil by mouth and antibiotics.

Therapeutic hypothermia

Definition: Intentional cooling of an infant of any gestational age to a core temperature $<35.0^{\circ}\text{C}$

Coding: 99: unknown.

0: no.

-1: yes.

Guide for use: Record if therapeutic hypothermia has occurred.

Early infection

Definition: An episode of systemic sepsis with initial symptoms occurring before 48 hours after birth.

Coding: 99: unknown.

0: no early infection noted.

-1: yes, early infection noted.

Guide for use: These conditions must apply:

Isolation of an organism from at least one blood culture and, after consideration of the clinical and laboratory evidence, a decision is made to give antibiotics with therapeutic intent against this organism. Mixed coagulase negative staphylococci or other skin flora – contaminant are not included.

Episodes of late-onset sepsis

Definition: At least one episode of systemic sepsis with initial symptoms from 48 hours after birth.

Coding: 2-digit field representing total episodes of late onset sepsis.

Guide for use: Isolation of organisms from one blood culture and, after considering clinical / laboratory evidence, decision made to give antibiotics with therapeutic intent against this organism. The following must not apply: mixed coagulase negative staphylococci or other skin flora contaminant. Same blood organism isolated from blood during previous 14 days – repeat isolate.

Maximum grade of intraventricular haemorrhage

Definition: Worst level of IVH seen on either side by ultrasound or post mortem examination.

Coding: 0: none – ultrasound / post mortem shows no haemorrhage.

1: Grade 1 – subependymal germinal matrix haemorrhage.

2: Grade 2 – intraventricular haemorrhage with no ventricular distension.

- 3: Grade 3 – intraventricular haemorrhage with ventricle distended with blood.
- 4: Grade 4 – intraparenchymal haemorrhage.
- 5: Not examined– by ultrasound or by post mortem examination.

Date of late head ultrasound

Definition: Date of the cerebral ultrasound scan nearest to six weeks of age.

Coding: DD / MM / YYYY

Ventricle size

Definition: Size of ventricle at the ultrasound closest to six weeks of age (date above). Ventricular index (VI) is measured as the furthest lateral extent of each ventricle from the midline measured at the level of Foramen of Monro.

Coding: 0: unknown.

- 1: no dilatation – VI less than 97th centile.
- 2: dilatation – VI equal to 97th centile / 97th centile + 4mm.
- 3: hydrocephalus – VI greater than 97th centile + 4mm or hydrocephalus present requiring a shunt or drainage (permanent or transient).

Ventricular Index (VI)

Definition: Size of ventricle at the ultrasound closest to six weeks of age (date above).

Coding: 4-digit number representing VI in mm correct to one decimal place.

Guide for use: Record if ventricular dilatation is present, i.e. 'dilatation' or 'hydrocephalus'.

Cerebral cystic formations

Definition: Changes in brain parenchyma seen at the scan closest to six weeks of age.

Coding: 0: unknown.

- 1: no cysts – none seen on ultrasound.
- 2: porencephalic cyst(s) – parenchymal lesions corresponding to grade 4 IVH.
- 3: periventricular leukomalacia (PVL) – ischaemic brain injury affecting periventricular white matter in the boundary zones supplied by terminal branches of both centripetal and centrifugal arteries.
- 4: encephaloclastic porencephaly – relatively late development on cerebral scan of extensive dense, cystic lesions involving the periphery of the brain (ANZNN 2009).

Baby meets local criteria for ROP exam

Definition: The baby meets the criteria for eye examination for ROP.

Coding: 99: unknown.

- 0: no.
- 1: yes, did meet local criteria.

Retinopathy of prematurity (ROP)

Definition: Worst stage of ROP in either eye prior to going home.

Coding: 0: none seen – no changes seen.

- 1: stage I – demarcation line.
- 2: stage II – ridge.

