

Guideline and Procedure



HNEkidshealth
Children, Young People & Families



Health
Hunter New England
Local Health District

Resuscitation of the Newborn Infant

Sites where Guideline and Procedure applies	All Maternity and Newborn Service sites in HNELHD
This Guideline and Procedure applies to:	
1. Adults	No
2. Children up to 16 years	No
3. Neonates – less than 29 days	Yes
Target audience	All providers of birthing and newborn care; includes midwives, registered nurses, obstetricians, medical officers, midwifery and medical students
Description	This document outlines the steps, equipment and personnel required to provide effective resuscitation for both the newborn and the neonatal inpatient
Go to Procedure	
Keywords	Newborn, resuscitation, airway, breathing, circulation, infant, birth, neonate, maternity, NICU, SCU, advanced life support
Document registration number	HNELHD GandP 20_04
Replaces existing document?	Yes
Registration number and dates of superseded documents	HNELHD GandP 18_17 Version One from 20 September 2018; Maternity and Newborn – Resuscitation of the Newborn Infant PD2008_027:PCP 1
Related Legislation, Australian Standard, NSW Ministry of Health Policy Directive or Guideline, National Safety and Quality Health Service Standard (NSQHSS) and/or other, HNE Health Document, Professional Guideline, Code of Practice or Ethics::	
<ul style="list-style-type: none"> • NSW Health Guideline GL2018_016 Maternity - Resuscitation of the Newborn Infant • ANZCOR (2016) Newborn Resuscitation guidelines 13.1 to 13.10 	
Prerequisites (if required)	Newborn Basic Life Support (NBLS) education and training is mandatory for all NSW Health Maternity clinicians and HNELHD Neonatal clinicians. NBLS training, education and assessment for NSW Health clinicians consists of: <ul style="list-style-type: none"> - Online training to be completed every 5 years and - Practical component – <i>Newborn Basic Life Support Practical Session</i> – to be completed annually
Guideline and Procedure note	This document reflects what is currently regarded as safe and appropriate practice. The guideline does not replace the need for the application of clinical judgment in respect to each individual patient but the procedure/s require mandatory compliance . If staff believe that the procedure/s should not apply in a particular clinical situation they must seek advice from their unit manager/delegate and document the variance in the patient's health record.
Position responsible for the Guideline and Procedure and authorised by	Dr Paul Craven, Executive Director, Children, Young People and Family Services
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Note: Over time links in this document may cease working. Where this occurs please source the document in the PPG Directory at: <http://ppg.hne.health.nsw.gov.au/>

PURPOSE AND RISKS

This document is specifically for newborns (first minutes to hours of life) and applies to babies for the duration of their first hospital stay, these babies may be cared for in the Neonatal Intensive Care Unit (NICU), Special Care Units (SCU) or post-natal wards located at hospitals throughout the Local Health District.

The transition from foetal to extra-uterine life is characterised by a series of unique physiological events.

- *The lungs change from liquid-filled to air-filled.*
- *The blood flow to the lungs increases dramatically and the intra-cardiac and extra-cardiac shunts close.*
- *Adaptation to extra-uterine life depends on many coordinated and interdependent physiological events and failure of any of these events can impair successful transition.*

Given this complexity, we should always assume resuscitation will be required.

Newborn resuscitation training is mandatory for all clinical staff who may be called upon to provide birthing services and/or care for newborns, to ensure that they possess the necessary knowledge and skills to initiate basic newborn resuscitation which includes positive pressure ventilation via face mask or laryngeal airway and cardiac compressions. As the need for resuscitation cannot be reliably predicted, a complete set of resuscitation equipment should be available at all births, in both the delivery room and the operating theatre, and checked prior to every use. The Neonatal Resuscitation Trolley Flip Chart with standardised equipment list provides a guide to equipment required and should be attached to all Resuscitaires.

Staff trained in advanced neonatal resuscitation with the ability to provide, when necessary, advanced airway management, umbilical venous catheter placement and administration of drugs and fluids may be needed for low-risk births and in attendance for all high-risk births (ANZCOR, 2016 Guideline 13.1). Someone with advanced skills should be on-call for low-risk births as per local facility guideline.

HNELHD operates within a tiered network of maternity and newborn services which helps to ensure that women and their babies have the appropriate access to higher levels of maternity and newborn care when risk factors are identified beyond the designated role delineation of the local service. Clinicians should make the decision as to the most appropriate facility for care based on the baby's individual needs. For the purpose of this Guideline the term newborn resuscitation applies to the resuscitation of the newborn infant immediately following birth and during the birth admission.

Any unplanned event resulting in, or with the potential for injury, damage or other loss to infants/staff/family as a result of this procedure must be reported through the Incident Information management system and managed in accordance with the NSW Health Policy Directive PD2019_034: Incident Management Policy. This would include unintended injury that results in disability, death or prolonged hospital stay.

Risk Category: *Clinical Care & Patient Safety*

CLINICAL PROCEDURE SAFETY LEVEL

Every clinician involved in the procedure is responsible for ensuring the processes for clinical procedure safety are followed. The following level applies to this procedure (click on the link for more information):

[Level 1 procedure](#)

Staff Preparation

It is mandatory for staff to follow relevant: "Five moments of hand hygiene", infection control, moving safely/safe manual handling, documentation practices and to use HAIDET for patient/carer communication: **H**and hygiene **A**cknowledge, **I**ntroduce, **D**uration, **E**xplanation, **T**hank you or closing comment.

CONTENTS

[Anticipating the need for Resuscitation](#)

- [Personnel required](#)
- [Equipment](#)
- [Environment](#)

[Assessment of the Newborn](#)

[Delayed Cord Clamping](#)

[Airway](#)

[Breathing](#)

- [Air and Oxygen use](#)
- [Positive Pressure Devices](#)
- [Mask Ventilation Technique](#)
- [Intubation](#)
- [Laryngeal Mask Airway](#)

[Circulation](#)

- [Cardiac compressions](#)
- [Vascular Access](#)
- [Medications & Fluids in Resuscitation](#)

[Post-Resuscitation Care & Documentation](#)

[Discontinuing Resuscitation](#)

[Care of the Family](#)

[Appendices](#)

GUIDELINE AND PROCEDURE

While not requiring mandatory compliance, staff must have sound reasons for not implementing standards or practices set out within guidelines issued by HNE Health, or for measuring consistent variance in practice.

Introduction

Approximately 85% of infants born at term will spontaneously breathe within 10 to 30 seconds of birth; of the remainder:

- 10% will respond to drying and stimulation
- 3% will require positive pressure ventilation (PPV)
- 2% will require intubation and PPV
- 0.1% will require chest compressions and/or adrenaline (epinephrine) to achieve transition

As the need for newborn infant resuscitation may be unexpected, suitable environment, equipment and personnel trained to resuscitate must be available at all times and in all places where infants are born. The Maternity and Newborn Services across HNELHD endorse the ANZCOR (2016) Guidelines for 'Resuscitation of the newborn infant' 13.1–13.10, and clinicians in HNELHD must follow the ARC algorithm for newborn resuscitation (see Appendix 2).

Anticipating the need for Resuscitation

[Top](#)

Personnel required

Newborn resuscitation training is mandatory for all clinical staff who may be called upon to provide birthing services and/or care for newborns, to ensure that they possess the necessary knowledge and skills to initiate basic newborn resuscitation which includes PPV via face mask or laryngeal airway and cardiac compressions.

Staff trained in advanced neonatal resuscitation with the ability to provide, when necessary; advanced airway management, umbilical venous catheter placement and administration of drugs and fluids, must be in attendance for all high-risk births. A clinician with advanced skills should be available/on-call for low-risk births when needed.

