

Neonatal Services

Module overview

Please note: This module must be read in conjunction with the Fundamentals of the Framework (including the glossary and acronym list).

The neonatal period is generally defined as the first 28 days of an infant's life. However, infants may be cared for in a neonatal service for more than 28 days, depending on the time frame from birth to discharge.

A neonatal service can provide a range of care from well infant care to highly specialised care. This includes care for sick, low birth weight and/or premature infants, and/or infants born with congenital conditions or other conditions that compromise their health and survival. Regardless of the level of neonatal service provided, it is essential that neonatal staff are skilled in neonatal resuscitation, stabilisation and examination.

Maternal health directly affects the physical and psychological health of the baby, and continues to affect their health during the childhood and adult years. Therefore, high-quality neonatal services should be integrated into a continuum of care with maternal and child health services.

Neonatal care is provided across six service levels. Neonatal services at Levels 1, 2 and 3 primarily care for well infants. Infants who need intensive medical attention and specialised diagnosis and treatment are admitted into a special care neonatal service at Levels 4, 5 and 6—the level required depends on the infant's gestational age, risk factors and the level of clinical care required. Health services at Levels 4 and 5 provide neonatal care as an integral component of general paediatric services. At Level 6, neonatal paediatric specialist staff deliver complex care to infants.

Specialised neonatal services may provide:

- antenatal consultation and planned management of birth with maternal foetal medicine (MFM) services where neonatal illness/abnormality is expected
- consultation and assessment of infants post-birth (including well newborn assessment)
- specialised transport services for infants requiring special or intensive care
- follow-up and ongoing care after discharge from the neonatal service.

Distance and other geographical implications, as well as social isolation, are important considerations in managing neonatal and maternity services in Queensland.¹ Best practice evidence states that mothers and infants should not be forced to travel beyond their nearest referral centre (or centres, if they are more or less equidistant), and that higher level services should not transfer their own high-risk mothers and infants.² Furthermore, infants born outside of the expected gestational age and weight for the level of service capability may, based on clinical decision-making, be managed safely at the local level. These decisions however, will not be made in isolation. The advice of staff within a higher level service will be sought and will help to guide the risk-management strategy of the service.

The general support service requirements for neonatal services include:

- access to child health services and Child Safety Services in the Department of Communities, and early interventional services
- access to child health and child immunisation schedules
- access to hearing screening facilities and assessment.^{3,4}

Where clinical management is considered beyond the capability of a service, care will be managed in consultation with a higher level neonatal service. The following clinical situations may indicate a higher level of care is required:

- an Apgar score of 6 or less at 5 minutes
- birth weight less than 2000 grams
- evidence of respiratory distress/recurrent apnoea
- persistent hypothermia
- neonatal hypoglycaemia
- major congenital anomaly requiring specialist care and/or surgery (e.g. gastroschisis)
- suspected congenital heart disease
- convulsions
- jaundice and appears in need of exchange transfusion
- bleeding from any site
- a need for special diagnostic and/or therapeutic services.

Additionally, each service providing neonatal care must assess the environment and ensure a dedicated and secure area is available, consistent with the neonate's clinical and safety needs.

Service networks

In addition to what is outlined in the Fundamentals of the Framework, specific service network requirements include:

- established maternity policies and infrastructure (including stabilisation, transfer and back-transfer)
- consultation with the referring and receiving multidisciplinary team when infants, who no longer require intensive care services (neonatal intensive care unit/paediatric intensive care unit), are transferred back to a service near to their home.⁵

Note: The literature suggests that among infants who require neonatal intensive care, mortality is significantly greater for those who are transferred post-birth than for those who are transferred *in utero*. Therefore, if possible, the birth of a high-risk infant should be planned to occur in a hospital with a neonatal service capable of providing the anticipated higher level of care. If birth in a facility without the necessary capabilities cannot be avoided, the infant should be stabilised and transferred to a higher level of care within the service network—one that has the required capabilities to ensure the infant's optimal outcome.⁶

Workforce requirements

In addition to what is outlined in the Fundamentals of the Framework, specific workforce requirements include:

- all neonatal clinical staff in non-birthing facilities must attend education on imminent birth, preferably conducted by a midwife
- in addition to site-specific requirements, staff providing neonatal services must attend the following programs/training sessions annually (as appropriate):
 - child safety training
 - breastfeeding competency

- clinical staff participate in neonatal resuscitation program or similar (with refresher training at least every 2 years)
- clinical staff competent in neonatal basic life support.

