NETS WA
Newborn Emergency Transport Service

Intubation on NETS Retrievals

Scope (Staff):	Nursing and Medical Staff
Scope (Area):	NETS WA

Child Safe Organisation Statement of Commitment

CAHS commits to being a child safe organisation by applying the National Principles for Child Safe Organisations. This is a commitment to a strong culture supported by robust policies and procedures to reduce the likelihood of harm to children and young people.

This document should be read in conjunction with this disclaimer

Contents

Aim

- Prepare NETS WA clinicians to perform endotracheal intubation on NETS retrievals through a standardized and structured approach whilst promoting good communication, teamwork and situational awareness.
- To reduce complications and adverse events during the intubation procedure.

Risk

Neonatal endotracheal intubation is a highly skilled procedure and can cause marked physiological changes in the neonate

Key points

- **ALL** patients requiring intubation should be discussed with the on-call NETS WA Consultant prior to intubation unless in a clinical emergency.
- Preparation is paramount. Check equipment prior to the procedure and make sure it is present and working.
- Try to not get too task focussed. Remember the primary goal is oxygenation **NOT** intubation.
- Factors associated with intubation success and reduced adverse events are:
  - Provider experience
  - Use of premedication (in non-emergency intubations)
  - Use of video laryngoscope
  - Teamwork, communication and preparation

Indications for Intubation

Indications and thresholds to intubate for transport may be different from within the neonatal unit. There may be a lower threshold to intubate due to the need for a stable airway during transport.

Nasal vs Oral Intubation

- Oral intubation is recommended and neonates can be safely transported with a secured oral ETT.
- Nasal intubation can be considered by clinicians experienced in nasal intubations.

Guide for Endotracheal Tube Size

In a resuscitation situation when the weight of a baby is unknown, gestational age may be used to help guide correct endotracheal tube size.

Gestational Age	Weight (g)	Uncuffed ETT (mm)	Length at the lips (cm)	Length at nares (cm)
< 28 weeks	< 1000	2.5	< 6.5 – 7.0	6.5 - 7.5
28 - 32 weeks	1000 - 2000	3.0	7.0 - 8.0	7.5 - 9.0
32 - 36 weeks	2000 - 3000	3.5	8.0 - 9.0	9.0 - 10.5
Term Neonate	3000 - 4000	3.5 – 4.0	9.0 – 10.0	10.5 - 12.0

Table 1: Guide for size of ETT

Oral ETT depth = weight (kg) + 6cm

Nasal ETT depth = (weight (kg) x 1.5) + 6 cm

Intubation Procedure

Follow the Intubation checklist on NETS WA Intubation Record MR400.03

‘**Team Huddle**’

- Allocate team roles - utilise staff members from the referring hospital if possible – may need to allocate several roles to an individual due to staffing constraints
  - Team leader – Coordinates the team. Delegate roles and discusses preparations and plans. Maintains situational awareness. Team debriefer.
  - Airway lead (intubator) – Perform intubation and provides support to team leader by sharing cognitive load.
  - Airway assistant – Assist clinician with intubation and securing of ETT.
  - Medication nurse – Ensure IV access is patent, draw up and administer medications as required.
  - Circulation nurse – Prepare fluid boluses.
  - Scribe – document events.
- What is your intubation plan?
  - Plan A – Initial plan with goal to maximise likelihood of tracheal intubation success at 1st attempt. An attempt is defined as when the laryngoscope passes the lips whether the ETT is attempted to be passed or not.

  - Plan B – If intubation fails, what is your next plan? What am I going to change? Change one thing before next intubation attempt e.g. addition of stylet, different sized ETT, more senior staff/ anaesthetist.
  - Plan C – Can't intubate but CAN ventilate. Oxygenation of the baby is the priority.
- Do I anticipate a difficult airway?
  - History of difficult intubation
  - Micrognathia
  - Craniofacial abnormalities
  - Large tongue
  - Signs of respiratory obstruction

Premedication

Premedication is recommended to minimise pain, stress, and physiological instability associated with intubation. Premedication reduces the time taken and number of attempts required for successful intubation.

Premedication should **ALWAYS** be used unless in a resuscitation situation. Premedication should include analgesia and muscle relaxant with choice of premedication individualised to the clinical status of the baby.

Preferred medications are fentanyl, suxamethonium +/- atropine.

- Atropine – Vagolytic - Optional. May give in situations where there may be cardiovascular instability or to treat bradycardia during the intubation. Atropine should be given prior to fentanyl
- Fentanyl – Analgesia - Given by SLOW IV push over 2-3 minutes (chest wall rigidity and impaired ventilation can occur with rapid administration).
- Morphine - Analgesia - can be used if Fentanyl not available but onset of action is slower and takes at least 5-10 minutes to take effect. Atropine should be given after morphine.
- Suxamethonium – Muscle relaxant - Use with caution if abnormal upper airway anatomy. Must be used with analgesia and sedation and not given on its own. Do not use in cases of hyperkalaemia, neuromuscular disorders, raised intracranial pressure of family history of malignant hyperthermia.
- Ketamine – analgesia and sedative - minimal effects on cardiovascular stability (less hypotension or respiratory depression) May be a better choice of drug in sepsis and cardiac neonates. However, there is limited evidence for its use in neonates.

See Neonatal Medication Protocols for all medication doses.