Staff with advanced skills should attend all high-risk births including:

- Preterm infants <35 weeks gestation, plus additional clinicians for the cohorts listed below;
 - In regional units General Practitioners and Paediatricians present for all <34 weeks gestation
 - In the tertiary unit senior staff Consultant and/or Fellow present for <26+6 weeks gestation, and available for those <29 weeks gestation
- Multiple births
- Infants with significant antenatally diagnosed anomalies
- Concerning foetal heart rate patterns on CTG
- Thick meconium
- Breech vaginal birth
- Instrumental births
- Caesarean section with identified maternal and/or foetal risk factors
- Opioids administered to mother within 4 hours of birth
- Any situation where attending staff are concerned as to the condition of the foetus (e.g. reduced foetal movements, prolapsed cord, large APH)

There may be circumstances when a midwife or medical officer requests neonatal assistance despite it appearing to be an uncomplicated birth; such requests should be respected. Caesarean sections, if possible and when not an emergency procedure, should not commence until required neonatal staff are present.

Equipment Requirements

As the need for resuscitation cannot be reliably predicted, a complete set of resuscitation equipment should be available at all births, in both the birthing environment and the operating theatre. The Neonatal Resuscitation Trolley Flip Chart (see Appendix 3) with standardised equipment list provides a guide to equipment required and should be available in all resuscitation environments.

This equipment should include:

- Alcohol based hand rub
- Personal Protective Equipment (PPE)
- Infant Resuscitaire with radiant heat source
- Light source
- Air and oxygen supply with a blender attached
(In the absence of a blender, refer to Appendix 4 for oxygen/air mix)
- Clock/Apgar timer
- Warm towels and blankets
- NeoHelp or polyethylene wrap for infants <30 weeks gestation or <1500 gms
- Stethoscope
- Pulse oximeter with disposable probe available
- Flow driven T-piece device (e.g. Neopuff™) with suitable mask
Self-inflating resuscitation bag *(ideally with positive end expiratory pressure (PEEP) valve)*
- Assorted sizes of neonatal face masks
- Size 1 laryngeal mask airway – for babies >34 weeks gestation or >2 kg
- Suction source, tubing and catheters (6, 8, 10 and 12 FG)
- Laryngoscopes and straight blades (size 00 = 6 cm, size 0 = 7.5 cm and size 1 = 10 cm)
- Endotracheal tubes (ETT) ± stylet (sizes 2.5 mm, 3 mm, 3.5 mm and 4 mm)
- End-tidal carbon dioxide detector
- Umbilical vein catheterisation (UVC) set including catheters
- Syringes and drawing up needles
- Adrenaline (epinephrine) 1 mg/10 mL (1:10,000) solution
- Sodium chloride 0.9% (normal saline)
- NSW Health Resuscitation Record
- Access to emergency O negative blood

The appropriate resuscitaire and equipment must be checked to be present and working by the midwife and/or clinician in attendance for the birth:

- Ideally once per shift and at a **minimum of once in 24 hours**
- **Prior to all deliveries/births**
- A log record must be kept of the equipment check and should include date, signature and completed checked actions (see Appendix 6). Compliance should be audited by the local Managers each month.

Communication

Adequate communication between those caring for the mother and baby and those responsible for resuscitation is essential. This should include any factors that may affect the resuscitation and

management of the newborn including maternal conditions, antenatal diagnoses, plan for delayed cord clamping and assessment of foetal wellbeing.

Whenever possible, the resuscitation team should introduce themselves to the mother and her partner before the birth and outline their responsibility in the resuscitation. For a complex delivery, the resuscitation team should discuss individual roles and who to call should further help be required.

Environment

Prevention of heat loss reduces mortality and morbidity in newborn infants. For every 1°C drop in temperature below 36.5°C in infants, mortality increases markedly.

Newborn infants lose heat by:

- Evaporation
- Radiation
- Convection
- Conduction

If resuscitation is not required, the mother's body can keep the infant warm by placing the infant skin to skin on the mother's chest and covering the infant with a warm blanket, delayed cord clamping can occur during this time also. Ensure infant's airway is not compromised and infant is positioned appropriately (See HNELHD CG 18_11: Maternity - 'Safe' Skin-to-Skin Mother/Baby Contact at Birth).

To prevent heat loss, if resuscitation is required, dry the infant (gestation and weight appropriate) and place under a radiant heater on a warm surface in a draft-free environment. Where able, operating rooms may be warmed for preterm births if time permits by requesting room temperature to be increased to 26°C (e.g. via Engineering Department) prior to commencement, this can take up to 20 minutes for the temperature to reach the target (any emergency delivery should **not** be delayed pending this action).

Additional measures are recommended to prevent heat loss in very preterm infants <30 weeks gestation or <1500 grams:

- Place in polyethylene wrap or a NeoHelp polyethylene bag immediately after birth. The baby's body is **NOT** dried before wrapping in 'plastic wrap'.
- Cover the head (except face) with hat or bonnet.
- Use warmed humidified resuscitation gases.
- In JHCH, for those <30 weeks, ensure CPAP circuit on and heated.

NOTE: *The NeoHelp bag may be used in any baby that is a concern for, or an identified risk for potential heat loss.*

Assessment of the newborn infant

[Top](#)

The initial assessment to determine the need for resuscitation includes:

- Breathing
- Heart rate (HR)
- Tone

Subsequent and ongoing assessment is based on infant's breathing, HR, oxygen saturations and tone.

Apgar's

The Apgar score is used to document postnatal adaptation at:

- 1 minute
- 5 minutes
- 10 minutes

If the Apgar is <8 at 10 minutes, Apgar's must be repeated every 5 minutes until ≥ 8 or up to 20 minutes. Infants with low Apgar scores, cyanosis, bradycardia (<100 bpm) or irregular or absent respirations require ongoing support and monitoring.

Stimulation

Most babies respond to stimulation (e.g. drying) and will not require further resuscitation. If the baby does not breathe or is gasping or has a heart rate less than 100 bpm, resuscitation should be commenced. All gestations should be stimulated at birth, however drying is not recommended in babies <30 weeks and/or <1500gms, these babies should be wrapped in plastic or placed into NeoHelp bag and then stimulated.

Delayed Cord Clamping (DCC)

In vigorous babies, of all gestations, delayed cord clamping is recommended as standard practice. The duration of delaying cord clamping can vary, recommendations are a minimum of 30 seconds; however, if appropriate DCC can occur for up to 60 seconds.

In the more severely compromised infant, the more likely resuscitation measures need to take priority over DCC. Ideally, this should be discussed prior to the birth, when planning the resuscitation actions with the clinical team. The option to bail out from DCC is always available when the clinical condition of the newborn requires other intervention. Cord milking is not recommended and should not be practiced.

Airway

After stimulation, most babies establish a HR >100 bpm and regular respirations. If these are not established, then patency of the airway should be ensured. The neonatal airway is patent when in the neutral or slightly extended (the sniffing) position.

Newborn infants do not require suctioning of the nose, mouth or pharynx after birth as they can clear their airways effectively and suctioning can delay the normal rise in oxygenation. Suction may be required when the airway is obstructed by particulate meconium, blood clots or tenacious mucus.

Breathing

Most term or near-term babies should establish regular respirations within 10 to 30 seconds of birth, sufficient to maintain a HR >100 bpm. If breathing is not established and the HR remains <100 bpm, positive pressure ventilation (PPV) is required. If there is marked respiratory distress, continuous positive airway pressure (CPAP) should be administered via the T-piece device and mask.

Pulse oximetry must be used in all resuscitations when:

- Requiring positive pressure ventilation
- There is any concern regarding the infant's colour
- Oxygen is to be administered.

The oximetry probe must always be placed on the right hand (pre-ductal). **Blended air/oxygen** should be used to achieve targeted oxygen saturations (as per ARC algorithm).

Heart Rate

This should be determined by listening to apex beat with a stethoscope. Feeling for umbilical pulsation is not reliable. The HR should be >100 bpm within 30 seconds of birth. If the HR remains <100 bpm, PPV is required. Pulse oximetry should be used in all resuscitations requiring PPV and results should be displayed within 1 minute of birth. **An increasing HR is the best physiological measure of effective resuscitation.**

Tone

A floppy infant may be a compromised infant.

Colour

An uncompromised infant may take up to 10 minutes to look pink. Colour is generally poorly assessed and if there is a concern of ongoing cyanosis, a pulse oximeter should be attached to the right hand to establish the oxygen saturations of the newborn baby. The following table should be used to blend air/oxygen delivery based on targeted oxygen saturations.