Level 1 Neonatal Service

Service description

A Level 1 service provides care for healthy infants greater than or equal to 37 weeks gestational age. The emphasis at Level 1 neonatal service is on parenting, bonding, and support for feeding and lactation. Care is predominantly provided by registered nurses and/or midwives in community settings or home-based care.

A Level 1 neonatal service has the capability to provide basic life support for infants and can stabilise infants who require transfer to a higher level of service. Transfer can be achieved via mechanisms such as Retrieval Services Queensland (RSQ). A Level 1 service has documented processes for referral to/from higher level services within the relevant neonatal service network.

Service requirements

As per module overview, plus:

- education and support for parenting, bonding, feeding and lactation
- written information for parent/s using community and child health supports
- breastfeeding advice and support consistent with the Baby Friendly Health Initiative (BFHI)
- blood collection for neonatal screening
- arrangements are made for bilirubin testing
- pathology services on-site, including bilirubin and glucose testing
- documented processes with Retrieval Services Queensland (RSQ), Royal Flying Doctor Service (RFDS), Flying Obstetric and Gynaecology (FOG) Services, and the Queensland Ambulance Service (QAS), utilised according to patient location
- access to paediatric specialty services for advice/referral
- access to routine healthy hearing screening and diagnostic audiology services.

Workforce requirements

As per module overview, plus:

Medical

- access to registered medical practitioner/s

Nursing

- registered nurses and/or midwives with relevant clinical knowledge, demonstrated evidence of ongoing clinical competency, and experience appropriate to the service being provided

Allied health

- access to allied health services, including dietetics, occupational therapy, physiotherapy, social work and speech pathology within local areas, via referral from a midwife, nurse and/or general practitioner, or from a visiting or outreach service

Other

- Aboriginal and Torres Strait Islander health workers who have undertaken neonatal resuscitation training
- access or links to an Aboriginal and Torres Strait Islander liaison officer
- access to pastoral care.

Support service requirements

A Level 1 service requires:

Service	On-site	Accessible
medication		1
pathology		1

Level 2 Neonatal Service

Service description

A Level 2 service primarily provides planned care for healthy infants greater than or equal to 37 weeks gestational age. This level of service has the capability to retain and/or accept infants of less than 37 weeks gestational age who are physiologically stable and feeding well. Care of infants of less than 35 weeks gestational age must always occur in consultation with a higher level of service.

A Level 2 service is competent in providing basic life support for infants and can stabilise those who require transfer to a higher level of service. There may be limited birthing services available at this level (refer to Maternity Services module).

Service requirements

As per Level 1, plus:

- access to a clinician competent in undertaking a complete examination of the infant within 72 hours of birth
- adherence to patient identification policies, including use of infant identification mechanisms
- consultation with a higher level service for infants requiring phototherapy
- provision for one nasogastric/orogastric tube feed; if more than one tube feed is needed, in consultation with a higher level service
- neonatal bilirubin result available within 12 hours
- bedside blood glucose testing
- pulse oximetry, Isolette® (incubator) and/or Resuscitaire® and resuscitation equipment
- Neopuff™ or similar equipment for short-term ventilation of infants awaiting transfer to higher level of service
- completion of Queensland Perinatal Data Collection Form (MR63d) or electronic equivalent under *Health Act 1937–1988* (Division 12—Perinatal Statistics)
- neonatal service review and audit for all patient transfers
- audit in the event of perinatal mortality and morbidity in consultation with higher level service
- audit of perinatal mortality in accordance with Perinatal Society of Australia and New Zealand (PSANZ) Perinatal Death Classifications.

Workforce requirements

As per Level 1, plus:

Medical

- access—24 hours—to registered medical practitioner able to attend within 30 minutes in normal circumstances

Nursing

- registered nurses/midwives available 24 hours

Allied health

- as per Level 1 service

Other

- access to biomedical support for equipment maintenance.

Support service requirements

A Level 2 service requires:

Service	On-site	Accessible
medical imaging		2
medication	2	
pathology		2

Specific risk considerations

In addition to risk management outlined in the Fundamentals of the Framework, specific risk management requirements relevant to a Level 2 neonatal service include:

- a second attendant trained in neonatal resuscitation must be immediately available on-site to attend the birth in services where planned birthing occurs.

