

Royal Hospital for Women (RHW)
NEONATAL BUSINESS RULE
COVER SHEET



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SUMMARY	To guide procedural placement of an endotracheal tube for airway management during assisted mechanical ventilation or neonatal resuscitation.
Key Words	Intubation, resuscitation, deterioration, mechanical ventilation, laryngoscope, endotracheal tube, neonate

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1 BACKGROUND

Intubation of the neonate may be performed as an elective escalation of care or as an emergency procedure. Intubation is a high-risk procedure which should be undertaken with supervision from a suitably qualified staff member (Consultant/Fellow/Neonatal Nurse Practitioner [NNP]) where feasible. Intubation has the potential to provoke physiological instability along with complications such as airway trauma.

Each neonate must be assessed and supported to ensure the establishment of a safe airway and effective breathing. Correct mask placement and effective Intermittent Positive Pressure Ventilation (IPPV) (if required) are often sufficient as a short-term measure until intubation is established, or senior assistance is available.

2 RESPONSIBILITIES

2.1 Staff

2.1.1 NCC Medical/NNP

- Identify any neonate that may require intubation
- Prescribe any pre- medication that may be required if time permits
- Prepare intubation equipment
- Allocate roles for staff members assisting in procedure
- Perform 'time out' if undertaking an elective intubation or time safely permits
- Perform intubation safely, have no more than 2 attempts by a single proceduralist if more than one proceduralist is present.
- Recognise when there may be a difficult airway and seek appropriate assistance (e.g. Anaesthetic or Ear Nose and Throat Specialist)
- Recognise and respond to any deterioration appropriately
- Confirm successful intubation through pedicap and air entry assessment
- Manage neonate post intubation and monitor for signs of complications
- Document procedure in patient's medical record
- Inform parent/carers of procedure.

2.1.2 Nursing/Midwifery

- Prepare neonate for intubation including correct positioning, aspiration of gastric tube, oral suction
- Check safety equipment is functional (Neopuff™, self- inflating bag and mask, suction)

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- Ensure neonatal resuscitation trolley is at the bedside
- Prepare pre- medication that may be required
- Provide assistance throughout procedure
- Recognise and respond to any deterioration appropriately
- Secure the endotracheal tube (ETT) appropriately
- Document intubation procedure on the Neonatal Resuscitation Record Form and in the patient's notes

3 PROCEDURE

3.1 Indications

- Respiratory failure if unresponsive to non- invasive ventilation
- Surfactant administration using 'INSURE' technique
- Congenital diaphragmatic hernia
- For procedures/surgery requiring sedation/muscle relaxation

3.2.1 Equipment

- Mechanical ventilator set to appropriate mode and settings
- Continuous cardiorespiratory monitoring and pulse oximetry
- Neopuff™ and appropriately sized face mask
- Self-inflating resuscitation bag (Available in the event of T-piece failure)
- Suction catheters FG 8, 10 or 12 depending on size of neonate
- Sterile gloves (correct size for proceduralist)
- Sterile paper towel x2
- Sterile plastic drape
- Laryngoscope and blade (If using video laryngoscope (C-MAC) see policy for detailed instructions on use)
- Uncuffed ETT
- ETT introducer (oral intubation only)
- CO₂ detector (Pedi cap)
- Magills forceps (if required)
- Barrier film wipe (e.g. Cavidon)
- Pre-cut adhesive tapes or 'NeoBar®' to secure ETT
- 10 mL enteral syringe
- Stethoscope
- Neonatal resuscitation trolley
- Neonatal Resuscitation Record Form
- Disinfectant wipes

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NOTE:

Laryngoscope blade size¹

- Miller straight blades used for neonates
- Size 0 or 00 for preterm neonates
- Size 1 for term neonates

Choosing correct ETT size²:

Weight	ETT size
<1000g	2.5mm
1000-2000g	3.0mm
2000-3000g	3.5mm
>3000g	3.5 or 4.0mm

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3.2.2 ETT Insertion Depth

- Tochens formula ('rule of six') is the method used to estimate ETT insertion depth^{2,8}. It can overestimate oral ETT insertion depth and underestimate nasal ETT depth.
- 'Rule of six':
 - Oral ETT: weight (kg) + 6cm = length at the lip
 - Nasal ETT: (weight kg x 1.5) + 6cm = length at the nares
- Table 1 ANZCOR guidelines of ETT Insertion Depth^{2,7}.