Target Saturations Table

TIME FROM BIRTH	TARGET SATURATIONS FOR NEWBORN INFANTS REQUIRING RESUSCITATION
1 minute	60–70%
2 minute	65–85%
3 minute	70–90%
4 minute	75–90%
5 minute	80–90%
10 minute	85–90%

NOTE - The pink shaded target saturations map to the Apgar times
 70% by 1 minute
 80% by 5 minutes
 90% by 10 minutes

Airway – ‘A’

[Top](#)

Effective airway support and ventilation is the key to successful neonatal resuscitation

All infants should be placed to maintain a neutral airway position (see Figure 1).



Figure 1: Neutral airway position

(Picture from BLS module MHL,

HETI)

Airway Suction

If the airway is obstructed by blood, pus, fluid or meconium this may be cleared with a large bore suction catheter (e.g. 10–12 FG). The suction should be for no more than 5 seconds and enter the oral cavity by no more than 5 centimetres. The negative suction pressure should not exceed 100mmHg (13 kPa).

Management of Meconium

- There is no evidence supporting suctioning of either mouth or nose before delivery of the shoulders in the event of meconium at the delivery and this should **NOT** be performed.
- There is insufficient published evidence to support routine suction of any newborn infant born through meconium.
- If suctioning below the vocal cords, this should be performed by someone experienced in intubation and using a meconium aspirator.
- The clinician attempting tracheal suction via ETT must be present prior to the delivery and intubation episodes are limited to a single attempt.
- The intubation should be accomplished before spontaneous respirations or assisted ventilation has commenced and very promptly to minimise delay in establishing breathing.
- The intubation should **NOT** delay further resuscitative efforts.
- If there is no advanced clinician who is experienced at intubation present at the delivery the normal resuscitation algorithm should be followed, with no delay.
- Suction once only as there is no evidence to support repeated intubation for endotracheal suction.

Breathing – ‘B’

[Top](#)

Positive Pressure Ventilation (PPV)

After initial stimulation and prevention of hypothermia, if the newborn infant has absent or inadequate breathing, is gasping or has a HR <100 bpm, the infant should be positioned in the neutral airway position (see Figure 2) and PPV started. Effective ventilation is the most important part of neonatal resuscitation. The aim of positive pressure ventilation is to move the baby's chest wall and result in an increased HR. The face mask should fit well and enough pressure should be delivered to move the chest wall.

To deliver PPV, ensure the mask covers the baby's mouth and nose but not the baby's eyes.

There should be a good seal and the airway should be in neutral position.

Ventilation should be at a rate of 40–60 breaths/minute (physiological rate).

Positive pressure devices include:

- Pressure-limited, flow-driven T-piece devices (Neopuff)
- Self-inflating bag and mask devices (e.g. Ambu-bag®, BAG™ II Disposable Resuscitator, Laerdal)
- Flow-inflating devices (anaesthetic bags)



Figure 2: Ideal mask position (Picture from NICU, JHCH)

Air and Oxygen use

[Top](#)

In all cases, the first priority is to ensure adequate inflation of the lungs, followed by increasing the concentration of inspired oxygen only if needed

The ability to provide blended oxygen must be available at all times.

For term infants

- **Always commence resuscitation in AIR** – and apply pulse oximeter to right hand. Blend oxygen to achieve target saturations as per saturation target table

For preterm infants (<37 weeks of gestation)

- Commence resuscitation in 30% oxygen and apply pulse oximeter to right hand. Blend oxygen to achieve target saturations as per saturation target table

When HR <60 bpm or Asystole

- Following PPV, if HR <60bpm, cardiac compressions should commence and **100% oxygen** (for all infants) is required

If oxygen is required during the resuscitation, begin reducing when oxygen saturations $\geq 90\%$.

For preterm infants (<35 weeks) ANZCOR recommends against initiating resuscitation in high oxygen concentrations (65–100%) and recommends commencing resuscitation either in room air or up to 30% oxygen concentration. The optimal starting oxygen concentration and the most appropriate time-specific target saturations for preterm infants remain to be determined.

Oxygen saturation monitoring

Pulse oximetry is a continuous and non-invasive method of measuring the level of arterial oxygen saturation (and HR) by placing a disposable sensor on the infant and must be used for any baby who requires resuscitation beyond stimulation. Oxygen saturations and HR to be monitored during the resuscitation using the Masimo Rad-8[®] monitor secured to each resuscitation trolley in Birth Suite and Theatre.

To apply sensor and use the saturation monitor:

- First apply the disposable sensor to the infant on the right hand or wrist (pre-ductal).
- Switch unit on after sensor has been applied, as the oximeter then immediately interprets signals from the infant and this reduces artefact. The superior reliability and speed in data display with this method of sensor application suggest that it should be used in the birthing suite.
- Once on, the monitor should be adjusted to maximum sensitivity.
- If saturations reach $\geq 90\%$ while supplemental oxygen is being administered, the oxygen concentration should be decreased.
- Other monitors may not have a maximum sensitivity, but can still be used in newborn resuscitation if they are on the individual trolleys along with local knowledge and training.

Positive pressure devices

[Top](#)

A T-piece device, a self-inflating bag (neonatal) and a flow-inflating bag are all acceptable devices to ventilate newborn infants via a face mask, laryngeal airway or endotracheal tube.

T-piece Device

Flow-driven, pressure-limited T-piece devices (Neopuff) are the preferred device for use during resuscitation. Gas flows into the face mask via the inlet arm and pressure is achieved by interrupting the escape of gas. Pressure is displayed on the manometer. PEEP is delivered continuously by adjusting the outlet valve. PEEP is used to increase lung volumes and should be set at 5–6cm H₂O, to begin resuscitation.

To use the T-piece device (Neopuff)

- A gas supply is **ALWAYS** needed and should be checked and connected to the gas inlet port.
- The flow for the Neopuff should be set at **10L/min**.
- The patient circuit is connected to the gas outlet.
- Set desired positive inspiratory pressure (PIP) at:
 - 30cm H₂O for term infants
 - 20–25cm H₂O for premature infants
- The maximum pressure relief valve should be set at 50cm H₂O.
- The PEEP should be set at 5cm H₂O (regardless of gestation).
- Ventilate at a rate of 40–60 breaths/minute.

Self-Inflating Bags

(Ambu-bag, BAG II Disposable Resuscitator, Laerdal)

These re-expand without a gas source due to their elastic recoil and should be available in all resuscitation settings in the event of failing pressurised gas delivery. The pressure relief valve is fixed at 35-40mmHg and can be overcome by occluding the valve if higher pressure is required. Note, these devices cannot provide CPAP.

Flow-inflating bags (anaesthetic bags)

These require a gas source and are operator-dependent and seldom used. Both PIP and PEEP can be provided by this system with an attached pressure gauge.

Mask Ventilation Technique

[Top](#)

- Place baby in neutral position and ensure airway is clear.
- The face mask should be applied using a straight down motion ensuring the mask encircles chin to the nasal bridge and held in place by gripping the stem and pushing in downward motion that minimises leak.
- Inflate the lungs with the pre-set pressure and assess adequacy of chest rise.
- Use a ventilating rate of 40–60 inflations a minute with an inspiration time of 0.3 to 0.5 seconds.
- Consider two-person technique.

If the chest does not move, complete a MRSOPA checklist:

- **M** – Mask – check position and size
- **R** – Reposition airway to neutral
- **S** – Suction if visible obstruction
- **O** – Open mouth slightly
- **P** – Pressure increase/consider Pneumothorax – increase inspiratory pressure or assess for air leaks, equal-sided chest movement
- **A** – Adjunct airway: Intubate or laryngeal mask airway (LMA)

Effectiveness of ventilation is assessed by:

1. Chest rise with each inflation
2. Increase in HR above 100 bpm
3. Oxygenation saturations improving

Endotracheal Intubation[Top](#)

A decision to perform tracheal intubation will depend on the gestation of the infant, degree of respiratory depression, response to face mask (or laryngeal mask) ventilation and the skill and experience of the resuscitator.