Level 3 Neonatal Service

Service description

A Level 3 service provides planned care for healthy infants greater than or equal to 37 weeks gestational age. This level of service has the capability to retain and/or accept infants of 35 to 37 weeks gestational age who are physiologically stable. Care of infants less than 35 weeks gestational age must always occur in consultation with a higher level of service.

A Level 3 neonatal service is competent in providing basic life support for infants and can stabilise and manage those who require transfer to a higher level of service within a relevant neonatal service network.

Service requirements

As per Level 2, plus:

- for all births, at least one clinician is available exclusively for neonatal resuscitation (refer to Maternity Services module)
- initiates and maintains intravenous therapy
- provides phototherapy
- provides controlled oxygen therapy in consultation with a higher level of service
- provides more than one nasogastric/orogastric tube feed in consultation with a higher level of service
- emphasises parenting, bonding and breastfeeding
- full blood count and blood group result available within 24 hours
- provides bedside blood glucose test and collects blood cultures
- mobile chest/abdomen x-ray capability.

Workforce requirements

As per Level 2, plus:

Medical

- as per Level 2 service

Nursing

- registered nurses/midwives available on-site 24 hours

Allied health

- access to outreach, community- or hospital-based health professionals such as dietitians, physiotherapists and social workers

Other

- access to outreach, community- or hospital-based pastoral care workers.

Support service requirements

A Level 3 service requires:

Service	On-site	Accessible
children’s anaesthetic		5
medical imaging	3	
medication	3	
pathology		3

Level 4 Neonatal Service

Service description

A Level 4 service with a continuous positive airway pressure (CPAP) device available on-site has the capability to plan and deliver care for infants greater than or equal to 32 weeks gestational age who have an estimated birth weight of more than 1500 grams, with no additional risk factors (if born at that hospital), or who are back-transferred from a higher level service. Where CPAP is not available on-site, a Level 4 service has the capability to plan and deliver care for infants greater than or equal to 34 weeks gestational age.

Where unplanned births of infants of less than 32 weeks gestational age and/or infants with a birth weight less than 1500 grams occur, care must be provided in consultation with a Level 5 or 6 neonatal service.

Births are reported according to the registration criteria of the Australian and New Zealand Neonatal Network (ANZNN). A Level 4 service has documented plans with public or licensed private health facilities to support patient referral and transfer to/from higher and lower level services.

Service requirements

As per Level 3, plus:

- all infants admitted to the unit are referred to a registered medical specialist with credentials in paediatrics who is credentialed to provide clinical neonatal care in the facility
- commences mechanical ventilation in consultation with a higher level neonatal service pending transfer to a Level 5 or 6 service
- maintains a minimum nurse:patient ratio of 1:1 for mechanically ventilated infants being managed for transfer
- gives artificial surfactant, when required
- inserts and manages umbilical arterial and venous catheters
- accepts and cares for stable infants currently less than 32 weeks gestational age or 1500 grams after transfer from a higher level of service
- accepts and cares for infants less than 32 weeks gestational age or 1500 grams after transfer (must have CPAP on-site)
- obtains arterial blood gas results within 30 minutes and electrolyte results, full blood count and blood group test results within 4 hours
- capacity for heart rate and blood pressure monitoring
- has access to cranial ultrasonography
- provides reports to the ANZNN of infants born before 32 weeks gestational age or less than 1500 grams or who have been on CPAP or mechanical ventilation for more than 4 hours (and/or information consistent with ANZNN that may change from time to time)
- may provide CPAP; however, where a Level 4 service is unable to provide CPAP on-site, planned birthing will not be provided for infants less than 34 weeks gestational age.

Workforce requirements

As per Level 3, plus:

Medical

- a registered medical practitioner with experience in paediatrics available to attend within 5 minutes (in normal circumstances) when the infant is unstable or mechanically ventilated
- a lead clinician with responsibility for clinical governance of the neonatal service
- a registered medical specialist (specialist pediatrician) to provide neonatal care available 24 hours and able to attend within 30 minutes, in normal circumstances

Nursing

- a registered nurse or midwife responsible for the neonatal unit with relevant clinical knowledge and demonstrated evidence of ongoing clinical competency appropriate to the service being provided
- a minimum of two registered nurses or midwives with neonatal postgraduate qualifications and/or equivalent experience on duty at any one time in the neonatal unit when it is occupied exclusively by infants needing Level 4 care, or a delegated second registered nurse or midwife is available to attend immediately (when the neonatal unit is jointly located with another maternity ward)

Allied health

- access to dietetic, physiotherapy, social work and speech pathology services

Other

- access to a lactation consultant
- access to Aboriginal and Torres Strait Islander liaison officer.