Corrected gestation (weeks)	Actual weight (kg)	ETT mark at lip (cm)
23–24	0.5–0.6	5.5
25–26	0.7–0.8	6.0
27–29	0.9–1.0	6.5
30–32	1.1–1.4	7.0
33–34	1.5–1.8	7.5
35–37	1.9–2.4	8.0
38–40	2.5–3.1	8.5
41–43	3.2–4.2	9.0

- Final ETT position **MUST** be confirmed with chest Xray

NOTE:

If using stylet, the stylet tip must not pass the end of the ETT opening and must be secured to prevent movement during the procedure

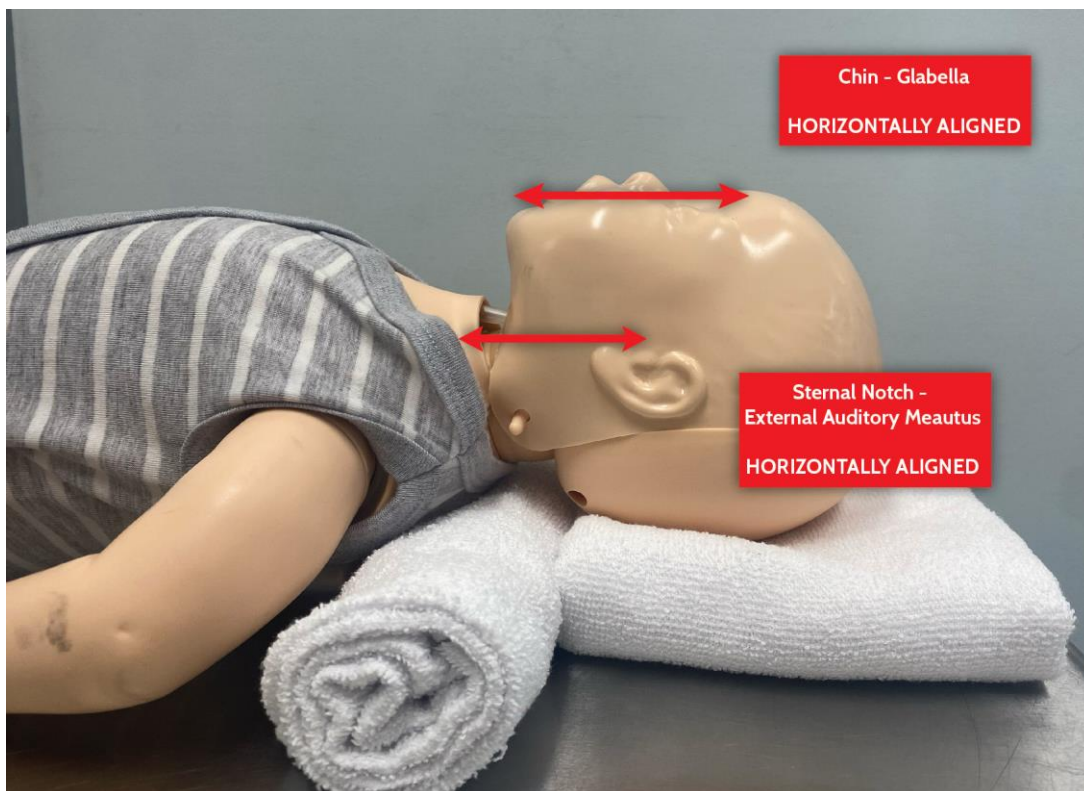
3.3.1 Oral Intubation Clinical Practice

1. Inform parent/carers of procedure if possible.
2. Set up emergency equipment prior to intubating:
 - Neopuff™ set to required Positive Inspiratory Pressure (PIP) and Positive End Expiratory Pressure (PEEP)
 - Appropriately sized face mask attached to Neopuff™
 - Suction (check suction pressure set at -100mmhg)
 - Resuscitation trolley
3. Ensure continuous cardiorespiratory and pulse oximetry connected
4. Ensure the proceduralist:
 - Is a Doctor/NNP who is skilled in intubation (or supervised)
 - Has an assistant to suction and assist with airway management
 - Has a second assistant for medication preparation/administration and documentation
5. Check laryngoscope has the appropriate size blade and the light is working.