Tracheal intubation may need to be performed:

- If ventilation via mask and bag/or T-piece device has been unsuccessful or prolonged
- In special circumstances such as congenital diaphragmatic hernia or extremely low birthweight
- For infants born without a detectable heartbeat, consideration should be given to intubation as soon as possible after birth

Although tracheal intubation is important, in inexperienced hands it is more important to get chest movement with mask and bag/or T-piece ventilation or by using a laryngeal mask in larger babies, before attempting intubation.

Approximate size and length of ETT

WEIGHT	GESTATION	ETT SIZE	POSITION AT LIP
< 600 gms	< 26 weeks	2.5	6 cms
< 1000 gms	< 28 weeks	2.5	7 cms
1000 – 2000 gms	28 – 34 weeks	3.0	8 cms
2000 – 3000 gms	34 – 38 weeks	3.5	9 cms
> 3000gms	> 38 weeks	4.0	10 cms

The approximate depth of insertion of ETT from the middle of the lip can be calculated as infant **weight in kg + 6 cm**

Equipment required

- Appropriate size ETT
- Introducer/stylet
- Laryngoscope handle with appropriate size straight blade:
 - Size 1 – Term
 - Size 0 – Preterm
 - Size 00 – extreme preterm (<27 weeks)
- Stethoscope
- CO₂ detector
- Suction catheter 10 FG or 8 FG for extreme preterm infants
- Appropriate PPV device

Intubation technique

- To intubate neonates, a straight bladed laryngoscope should be used.
- For resuscitation, the ETT is usually placed orally.
- The laryngoscope is held in the left hand.
- The tip of the laryngoscope blade is passed over the tongue, sweeping it out of the way. The epiglottis is visualised and gently lifted by the laryngoscope blade. The vocal cords lie behind the epiglottis.
- The ETT is held in the right hand and introduced through the visualised vocal cords. The ETT is placed so that the solid black line (vocal cord indicator) on the ETT rests at the level of the vocal cords.
- The centimetre mark at the lip is noted.
- If a stylet is used to aid in the insertion of the ETT, it must **not** protrude beyond the end of the ETT.
- Remove the stylet gently while holding the ETT against the hard palette.
- Place CO₂ detector on end of ETT and provide PPV and observe for appropriate colour change.
- Auscultate the chest bilaterally for air entry and observe for equal chest rise.

The effectiveness of ventilation via endotracheal tube is confirmed by three observations:

1. Chest moves with each inflation
2. Increase in HR above 100 bpm
3. Oxygen saturations improve

Other signs to verify the ETT is in the correct position include:

- Visual inspection as it passes through the vocal cords
- Colour change of CO₂ detector to identify expired CO₂
- Listening to bilateral symmetrical air entry over the chest (axilla) and also listening over the stomach
- Mist may condense on inside of the ETT
- Once the infant is stabilised the ETT position **must** be confirmed by chest X-ray

CO₂ Detection

- The CO₂ detector may have false or negative reading if the infant has a very low or absent pulmonary blood flow, if the chest wall is moving well in a depressed infant, some caution is needed to avoid unnecessary extubation and reintubation.
- False positives may occur if CO₂ detector is contaminated with adrenaline (epinephrine) or surfactant.
- In extremely low birth weight infants (ELBW) the CO₂ detector may take up to 5 breaths to change colour.

When to call for help

A senior colleague, Fellow or Consultant, should be called whenever local policies requires them to be present. If there has been 1 failed intubation attempt during resuscitation or if cardiac compressions have commenced a senior clinician should be called.

Intubation and Ventilation

Newborns requiring resuscitation and intubation in non-tertiary centres should remain intubated, ideally they should be placed on a ventilator to achieve tidal volumes of 4–6 mL/kg/breath, and the Newborn and paediatric Emergency Transport Service (NETS) should be contacted immediately.

For sites that do not have access to a mechanical ventilator, manually ventilate the infant using the Neopuff with appropriate pressure settings. The ETT should be secured using either the NeoBar[®] device or with DuoDERM[®] and adhesive tape, keeping in mind the need to protect the infant's skin integrity.

Laryngeal mask airways (LMA)

[Top](#)

Use of a laryngeal mask should be considered in babies who require PPV and where a patent airway is difficult to secure. Size 1 LMA's must only be used for newborns/neonates. The baby must meet the following criteria:

- ≥ 34 weeks gestation
- ≥ 2 kg in weight
- ≤ 5 kg in weight

The LMA should be inserted by a skilled BLS trained operator who can recognise its correct placement.

To use an LMA:

- Test inflation of the cuff (using a syringe and 4mL of air) – then slowly and fully deflate LMA cuff before insertion when using Unique LMA (see Figure 3), *NOT required for i-gel LMA (see Figure 4)*.
- Lubricate the back and sides of the LMA with baby's saliva or water-soluble lubricant round the anterior surface of the cuff or in the bowl of the mask.
- Holding the LMA like a pen, insert it with the open side of the cushioned mask facing (towards the tongue, away from the palate). The index finger, placed inside the bowl of the mask, is used to prevent the tip from curling and to guide the mask, sliding the back of it against the hard palate and into the pharynx until resistance is felt.
- The tube is then held firmly and with slight downward pressure with the other hand while the index finger is removed.
- The cuff is then inflated with 4mL of air. The tube may rise up slightly out of the hypopharynx as the mask is inflated, *NOT required for i-gel LMA*.
- A resuscitation device (BAG II Disposable Resuscitator, Laerdal or Neopuff) is then connected to the adapter.

If no chest movement is achieved, the LMA may not be in the correct position and, the cuff should be deflated and LMA (*if Unique LMA*) should be removed and bag and mask ventilation should be resumed. There is no evidence to support the routine use of laryngeal masks during CPR or the administration of adrenaline (epinephrine) via the LMA.



Figure 3: LMA[®] Unique[™] Airway (Picture from Google images)



Figure 4: i-gel® single use supraglottic airway (Picture from Google images)

LMA placement may be used for basic life support. Staff that have completed BLS training and assessment on an annual basis are able to site an LMA in an emergency situation when an airway cannot be successfully established by previously mentioned methods (T-piece or bag valve and mask, or ETT)

Circulation – ‘C’

[Top](#)

Cardiac compressions

After initial assessment, drying, stimulation and 30 seconds of assisted ventilation, the HR and breathing of the baby is reassessed, along with tone and saturations:

- If the HR is >100 bpm and the baby is breathing, then PPV can be stopped
- If the HR is >60 bpm and <100 bpm, then PPV is continued for another 30 seconds and increasing pressure and oxygen should be considered
- If the HR is <60 bpm or asystole is present with effective PPV, then commence chest compressions in combination with the PPV and 100% oxygen and intubation or insertion of laryngeal airway
- Chest compressions should continue until the HR is >60 bpm
- The HR should be checked by auscultation of the apex beat

Call a senior staff member, Fellow or Consultant, if chest compressions are required

Cardiac compression techniques

- The recommended technique for chest compression is the 2 thumb encircling technique (see Figure 5).
- Depress the lower half of the sternum (1 finger breadth below the inter-nipple line) approximately 1/3 of the anterior-posterior (AP) diameter of the chest.
- During UVC insertion, this technique should be maintained by reversing the position to avoid potential sharps injury.



Figure 5: Two thumb encircling chest technique (Picture from NICU, JHCH)

The 2-finger method (see Figure 6) may be used in the event there is a lone resuscitator.



Figure 6: The 2-finger technique (Picture from NICU, JHCH)

Ratio of compressions to PPV

There should be 90 chest compressions/minute and 30 breaths/minute when performed in combination. Three compressions should be followed by a half second pause to deliver PPV a total of 120 events per minute. Chest compressions and PPV should be coordinated to avoid simultaneous delivery of a compression and a breath.