- 3: stage III – ridge with extraretinal fibro-vascular proliferation.
- 4: stage IV – retinal detachment.
- 5: not examined – no eye examination.

Therapy for retinopathy of prematurity

Definition: Any therapy used to treat retinopathy of prematurity (ROP), i.e. laser or cryotherapy.

Coding: 99: unknown.

- 0: no therapy for ROP received.
- 1: yes, therapy given for ROP.

Died

Definition: The death of this baby occurred prior to discharge from hospital.

Coding: 99: unknown.

- 0: no, survived to discharge to home.
- 1: yes, died.

Date of death

Definition: Date of death of the baby.

Coding: DD / MM / YYYY

Guide for use: If baby is known to have died after discharge, record date here and 'no' to died.

Post mortem

Definition: Post mortem examination performed.

Coding: 99: unknown.

- 0: no post mortem performed.
- 1: yes, a post mortem was performed.

Immediate cause of death

Definition: The cause of death as stated on the death certificate.

Coding: unspecified free text field

Guide for use: To be described in morbid anatomical terms.

Death due to congenital anomaly

Definition: The death of the infant directly attributed to the congenital anomaly.

Coding: 99: unknown.

- 0: no.
- 1: yes.

Guide for use: Must be coded as 'yes' for major congenital anomaly and 'yes' for died.

Transferred to another hospital

Definition: The baby was transferred to another hospital nursery before going home.

Coding: 99: unknown.

0: no, never transferred.

-1: yes, transferred.

Date of transfer

Definition: Date on which a baby completes an episode of care after birth in the hospital of registration.

Coding: DD / MM / YYYY

Guide for use: Use the most significant date.

Discharge date

Definition: Date on which a patient completes an episode of care.

Coding: DD / MM / YYYY

Comment: All data collection ceases on this date.

Glossary

Antepartum fetal death: fetal death occurring before the onset of labour.

Apgar score: numerical score used to indicate the baby's condition at 1 minute and 5 minutes after birth. Between 0 and 2 points are given for each of five characteristics: heart rate, breathing, colour, muscle tone and reflex irritability, and the total score is between 0 and 10.

Baby's length of stay: number of days between date of birth and date of separation from the hospital of birth (calculated by subtracting the date of birth from the date of separation).

Birth status: status of the baby immediately after birth.

Birthweight: the first weight of the baby (stillborn or liveborn) obtained after birth (usually measured to the nearest 5 grams and obtained within one hour of birth).

Caesarean section: operative birth by surgical incision through the abdominal wall and uterus.

Early neonatal death: death of a liveborn baby within seven days of birth.

Extremely low birthweight: birthweight of less than 1,000 grams.

Fetal death (stillbirth): death prior to the complete expulsion or extraction from its mother of a product of conception of 20 or more completed weeks of gestation or of 400 grams or more birthweight. The death is indicated by the fact that after such separation the fetus does not breathe or show any other evidence of life, such as beating of the heart, pulsation of the umbilical cord or definite movement of voluntary muscles.

Forceps: assisted birth using a metallic obstetric instrument.

Gestational age: the duration of pregnancy in completed weeks calculated from the date of the first day of a woman's last menstrual period and her baby's date of birth, or via ultrasound, or derived from clinical assessment during pregnancy or from examination of the baby after birth.

Hyaline membrane disease: a disorder of the respiratory system.

Instrumental delivery: vaginal delivery using forceps or vacuum extraction.

Intrapartum fetal death: fetal death occurring during labour.

Intrauterine growth restriction: a fetus whose estimated weight is below the 10th percentile for its gestational age.

Late neonatal death: death of a liveborn baby after seven completed days and before 28 completed days.

Live birth: the complete expulsion or extraction from its mother of a product of conception, irrespective of the duration of the pregnancy, which, after such separation, breathes or shows any other evidence of life, such as beating of the heart, pulsation of the umbilical cord, or definite movement of voluntary muscles, whether or not the umbilical cord has been cut or the placenta is attached; each product of such a birth is considered liveborn (WHO definition).