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6. Disinfect the work surface of the Neonatal Resuscitation trolley.
7. Perform surgical hand wash, dry hands with sterile paper towel and don sterile gloves
8. Open sterile plastic drape on work surface of neonatal resuscitation trolley and set up equipment:
 - Appropriate ETT size
 - Stylet
 - CO₂ detector
 - Magills forceps (if required)
9. Assistant to place the mattress flat with neonate in supine position.
10. Assistant to position neonate's head:
 - "sniffing" position or slightly extended position (i.e. flexed neck and extended head)
 - The following criteria can also be used to assess optimum head position (picture 1)
 - i. glabella aligned horizontally with chin
 - ii. external auditory meatus horizontally aligned with the sternal notch
 - A simple head tilt may be required, or a shoulder and/or head roll may be used to obtain this position)



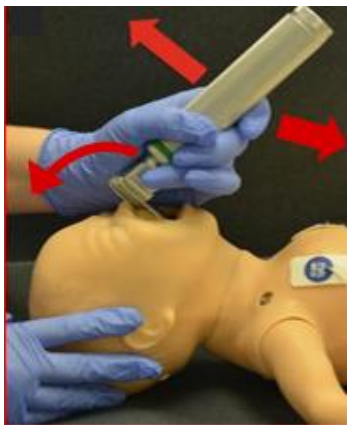
Picture 1

11. Adjust the bed height for staff undertaking procedure.
12. Assistant to aspirate gastric contents via intragastric tube with 10 mL enteral syringe (Intragastric tube may then be left insitu or removed dependent on operator preference).
13. Assistant to prepare intubation medication (if clinical situation permits) as per Australasian Neonatal Medicines Formulary (ANMF).

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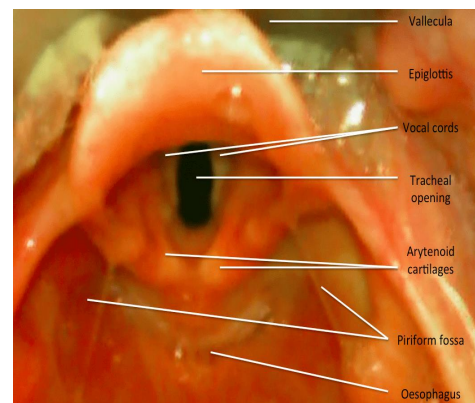
14. Assistant to suction oropharynx to clear airway (if required).
15. Perform 'Time Out' and ensure everyone is aware of roles (see appendix. 2 for Time Out procedure).
16. Assistant to administer any pre- medication required and the scribe is to document time of administration.
17. Assistant to remove respiratory support from neonate (if neonate is on this).
18. Proceduralist to place face mask on neonate's face and provide continuous positive airway pressure (CPAP) or IPPV via Neopuff™ until proceduralist is ready to attempt intubation.
19. Proceduralist to pass the laryngoscope blade over the neonate's tongue and move it to the left until the epiglottis comes into view.
20. Advance the tip of the laryngoscope blade to sit in the epiglottic vallecula.
21. Gently lift the laryngoscope blade (do not 'rock' backwards) (picture 2 & 3) until the vocal cords come into view (Picture 4).



Picture 2



Picture 3



Picture 4

NOTE:

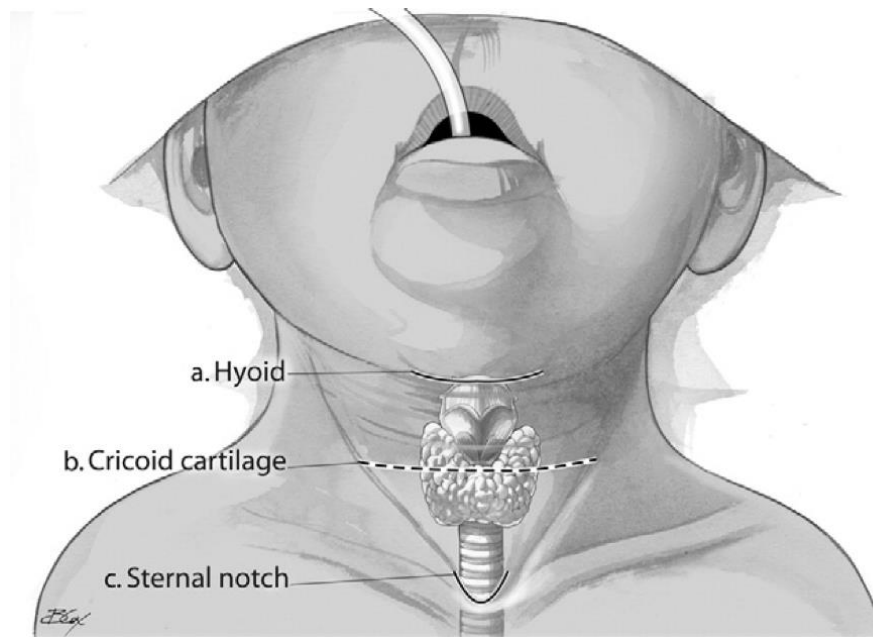
Application of cricoid pressure often assists in better visualisation of the vocal cords (picture 5)