Re-assessment

Following 30 seconds of PPV in conjunction with chest compressions, the baby's HR and respiratory effort is reassessed:

- If the HR remains <60 bpm, then PPV and chest compressions are continued and medications are used.
- Always ensure effective airway management, PPV and chest compressions are being delivered before progressing to medications.
- If an ETT has been placed and a new resuscitator takes over, then reassessment of ETT position requires direct vision to ensure the ETT is through the vocal cords of the baby. At any stage that chest movement is inadequate, airway and breathing should be reassessed. ETT tubes should never be assumed to be in the trachea – they need constant vigilance.

Medications and fluids in ongoing resuscitation

As medications and fluids act directly on the heart, delivering them centrally, via an umbilical venous catheter (UVC) is the preferred method.

Vascular Access

[Top](#)

It is recommended that insertion of UVC should occur as soon as cardiac compressions are required. New evidence suggests chest compressions without adrenaline (epinephrine) are insufficient to increase cerebral blood flow.

A UVC is the most rapidly accessible intravascular route for administration of adrenaline (epinephrine) and it can also be used for fluid administration.

Alternative routes may include peripheral veins or, in an emergency, the intraosseous route (for term infants and as per local policy).

Ventilation and chest compressions must be delivered continuously during preparation to administer IV medication and/or fluids.

Insertion of UVC

This is the procedure for an emergency situation, it is not a sterile procedure; however, it should be done with the cleanest possible approach.

- A complete umbilical vessel catheterisation pack is located in the circulation drawer of Resuscitaire.

- Set-up equipment on clean drape/dressing pack and wear appropriate PPE (goggles and gloves).
- Prime the UVC line with sodium chloride 0.9% prior to insertion (see Figure 7).
- Tie the umbilical cord with cord tie (ensure not overly tight to allow passing of catheter).
- Cut the umbilical cord approximately 1 cm above the base of the skin (see Figure 8).
- Insert catheter 3 to 5 cm below the base of the skin and pull back on syringe to assess for blood flashback.
- Flush line and administer adrenaline (epinephrine) (remember to continue to hold UVC in place).
- Once patient is stable, secure with tape (see Figure 8 & 9); loop UVC prior to securing with tape to act as anchor.

Insertion of a UVC is an advanced procedure and should be attempted by competent and confident clinical staff who have completed recognised ALS training within a 2-year period

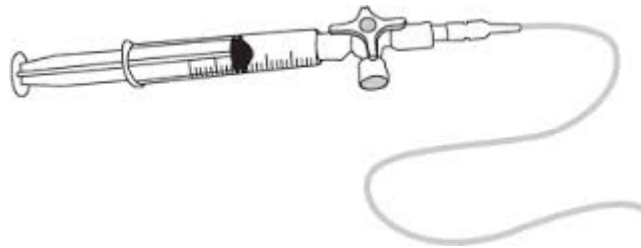


Figure 7: Primed UVC line set-up (Picture from ANZCOR Guideline)

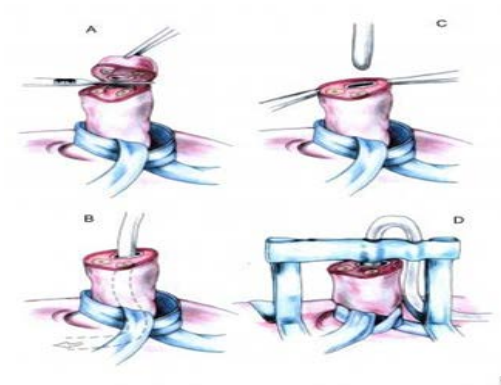


Figure 8: Umbilical venous catheter insertion and securing (Picture from Google images)



Figure 7: Securing of umbilical line (Picture from Google images)

Medications and Fluids in Resuscitation

[Top](#)

Adrenaline

(epinephrine)

Indications: Adrenaline (epinephrine) should be used if the HR remains <60 bpm despite effective airway management, PPV and cardiac compression.

Dosage: 10 to 30 microgram/kg (1mg/10ml) of 1:10,000 solution given by a quick push
(0.1–0.3 mL/kg of 1:10,000 solution)

- The UVC is the recommended administrative route.
- The dose should be followed by a small (1mL) sodium chloride 0.9% flush.
- This dose can be repeated every few minutes if the HR remains <60 bpm despite effective ventilation and cardiac compressions.

Suggested doses of adrenaline (epinephrine) for specific gestations are listed in the resuscitation algorithm (see Appendix 2).

There is insufficient evidence for the use of ETT adrenaline (epinephrine), however if intravenous access cannot be gained quickly enough, then use of the endotracheal route is possible.

NOTE: A higher dose is required via this route, 50–100 micrograms/kg (i.e. 0.5–1mL/kg of 1:10,000 adrenaline (epinephrine)) this must be followed with a 1mL sodium chloride 0.9% flush. The efficacy and safety of these doses have not been studied. It is suggested only one dose via this route be given and then aim to gain intravenous access again for subsequent doses.

Bicarbonate

Bicarbonate has not been found to be beneficial in acute resuscitation and is **not** recommended.

Naloxone

Naloxone **must not** be used as part of the initial resuscitation of newborns with respiratory depression in the delivery room. Naloxone should **never** be given to infants of narcotic-dependent mothers.

Volume replacement during resuscitation

Administration of intravascular fluid should be considered when there is suspected fluid loss or shock and the newborn has not responded adequately to initial resuscitative efforts.

Sodium chloride 0.9% is the first line fluid of choice. Initial fluid replacement should start with 10mL/kg of sodium chloride 0.9% (normal saline) administered as a quick push via the UVC. Boluses can be this can be repeated after response assessment.

O-negative blood can be used in emergency blood loss situations and when blood is required, staff must organise an urgent delivery from blood bank or theatres to release un-crossmatched, O-negative blood as an emergency. The blood is placed in a cooler with a timer. If the blood remains unused it should be returned to the blood bank or theatres as soon as possible after the birth. Every facility should document their local processes for accessing un-crossmatched O-negative blood if required.

Post-Resuscitation Care and Documentation

[Top](#)

Accurate documentation is essential after all neonatal resuscitations. Apgar's should be documented in the babies' blue book record and on eMaternity. In HNELHD, the NSW Health form

Newborn Resuscitation Record_NH700307 must be used 'for any infant who does not respond to stimulation and therefore requires any resuscitation intervention' (see Appendix 5). Paired arterial and venous umbilical blood gases should be collected for any infant who requires resuscitation. Gross examination of the placenta should be undertaken by the specialist medical practitioners and midwives present. Consideration should also be given to a histological examination (see NSW Health GL2014_006 Maternity – Indications for Placental Histological Examination).

Any infant requiring extensive resuscitation should be escalated to a higher level facility and admitted to NICU/SCU, and only extubated when safely monitored. They may require ongoing observation and monitoring, including early blood gas analysis and BSL monitoring.

An IIMS should be completed for any birth where:

- the arterial cord pH <7.10
- Lactate > 5.2
- Apgar score <7 at 5 minutes

Any infant who has experienced a significant intrapartum event should have their neurological status assessed over the first few hours after birth. Those infants who develop signs of moderate to severe encephalopathy should have a prompt consultation with a tertiary centre or NETS to discuss management and arrange retrieval for admission to a NICU. Therapeutic hypothermia (cooling) for moderate to severe encephalopathy needs to commence within six hours of birth as per the care of the infant with hypoxic ischaemic encephalopathy (HIE) (*as per Newborn Services guideline*).

Discontinuing of Cardiopulmonary Resuscitation

[Top](#)

In a newly-born, late-preterm and term baby, ANZCOR suggests that it is reasonable to stop resuscitation if the HR is undetectable and remains so for 10 minutes, because both survival and quality of survival deteriorate precipitously by this time. However, the decision to continue resuscitation efforts beyond 10 minutes when there is no HR or a very low HR, is often complex and may be influenced by issues such as whether the resuscitation was considered optimal, availability of advanced neonatal intensive care (including therapeutic hypothermia), presumed aetiology and timing of the arrest, the gestation of the baby, specific circumstances prior to delivery (e.g. known timing of insult) and wishes expressed by parents.

The absence of spontaneous breathing or an Apgar score of 1–3 at 20 minutes of age in babies >34 weeks but with a detectable HR are strong predictors of mortality or significant morbidity. Consultation with a neonatologist or NETS is recommended, when possible.