Support service requirements

A Level 4 service requires:

Service	On-site	Accessible
children's anaesthetic	4	
medical imaging	4	
medication	4	
pathology		3

Level 5 Neonatal Service

Service description

A Level 5 service has the capability to plan and deliver care for infants who were born at the hospital or back-transferred from a higher level service and who are greater than or equal to 29 weeks gestational age with an estimated birth weight of more than 1000 grams. Where unplanned births of infants at less than 29 weeks gestational age and/or with a birth weight less than 1000 grams occur, care must be provided in consultation with the Level 6 neonatal service.

No neonatal surgery is provided at this level.

Service requirements

As per Level 4, plus:

- a minimum of eight cots in the nursery
- manages expected short-term mechanical ventilation (i.e. 48–72 hours) in consultation with a Level 6 service
- provides emergency exchange transfusion in consultation with a Level 6 service
- provides parenteral nutrition under supervision and in daily consultation and review with a Level 6 service
- obtains arterial blood gas results within 30 minutes (i.e. around 15 minutes), full blood count results within 2 hours, and neonatal bilirubin results within 60 minutes, in normal circumstances
- on-site access—24 hours—to cranial ultrasonography
- links with neonatal ophthalmology services
- collects data according to a designated data set similar to the ANZNN criteria, but including parenteral nutrition, and in public services, provides data quarterly to the statewide maternity and neonatal clinical network.

Workforce requirements

As per Level 4, plus:

- registered medical practitioner or registered medical practitioner in paediatric training program or neonatal nurse practitioner on-site 24 hours

Medical

- a nominated lead clinician responsible for clinical governance of the neonatal services who is a registered medical specialist with credentials in neonatology

Nursing

- a nurse manager (however titled) who may have management and/or postgraduate qualifications in neonatal nursing and has relevant clinical nursing experience commensurate with the position responsible for the neonatal service
- a registered nurse in charge of each shift with relevant clinical knowledge and demonstrated evidence of clinical experience and ongoing clinical competency

- a minimum of two registered nurses/midwives at any one time on the neonatal unit, one of whom has neonatal training or is suitably experienced in the service being provided
- at least one qualified registered nurse/midwife for each ventilated neonate or neonate requiring parenteral nutrition or other clinical interventions and close observation
- the majority of nursing staff involved in caring for infants must have completed or be working towards a neonatal certificate or equivalent service certification

Allied health

- as per Level 4 service

Other

- on-site access to a lactation consultant within the newborn and/or maternity service.

Support service requirements

A Level 5 service requires:

Service	On-site	Accessible
children's anaesthetic	5	
medical imaging	5	
medication	4	
pathology	5	

Level 6 Neonatal Service

Service description

A Level 6 service provides the highest level of care to infants. A Level 6 service has personnel and equipment to provide continuous life support and comprehensive multidisciplinary care for extremely high-risk newborns and those with complex and critical illnesses. Neonatal surgery may be performed at this level of service. Multidisciplinary follow-up programs are provided for very premature infants and, where required, access to multidisciplinary early developmental programs is provided.

A Level 6 service provides education links to lower level services, as required, and has documented processes, within the relevant neonatal service network, with lower levels of neonatal services to support patient transfer and care.

This level of service also provides educational support to less comprehensive neonatal services. A Level 6 service plays a strategic role in the planning of clinical statewide services related to perinatal care, and participates in perinatal morbidity and mortality meetings within the service network.

Service requirements

As per Level 5, plus:

- supports infants of high-risk pregnancies
- close links with MFM services, including access to MFM telehealth services
- provides services for all aspects of neonatal care, including intensive care for critically ill infants, ventilation, total parenteral nutrition, and care for complex congenital and metabolic diseases of infants
- ready access to clinical and diagnostic paediatric subspecialties
- blood gas machine or other point-of-care laboratory equipment available within the nursery area capable of instantly measuring blood gases, electrolytes, bilirubin and haemoglobin
- emergency access to x-rays and high-level imaging services within 10 minutes, in normal circumstances
- on-site access—24 hours—to neonatal echocardiography services
- provides consultation and leadership for emergency neonatal transport
- participates in perinatal mortality and morbidity meetings, engaging and including lower level services within the neonatal service network.