Low birthweight: birthweight of less than 2,500 grams.

Maternal age: mother's age in completed years at the birth of her baby.

Mode of separation: status at separation of patient (discharge/transfer/death) and place to which patient is released (where applicable).

Neonatal care levels:

Level I care is for normal healthy term babies, some of whom may need short-term observation during the first few hours of life.

Level II refers to a nursery that generally has babies born at 32–36 weeks gestation weighing around 1,500 to 2,500 grams at birth. It includes care for babies who require intravenous therapy or antibiotics, and/or those who are convalescing after intensive care, and/or those who need their heart rate or breathing monitored, and/or those who need short-term oxygen therapy.

Level III or intensive care refers to the care of newborn infants who require more specialised care and treatment. It includes most babies born at less than 32 weeks gestation or less than 1,500 grams birthweight, and others who may require such interventions as intravenous feeding, and/or surgery, and/or cardiorespiratory monitoring for management of apnoea or seizures, and/or require assisted ventilation, and/or supplemental oxygen over 40% or long-term oxygen.

Neonatal death: death of a liveborn baby within 28 days of birth.

Neonatal morbidity: any condition or disease of the baby diagnosed after birth and before separation from care.

Perinatal death: a fetal or neonatal death of at least 20 weeks gestation or at least 400 grams birthweight.

Plurality: the number of births resulting from a pregnancy.

Post menstrual age (completed weeks): calculated by taking the gestational age plus postnatal age – e.g. when a baby born at 25 weeks gestation is 15 weeks old, they are 40 weeks PMA (also known as term equivalent age).

Post neonatal death: death of a liveborn baby after 28 days and within one year of birth.

Post term birth: birth at 42 or more weeks of gestation.

Presentation at birth: presenting part of the fetus at birth.

Preterm birth: birth before 37 weeks of gestation.

Resuscitation of baby: active measures taken shortly after birth to assist the baby's ventilation and heartbeat, or to treat depressed respiratory effort and to correct metabolic disturbances.

Retinopathy of prematurity (ROP): a disorder of the developing eye.

Sex ratio: number of male liveborn babies per 100 female liveborn babies.

Spontaneous vaginal: birth without intervention in which the baby's head is the presenting part.

Stillbirth: see Fetal death (stillbirth).

Teenage mother: mother aged less than 20 years at the birth of her baby.

Vacuum extraction: assisted birth using a suction cap applied to the baby's head.

Vaginal breech: vaginal birth in which the baby's buttocks is the presenting part.

Very low birthweight: birthweight of less than 1,500 grams.

References

Australian Bureau of Statistics 2012. Births, Australia, 2011. Cat. no. 3301.0. Canberra: ABS.

Chow SSW 2013. Report of the Australian and New Zealand Neonatal Network 2010. Sydney: ANZNN <www.preru.unsw.edu.au/ANZNN>.

Crowley PA 1995. Antenatal corticosteroid therapy: a meta-analysis of the randomized trials, 1972 to 1994. American Journal of Obstetrics & Gynecology 173:322–35.

Finer NN & Barrington KJ 2000. Nitric oxide for respiratory failure in infants born at or near term (Cochrane Review). In: The Cochrane Library, Issue 1, 2003. Oxford: Update Software.

Papile LA, Burstein J, Burstein R & Hoffer H 1978. Incidence and evolution of subependymal and intraventricular hemorrhage: a study of infants with birth weights less than 1500gm. Journal of Paediatrics 92(4):529–34.

Statistics New Zealand 2011. Demographic tables 2011. Wellington: Statistics New Zealand <www.stats.govt.nz>.

Wilkinson D, Andersen C, O'Donnell CP & De Paoli AG 2011. High flow nasal cannula for respiratory support in preterm infants. Cochrane Database Syst Rev 11(5).

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