**In non-tertiary units in HNELHD; contact NETS
Call: 1300 362 500 and follow the prompts**

**At JHH and JHCH; call NICU and request assistance from a Consultant
or Fellow on extension 23171**

If it is decided to withdraw or withhold resuscitation, care should be provided in a way that is focused on the baby's comfort (if signs of life are present) and dignity, and support of the parents. Documentation of decision is required on the resuscitation record and patient notes.

Debriefing

There are many people involved in a newborn resuscitation and adequate debriefing should be made available for staff and families involved. This can be an informal or formal process with external resource engagement; a pre-determined debriefing session should be defined and communicated as available for any staff wanting to attend. Debriefing is recommended after every resuscitation that requires advanced life support measures including CPR, intubation, adrenaline delivery or a re-direction of care (withdrawing of resuscitation).

Care of the Family

[Top](#)

Particular consideration should be given to the communication that takes place with parents and families whilst newborn resuscitation is occurring and following the event:

- Explain what has happened
- Provide appropriate reassurance
- Invite questions
- Explain the expected plan and what will happen next, and inform the family where you are taking their baby

Regardless of the outcome of the resuscitation, some parents/families may need additional support. Clinicians should be sensitive to their needs and take into account cultural considerations for the family, and refer appropriately when required. Support services may include:

- Social workers
- Aboriginal support services; midwives, health workers and liaison officers
- Multicultural health services for specific cultural groups

IMPLEMENTATION PLAN

The clinical guideline will be:

- Circulated to General Managers and Sector Managers.
- Circulated to the clinicians via Tiered Neonatal Network/Newborn Services and Children, Young People and Families Services and the Women's Health and Maternity Network.
- Made available on the intranet (PPG) and HNEKidshealth website.
- Presented at facility units meetings and tabled for staff to action.

MONITORING AND AUDITING PLAN

- The person or leadership team who has approved the clinical guideline is responsible for ensuring timely and effective review of the guideline.
- Evaluation will require a review of the most current evidence as well as consideration of the experience of HNELHD staff in the implementation of the clinical guideline.
- Data derived from monitoring and evaluation should inform the review of the clinical guideline either as required or scheduled.
- Implementation, education support and monitoring compliance be completed by local Clinical Educators and Managers.
- Amendments to the guideline will be ratified by the Manager and Head of Newborn Services and WHaM Networks prior to final sign off by Children, Young People and Families Services.

CONSULTATION WITH KEY STAKEHOLDERS

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APPENDICES

APPENDIX 1: Abbreviations & Glossary
APPENDIX 2: Newborn Life Support Algorithm
APPENDIX 3: Resuscitation Trolley Equipment Flip Chart
APPENDIX 4: Oxygen/air mix (with flow meters)
APPENDIX 5: NSW Health – Newborn Resuscitation Record_NH700307
APPENDIX 6: Resuscitation Equipment Log Checklist

RELATED NSW MINISTRY OF HEALTH DOCUMENTS

[PD2012_069 Health Care Records - Documentation and Management](#)
[PD2014_030 Using Resuscitation Plans in End of Life Decisions](#)
[GL2016_018 NSW Maternity and Neonatal Service Capability Framework](#)
[PD2013_049 Recognition and Management of Patients who are Clinically Deteriorating](#)

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FEEDBACK

Any feedback on this document should be sent to the Contact Officer listed on the front page.

APPENDIX 1

ABBREVIATIONS & GLOSSARY

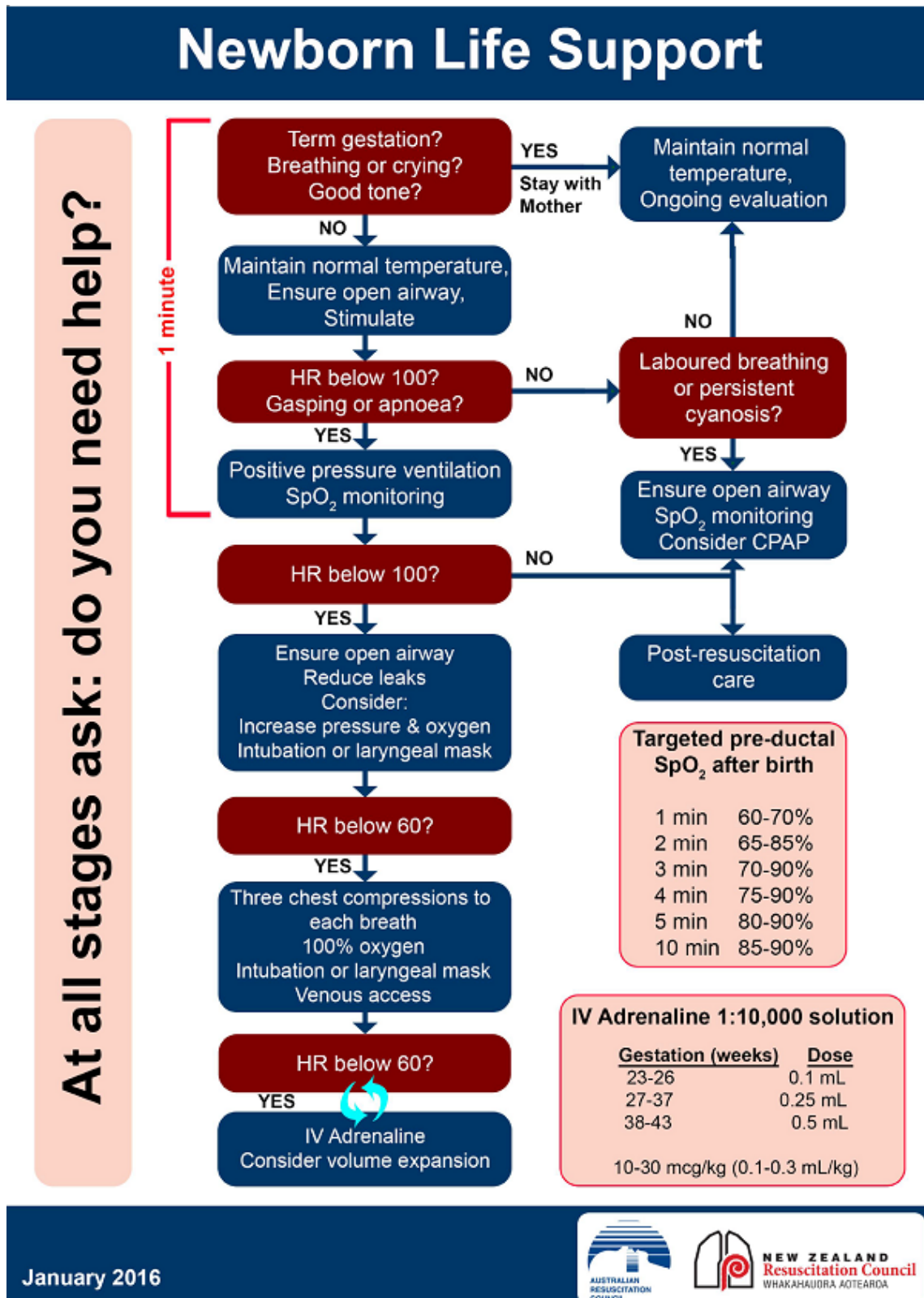
Acronym or Term	Definition
ANZCOR	Australian and New Zealand Committee on Resuscitation
APH	Antepartum haemorrhage
ARC	Australian Resuscitation Council
BLS	Basic Life Support
BPM	Beats per minute
BSL / BGL	Blood Sugar Level / Blood Glucose Level
CPAP	Continuous Positive Airway Pressure
CTG	Cardiotocograph – Electronic recording of the foetal heart rate and maternal contractions
DCC	Delayed Cord Clamping
ELBW	Extremely low birthweight infant <1000 gram
ETT	Endotracheal tube
FG	French Gauge
GA	General Anaesthetic
HNELHD	Hunter New England Local Health District
HR	Heart Rate
JHCH	John Hunter Children's Hospital
JHH	John Hunter Hospital
LMA	Laryngeal Mask Airway
MHL	My Health Learning
Multiple birth	More than one foetus <i>in utero</i>
NBLS	Newborn Basic Life Support
Neonate	An infant in the first 28 days of life
NETS	Newborn Emergency Transport Service
Newborn	An infant in the first minutes to hours following birth
NICU	Neonatal Intensive Care Unit
NSW	New South Wales
PEEP	Positive End Expiratory Pressure
PIP	Peak Inspiratory Pressure
PPV	Positive Pressure Ventilation
Rad-8®	Pulse oximeter- by Masimo