Cricoid pressure which is too firm can obscure the view of the vocal cords

Intubation attempts should be discontinued if there is persistent bradycardia <60bpm for > 30 seconds or earlier if significant signs of compromise.⁴

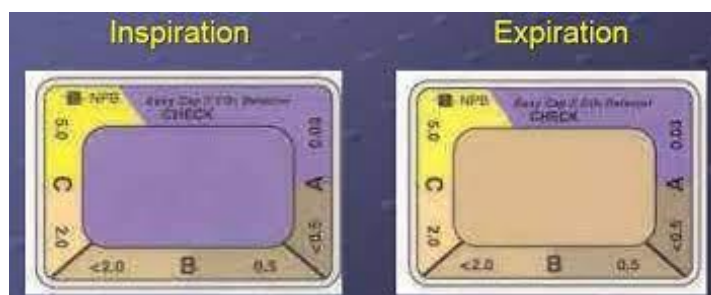
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Picture 5⁹

22. Pass the ETT through the vocal cords to predetermined measurement.
23. Remove laryngoscope from mouth and remove stylet from ETT (if used) (ensure sheath and tip from stylet are intact).
24. Attach CO₂ detector to ETT.
25. Provide IPPV for CO₂ detector to change colour to confirm tube placement. This may take 6 inflations before colour changes from purple to yellow⁵ (Picture 6)



Picture 6

NOTE:

CO₂ detector may not change colour with reduced cardiac output.

26. Proceduralist to continue to provide IPPV until ETT is connected to mechanical ventilator.
27. Assistant to auscultate bilateral breath sounds and inform proceduralist of air entry.
28. Remove CO₂ detector from Neopuff™ tubing once safe to do so.
29. Assistant to secure ETT with pre-cut adhesive tape or NeoBar® device.

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30. Clinical signs of successful intubation:

- CO₂ detector colour change “yellow” or “gold” colour
- Equal breath sounds on auscultation
- Symmetrical chest rise
- Improved colour and heart rate of neonate
- Vapour mist noted in ETT during exhalation

31. Connect to mechanical ventilator and ensure settings are achieved and there is equal chest rise and equal air entry.

32. Perform a chest X-ray to confirm correct ETT position.

- Ideal ETT tip position between T1 and T3

33. Document completed procedure in eRIC

NOTE: Failed intubation/Escalating a difficult airway

Escalate to a more senior staff member skilled in intubation

Consider adjunct airways (i.e. supraglottic airway/guedel airway)

Request urgent assistance through switch: SCHN Anaesthetic consultant and SCHN ENT Surgeon

3.3.2 Nasal Intubation Clinical Practice

- In some circumstances nasal intubation may be warranted, this is at the neonatologist's discretion.

NOTE:

A stylet is NOT used for the nasal approach

1. Inform parent/carer of procedure where possible.
2. Proceduralist to pass the ETT through the nostril
3. Advance the tip of the laryngoscope blade to sit in the epiglottic vallecula or gently lift the epiglottis
4. Gently lift the laryngoscope blade (do not 'rock' backwards) (picture 2 & 3) until the vocal cords come into view (Picture 4).
5. Holding the laryngoscope with one hand to maintain a direct view, with the other hand use Magills forceps orally to gently guide the tip of the ETT through the vocal cords to predetermined measurement (a second operator may assist with guiding the ETT through the nasal passage).
6. Remove laryngoscope from mouth.
7. Continue remaining steps as per oral intubation clinical guide

3.4 Documentation

- NSW Health Newborn Resuscitation record
- eRIC

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3.5 Education Notes

- Where practical, intubation should be discussed with parents prior to the procedure. In cases of emergent intubation parents should be updated at the earliest opportunity.
- Intubation attempts should be discontinued if there is persistent bradycardia <60bpm for > 30 seconds or earlier if significant signs of compromise. ⁴ Prolonged attempts are correlated with increase in overall morbidity with no change in overall success rate⁶.
- Estimating correct ETT depth remains challenging. There are high rates of inaccurate estimation for ETT depth therefore all ETT placements must be confirmed with chest X- ray and clinical assessment.
- Neonates should be placed with head midline and head/neck in a neutral position for chest X- ray. Head extension will shift the ETT tip upwards away from the carina, head flexion will shift the ETT tip downwards towards the carina.
- Thermoregulation is an important component of any procedural activity where the neonate will remain exposed for a period of time. Use of open care systems with overhead heaters or swaddling/placement of warm blankets over areas of the body not requiring visualisation should be considered. Do not place the ETT under radiant warmers prior to use as this may make them extremely pliable and more difficult to insert.
- Every intubation procedure is required to have contemporaneous documentation using the NSW Health Newborn Resuscitation Record. A staff member is to be allocated the role of documentation during the procedure. Names of all present staff members are to be documented. Each minute of resuscitation is to be documented including heart rate, saturations and interventions performed at that point in time (e.g. suction). Once completed this is then stored in the patients' medical notes.