Workforce requirements

As per Level 5, plus:

- at least one registered medical practitioner with experience in paediatrics and/or a neonatal nurse practitioner on-site 24 hours and whose duties are solely dedicated to the provision of neonatal services

Medical

- a nominated full-time lead clinician responsible for clinical governance of the neonatology service, who is a registered medical specialist with credentials in neonatology
- a registered medical specialist with credentials in neonatology on-site during business hours and available after hours

Nursing

- a full-time neonatal department nurse manager (however titled) who may have management and/or postgraduate qualifications in neonatal nursing and has relevant clinical nursing experience commensurate with the position responsible for the nursery
- at least 50 percent of nursing staff on the roster with or working towards a neonatal qualification, or with equivalent neonatal experience

Allied health

- as per Level 4 service

Other

- access to a genetics counsellor
- may have an acute care scientist or similar for the service.

Support service requirements

A Level 6 service requires:

Service	On-site	Accessible
children's anaesthetic	6	
children's intensive care	5	
children's surgical	6	
medical imaging	6	
medication	6	
pathology	6	

Legislation, regulations and legislative standards

Refer to the Fundamentals of the Framework and the Preamble to Children's Services for details.

Non-legislative standards, guidelines, benchmarks, policies and frameworks

In addition to what is outlined in the Fundamentals of the Framework and the Preamble to Children's Services, the following are relevant to neonatal services:

- Australian College of Midwives. National Midwifery Guidelines for Consultation and Referral, 2nd ed. ACM; 2008. www.midwives.org.au/

- Australian College of Neonatal Nurses. Competency Standards. ACNN; 2004.
www.acnn.org.au
- Australian Government Department of Health and Ageing. Commonwealth guidelines on 'Neonatal facilities for the treatment of newly born children approval under the Health Insurance Act 1973'. Canberra: Australian Government; 1997.
www.health.gov.au/internet/main/publishing.nsf/Content/phi-circulars-97-98.htm
- Australian Government Department of Health and Ageing. Continuous Positive Airway Pressure Guidelines. Department of Health and Ageing; 2009.
www.health.gov.au/
- Australian Nursing and Midwifery Council. Competency Standards. ANMC; 2006.
www.anmc.org.au
- Baby Friendly Health Initiative. BFHI; nd. www.bfhi.org.au/
- National Institute for Health and Clinical Excellence. Routine postnatal care of women and their babies: NICE Clinical Guideline 37. NICE; 2006.
www.nice.org.uk/nicemedia/pdf/CG37NICEguideline.pdf
- Perinatal Society of Australia and New Zealand. Clinical Practice Guideline for Perinatal Mortality 2nd ed, version 2.2. PSANZ; 2009.
www.psanzpnmsig.org/guideline.html
- Queensland Government. Drug Therapy Protocol: Midwifery. Queensland Health; 2008. www.health.qld.gov.au/ph/documents/ehu/dtp_midwifery.pdf
- Queensland Government. Healthy Hearing Program: A Statewide Universal Neonatal Hearing Screening Program. Queensland Health; 2007
- Queensland Government. Informed Consent. Queensland Health; 2010.
www.health.qld.gov.au/consent/
- Women's Hospitals Australasia. Benchmarking Maternity Key Indicators. WHMA; nd.
www.wcha.asn.au/index.cfm/spid/1_46.cfm.

Reference list

1. Queensland Government. Evaluation of the Report of the Statewide Neonatal Intensive Care Services Project 2006. Queensland Health;2006.
www.health.qld.gov.au/publications/qh_plans/NICU_final_report.pdf
2. Parmanum J, Field D, Rennie J, Steer P. National census of availability of neonatal intensive care. *BMJ* 2000 Sep 23;321(7263):727–9.
3. Stark AR, American Academy of Pediatrics Committee on Fetus and Newborn. Levels of neonatal care. *Pediatrics* 2004 Nov;115(5):1341–7.
4. Liley H. Report to the National Review of Paediatric Specialty Service. New Zealand; 1998.
5. Perinatal Society of Australia and New Zealand. Clinical Practice Guideline for Perinatal Mortality 2nd ed, version 2.2. PSANZ; 2009.
www.psanzpnmsig.org/guideline.html
6. Baby Friendly Health Initiative. BFHI; nd. www.bfhi.org.au/