Resuscitation of the Newborn Infant HNELHD GandP 20_04

Resuscitation	Defined as the preservation/or restoration of life by establishment and/or maintenance of airway, breathing, circulation, and related emergency care
SCU	Special Care Unit
T-piece device	A manually-operated, gas-powered resuscitator designed to provide breaths at a set flow with consistent Peak Inspiratory Pressure (PIP) and Positive End Expiratory Pressure (PEEP) to infants e.g. Neopuff
UVC	Umbilical Venous Catheter

APPENDIX 2

NEWBORN LIFE SUPPORT ALGORITHM



APPENDIX 3

RESUSCITATION TROLLEY EQUIPMENT FLIP CHART



THIS RESOURCE WAS DEVELOPED BY THE
NEONATAL INTENSIVE CARE UNIT OF THE
JOHN HUNTER CHILDREN'S HOSPITAL,
HUNTER NEW ENGLAND LOCAL HEALTH DISTRICT
AND MODIFIED FOR USE ACROSS THE HNELHD
TIERED MATERNITY & NEWBORN NETWORK
UPDATED SEPTEMBER 2019

REFERENCE:
AUSTRALIAN RESUSCITATION COUNCIL, GUIDELINE 13.1, RECOMMENDED EQUIPMENT AND DRUGS FOR
THE RESUSCITATION OF THE NEWBORN INFANT. JANUARY 2016.
REVISED BY: JO DAVIS, CNC NEWBORN SERVICES JHCH AND DR LARISSA KOROSTENSKI, HEAD
OF NEWBORN SERVICES JHCH (2019).

APPENDIX 3

RESUSCITATION TROLLEY EQUIPMENT FLIP CHART

LIST OF REQUIREMENTS FOR ALL NEONATAL RESUSCITATION TROLLEYS:

GENERAL:

- OVERHEAD WARMER
- LIGHT
- CLOCK WITH TIMER

ATTACHED TO O₂/AIR OUTLET:

- FLOWMETER WITH BLENDER CONNECTED TO T-PIECE DEVICE AND FACE MASK (SIZE 0)

ATTACHED TO TWIN-O-VAC:

- SUCTION TUBING WITH Y-SUCTION CATHETER (FG 10)

ON TOP OF TROLLEY:

- Stethoscope (neonatal size preferred)..... x 1
- Pulse oximeter with disposable probe available x 1
- Warmed Baby blankets x 2
- Warmed Towel x 1
- Polyethylene bag/wrap for infants < 1500g or < 30 weeks x 1
- Sterile baby receiver x 1 (OT trolley only)
- Bucket with lid, lined with plastic bag for placenta (unit specific)..... x 1 (OT trolley only)
- Doppler & gel (unit specific)..... x 1 (OT trolley only)
- Wrigley's, N Barnes, Kielland forceps (unit specific) x 1 (OT trolley only)
- Obstetric Vacuum Delivery System (unit specific) x 1 (OT trolley only)

REQUIREMENTS

APPENDIX 3

RESUSCITATION TROLLEY EQUIPMENT FLIP CHART

APPROPRIATE RANGE OF NEONATAL FACE MASKS (premature to term sizes)	
• Size 1	x 1
• Size 0/1	x 1
• Size 0	x 1
OROPHARYNGEAL AIRWAYS	
• Size 0	x 1
• Size 00	x 1
SUCTION CATHETERS	
• Size 6g	x 3
• Size 8g	x 3
• Size 10g or 12g	x 3
LARYNGEAL MASK AIRWAY (LMA)	
• Size 1.0 (≥ 34 weeks or ≥ 2kg)	x 1
• 5ml syringe	x 1
SELF INFLATING BAG (INFANT) WITH RESERVOIR (even if using T-Piece)	
GASTRIC TUBES (FOR GASTRIC DECOMPRESSION)	
• Size 8g	x 1
• 20ml syringe (orange)	x 1
SAFETY GLASSES	x 1

AIRWAY

APPENDIX 3

RESUSCITATION TROLLEY EQUIPMENT FLIP CHART

ENDOTRACHEAL TUBES (ETT)

- Size 2.5..... x 3
- Size 3.0..... x 3
- Size 3.5..... x 3
- Size 4.0..... x 3

INTUBATING STYLET OR INTRODUCER..... x 3

END-TIDAL CARBON DIOXIDE DETECTOR..... x 2

LARYNGOSCOPE HANDLE & BLADES

- stubby blade size 00 or 6cm (disposable)..... x 1
- short blade size 0 or 7.5cm (disposable)..... x 1
- long blade size 1 or 10cm (disposable)..... x 1

MECONIUM ASPIRATOR DEVICE..... x 1

SPARE BATTERIES FOR LARYNGOSCOPE..... x 2

EMERGENCY PNEUMOTHORAX KIT - CONTENTS	
• Alcohol wipes.....	x 2
• Cannulae (24g-yellow).....	x 2
• 3 way tap.....	x 2
• 10ml syringe.....	x 2

ETT SIZE AND INSERTION DEPTH (APPROX. INSERTION DEPTH = WEIGHT + 6CM)

WEIGHT	GESTATION	ETT SIZE	POSITION AT LIP
< 600 gms	< 26 weeks	2.5	6 cms
< 1000 gms	< 28 weeks	2.5	7 cms
1000 – 2000 gms	28 – 34 weeks	3.0	8 cms
2000 – 3000 gms	34 – 38 weeks	3.5	9 cms
> 3000gms	> 38 weeks	4.0	10 cms

BREATHING

APPENDIX 3

RESUSCITATION TROLLEY EQUIPMENT FLIP CHART

UMBILICAL VESSEL KIT; CHECKLIST BELOW

UMBILICAL VESSEL KIT - CONTENTS	
• Umbilical vessel catheters	
- Size sml (3.5/4.0).....	x 2
- Size lge (5.0).....	x 2
• 3 way tap.....	x 2
• Sterile gauze.....	x 2
• Sodium chloride (0.9%) 100 ml bag.....	x 1
• 1ml syringes.....	x 3
• 50mls syringe.....	x 2
• Drawing up needles.....	x 3
• Cord tie.....	x 1
• Curved Scalpel blade size 23.....	x 1

RESUSCITATION DRUGS

- ADRENALINE 1:10,000/10MLS VIAL..... x 2

READILY AVAILABLE ACCESS TO BLOOD FOR EMERGENCY NEONATAL TRANSFUSION

RESUSCITATION RECORD SHEETS..... x 2

- Micro ABG (blood gas syringes)..... x 2

UVC SECURING ITEMS

- Leukoplast tape..... x 1
- Scissors..... x 1
- DuoDERM..... x 1

- ETT ADRENALINE PACK—USE ONLY IF UVC ACCESS UNSUCCESSFUL INITIALLY (1ST DOSE ONLY)

ETT ADRENALINE PACK - CONTENTS	
• 5ml syringe.....	x 1
• 2ml syringe.....	x 1
• Drawing up needle.....	x 1
• Sodium chloride (0.9%) 10ml vial.....	x 1