3.6 Abbreviations

NNP	Neonatal Nurse Practitioner	IPPV	Intermittent Positive Pressure ventilation
ETT	Endotracheal Tube	CO ₂	Carbon Dioxide
ANZCOR	Australia and New Zealand Committee on Resuscitation	PIP	Positive Inspiratory Pressure
PEEP	Positive End Expiratory Pressure	ANMF	Australasian Neonatal Medicines Formulary
CPAP	Continuous Positive Airway Pressure	SCHN	Sydney Children's Hospital Network

3.7 Related Policies/procedures

- RHW NCC CBR- C-MAC Video Laryngoscope - Care and Maintenance
- RHW NCC CBR- Deteriorating neonate - Recognition and management inside newborn care centre

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- RHW NCC CBR- Golden Hours Protocol - Management of Preterm Infants <32 weeks in the first 2 hours of life
- RHW NCC CBR- Preterm Infants – Delivery Management for Extremely Preterm Infants (less than 26 Weeks) at the Royal Hospital for Women
- RHW CBR- Resuscitation of the Neonate at Delivery
- RHW NCC CBR- Drager Babylog VN 500 set up
- RHW NCC CBR- Endotracheal tube taping and securement using Neobar
- RHW NCC CBR- Extubation
- RHW NCC CBR- Nasal ETT strapping
- RHW NCC CBR- Suction - Closed Tracheal Suction from an Endotracheal Tube
- Australasian Neonatal Medicines Formulary (ANMF)
- ANZCOR Guidelines Guideline 13.5 – Tracheal Intubation and Ventilation of the Newborn

3.8 References

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4 ABORIGINAL HEALTH IMPACT STATEMENT DOCUMENTATION

- Considerations for culturally safe and appropriate care provision have been made in the development of this Business Rule and will be accounted for in its implementation.
- When clinical risks are identified for an Aboriginal and/or Torres Strait Islander woman or family, they may require additional supports. This may include Aboriginal health

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professionals such as Aboriginal liaison officers, health workers or other culturally specific services

5 CULTURAL SUPPORT

- For a Culturally and Linguistically Diverse CALD woman, notify the nominated cross-cultural health worker during Monday to Friday business hours
- If the woman is from a non-English speaking background, call the interpreter service: NSW Ministry of Health Policy Directive PD2017_044-Interpreters Standard Procedures for Working with Health Care Interpreters.

6 NATIONAL STANDARDS

- Standard 1 Clinical Governance
- Standard 4 Medication Safety
- Standard 5 Comprehensive Care
- Standard 6 Communicating for Safety
- Standard 8 Recognising and Responding to Acute Deterioration

7 REVISION AND APPROVAL HISTORY

Date	Revision No.	Author and Approval
2.4.2025	1	M Currie (Neonatal Nurse Practitioner) Endorsed NCC CBR Committee
29.9.25	1	RHW BRGC

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Appendix 1. Intubation Quick Checklist

Confirm	<ul style="list-style-type: none"> • Indication • Senior clinician aware • Patient • Procedure • Plan A & plan B
Team	<ul style="list-style-type: none"> • Designate roles & responsibilities <ul style="list-style-type: none"> • Team leader • Airway operator • Airway assist • Drugs • Scribe
Prepare	<ul style="list-style-type: none"> • Patient <ul style="list-style-type: none"> • Position & monitoring • Aspirate gastric tube • Secure IV access • Medications <ul style="list-style-type: none"> • Prepared and checked
Equipment	<ul style="list-style-type: none"> • Laryngoscope and blade • ETT size plus one size down • +/- stylet • Neobar or other ETT securement device • Resuscitation trolley • Pedicap • Suction • Neopuff and face mask • Ambubag and mask
Procedure	<ul style="list-style-type: none"> • Time out procedure (if non-emergent case) • Perform intubation & confirm ETT placement
Post Intubation	<ul style="list-style-type: none"> • Secure ETT • Attach to ventilator • Chest x-ray • Gas within 1 hour • Documentation

Appendix 2. Time Out Procedure

All team members to confirm:

- Patient & procedure
- Roles & responsibilities
- Patient appropriately positioned with secure IV access
- Medications prepared
- Required equipment available and functioning
- Emergency back up plan B if unsuccessful intubation
- All team members happy to proceed