CIRCULATION

APPENDIX 3

RESUSCITATION TROLLEY EQUIPMENT FLIP CHART

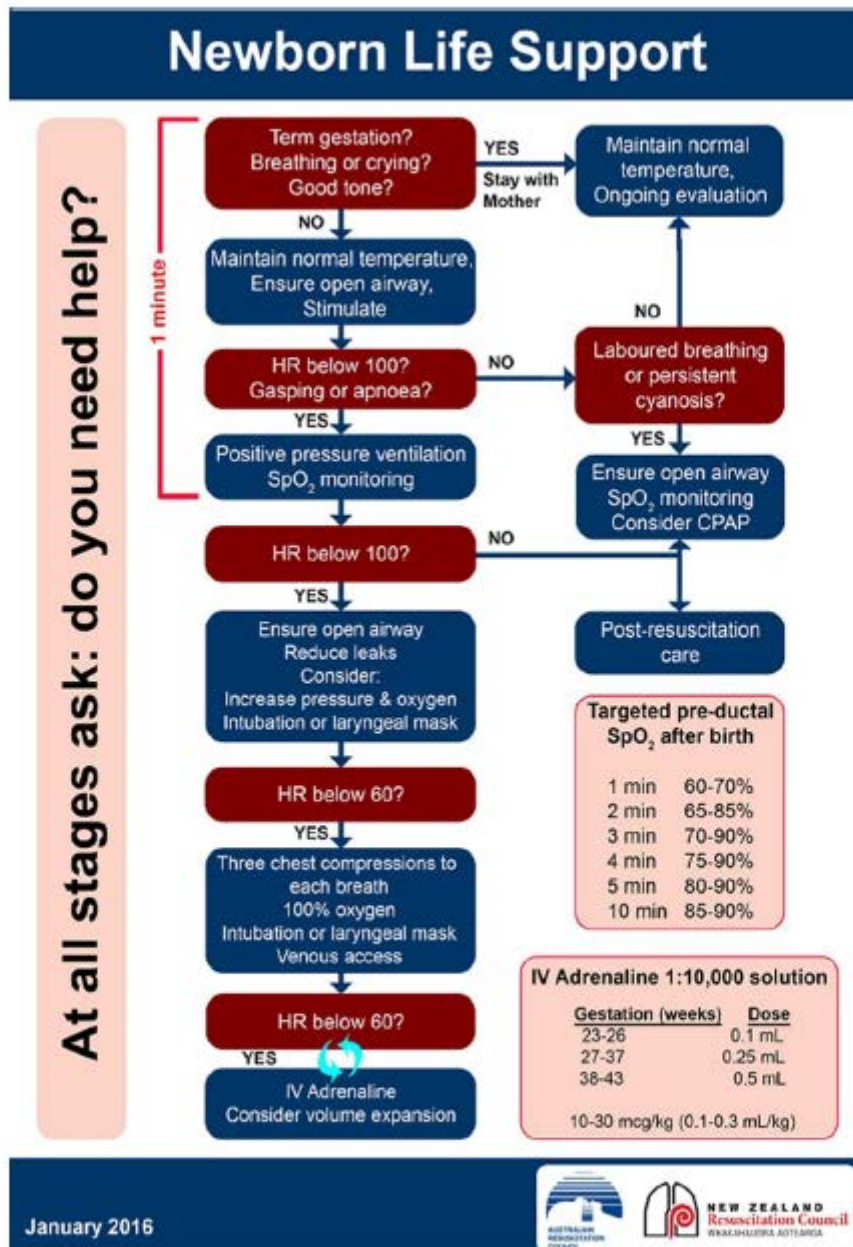
INSTRUCTIONS FOR T-PIECE DEVICE (NEOPUFF)

- Check gas flow by increasing the FiO_2 (oxygen) on the blender to 60% and turn the flow meter to 15 L/min for 10 seconds. If the oxygen is not connected correctly the external blender should alarm. If alarms correct the set-up.
- Once correct setup confirmed, return blender to start setting.
- Check T-piece and set-up for use through the following steps;
- Connect gas supply from blender to gas inlet port.
- Set gas flow rate at 10 L/min.
- Connect single use infant resuscitation circuit (patient tubing) to gas outlet.
- To check PEEP settings, occlude the bottom end of the T-piece and adjust the white dial (PEEP) valve to reach a delivered pressure of 5 cm H_2O as displayed on the manometer.
- To check PIP settings, occlude both the white dial (PEEP) valve and the patient end of the T-piece to deliver an inspiratory pressure & adjust peak inspiratory pressure (PIP) control dial to set;
 - 30 cm H_2O for term infant or,
 - 20 – 25 cm H_2O for premature infants,
- Check "pop-off" or maximum pressure release valve is set at 50 cm H_2O by turning PIP dial as far as possible to ensure stops at 50cm H_2O . Once confirmed reset PIP setting to suitable pressure setting as listed above.
- Ensure all staff are aware of how to override maximum pressure valve (the dial located on the left behind the cover if needed).
- Fit appropriate size face mask, and the T-piece device (Neopuff) is now ready for use.
- If not using in an immediate sense turn off gas flow until required.

T-Piece Device

APPENDIX 3

RESUSCITATION TROLLEY EQUIPMENT FLIP CHART



RESUS FLOW CHART


APPENDIX 4

OXYGEN/AIR MIX VIA FLOW METERS


Oxygen percentage	Oxygen flow (L/min)	Air flow (L/min)
21%	0	10
30%	1	9
40%	2	8
50%	4	6
60%	5	5
70%	6	4
80%	7.5	2.5
90%	9	1

APPENDIX 5

NSW HEALTH - NEWBORN RESUSCITATION RECORD_NH700307



SMR110034

 NSW Health Facility:	FAMILY NAME	MRN				
	GIVEN NAME	<input type="checkbox"/> MALE <input type="checkbox"/> FEMALE				
	D.O.B. ____/____/____	M.O.				
	ADDRESS					
NEWBORN RESUSCITATION RECORD		LOCATION / WARD		COMPLETE ALL DETAILS OR AFFIX PATIENT LABEL HERE		

Use for any newborn requiring airway, breathing or circulatory support. Activate Clinical Emergency Response System. Consider NETS and utilise the Vision For Life (time contacted : hours)

Risk factors for resuscitation	Thermoregulation <input type="checkbox"/> Increased room temperature <input type="checkbox"/> Overhead heater <input type="checkbox"/> Plastic wrap / bag <input type="checkbox"/> Warm blanket	Time	Blood gas	pH	pCO ₂	pO ₂	BE	HCO ₃	Lactate	BGL	Comments
				Cord arterial							
		Cord venous									
		Arterial									
		Venous / Cap									

Actual date ____/____/____ and time : hours at start of resuscitation	Gestation /40 weeks					Weight: grams					Estimated / Actual				
Time from start of resuscitation	1 Minute	2	3	4	5	6	7	8	9	10	11	12	13	14	15
OR Actual time: hours : minutes	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
EVALUATION															
Respiratory rate / minute															
Chest movement / Breath sounds - / R = L															
Heart rate: beats / minute															
SaO ₂ / site															
AIRWAY / BREATHING															
Baby in neutral position															
Dry baby / Stimulate															
Suction:															
Oral / Nasopharyngeal / Endotracheal															
Oxygen: Humidification <input type="checkbox"/> %															
Continuous positive airway pressure: Flow L/min															
cm H ₂ O															
Intermittent positive pressure ventilation (IPPV):															
Face mask (FM)															
Endotracheal (ETT)															
Laryngeal Airway Mask (LMA)															
IPPV settings:															
Peak inspiratory pressure cm H ₂ O															
Positive end expiratory pressure cm H ₂ O															
Mechanical rate breaths per minute															
Endotracheal Tube (ETT):															
Size															
cm at lip / nare															
CO ₂ detector Y / N															
Orogastric tube:															
Size 6 / 8Fr															
CIRCULATION															
Chest compressions (Start, stop times)															
UVC 3.5 / 5 FG cm at umbilicus															
Access site:															
Peripheral Venous Line															
Intraosseous															
0.9% Sodium Chloride ml															
Blood O negative ml															
DRUGS															
Adrenaline (1:10000)															
IV Dose ml															
ET Dose ml															
Initials															

If the baby is not improving during resuscitation check for blocked airway, ETT position, patency, equipment failure, pneumothorax, cardiac disease, diaphragmatic hernia

Holes Punched as per AS2328.1: 2012

BINDING MARGIN - NO WRITING

Page 2 of 4 NO WRITING NO WRITING Page 3 of 4