Equipment

Place the intubation dump kit (appendix 1) onto a clean trolley and cover with a sterile clear plastic drape. All intubation equipment should be placed onto the sterile drape to reduce the risk of Ventilator Acquired Pneumonia. A new ETT should be used for each intubation attempt.

Consider using size 3.0mm cuffed ETT for surgical and cardiac babies if infant is >35 weeks and >2.7kg. This may avoid the need for reintubation in theatre by the anaesthetists, for whom a cuffed ETT is the preferred option.

Intubation dump kit plus sterile clear drape on top	Suction
Appropriate Endotracheal Tube (see table 1) with one size above and below	Pedi-Cap™ CO_2 detector and/or End Tidal CO_2 detector for ventilator circuit
Laryngoscope – size 00, 0 and 1	Securing Tapes
Video laryngoscope (CMAC) if available	Skin Preparation Wipes
Set ventilator and T-piece at appropriate pressures with consideration to size and clinical status of the neonate	PPE – surgical face mask (N95 if suspected COVID-19), protective eye wear
Laerdel bag	Magill Forceps (optional)
Appropriate sized face masks	Stylet/ Bougie (optional)
Stethoscope	Supraglottic Airway – Laryngeal Mask (optional)

Patient preparation

- Ensure IV access patent and cardiorespiratory monitoring (ECG, SpO_2 and NIBP/IABP) in situ.
- Ensure neonate is supine, well positioned, comfortable and in as optimal physiological condition as possible before commencing intubation.
- Consider thermoregulation.
- Aspirate NGT if necessary.
- Assess airway patency with T-piece resuscitator or bag and mask before administration of muscle relaxant.
- Consider having fluid bolus/ inotropes/ resuscitation medication available and drawn up

Guidelines for Securing Endotracheal Tubes

- Securing an endotracheal tube (Appendix 2) is a minimum 2-person procedure. Emergency intubation equipment needs to be prepared in the event of an unplanned extubation.

Clinical Deterioration after Initiation of Ventilation

Follow the acronym 'DOPE' to troubleshoot. Disconnect from ventilator and bag manually whilst trouble shooting.

'D' Displacement of ETT

Check ETT for displacement or dislodgement – assess air entry/ chest wall movement

Where is it taped at the lips? Does the $ETCO_2$ detector (Pedi-Cap™) change from purple to yellow?

'O' Obstruction

Is ETT patent? Does the neonate need suction? Is the ETT or any tubing kinked?

'P' Pneumothorax

Is air entry equal? Consider transillumination/ CXR

'E' Equipment failure

Is there adequate gas flow (minimum 6-8 l/min)

Has there been a disconnection in the ventilator circuit?

Are you achieving adequate pressure/ tidal volume? Are the ventilator settings correct?

Is the oxygen being delivered? Are your cylinders on?

Management and Monitoring of a Ventilated Baby During Transport

- Obtain a CXR to check and optimise ETT position prior to loading and departure from referring hospital.
- Take a blood gas prior to departure. Ensure you have blood gas equipment available to repeat blood gases enroute back to the receiving hospital if required particularly if you have a prolonged travel time.
- Monitor $ETCO_2$. The trend is more important than the absolute value. Transcutaneous CO_2 monitoring is available and may be more useful

Sedation

Sedation may be necessary (Morphine or Fentanyl infusion +/- midazolam). The need for sedation and choice of medication should be discussed with NETS Consultant on call.

Muscle relaxation (Vecuronium boluses or infusion) is usually reserved for critically unwell infants e.g. Meconium aspiration, diaphragmatic hernias with severe pulmonary hypertension. The use of muscle relaxants should **ALWAYS** be discussed with the on-call NETS Consultant prior to use.

Documentation

Document the intubation procedure and any adverse events on the NETS WA observation and history sheet MR400.01 and complete the NETS WA Intubation Record MR400.03

Adverse events include desaturation <80% or >20% decrease from baseline oxygen saturations, bradycardia <100 bpm, oesophageal intubation, pneumothorax, right main bronchus intubation, gum trauma, 2nd dose medication, need for CPR

Related CAHS internal policies, procedures and guidelines
NETS WA Difficult Airway on Retrieval

References and related external legislation, policies, and guidelines

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2. Le CN et al. Impact of premedication on neonatal intubations by pediatric and neonatal trainees. *J Perinatol*. 2014;34:458–60
3. Foglia et al. Neonatal intubation practice and outcomes: An international registry study. *Pediatrics* 2019;143(1):e20180902
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5. Dalrymple H et al. Improving intubation success in pediatric and neonatal transport using simulation. *Pediatric Emergency Care*. 2022 Jan 1;38(1):426-430.
6. Barrington KJ et al. Premedication for endotracheal intubation in the newborn infant. *Paediatr Child Health* 2011 Mar; 16(3):159-164
7. Henrique de Oliveira Ferreira C et al, Direct laryngoscopy versus video laryngoscopy for neonatal tracheal intubation: An updated systematic review and meta-analysis *Trends in Anaesthesia and Critical Care* Oct 2024;58:101494

This document can be made available in alternative formats on request.

Document Owner:	Neonatology		
Reviewer / Team:	NETS WA		
Date First Issued:	January 2009	Last Reviewed:	October 2025
Amendment Dates:		Next Review Date:	October 2028
Approved by:	Neonatology Coordinating Group	Date:	28th October 2025
Endorsed by:	Neonatology Coordinating Group	Date:	
Standards Applicable:	NSQHS Standards:  Child Safe Standards: 1,10		

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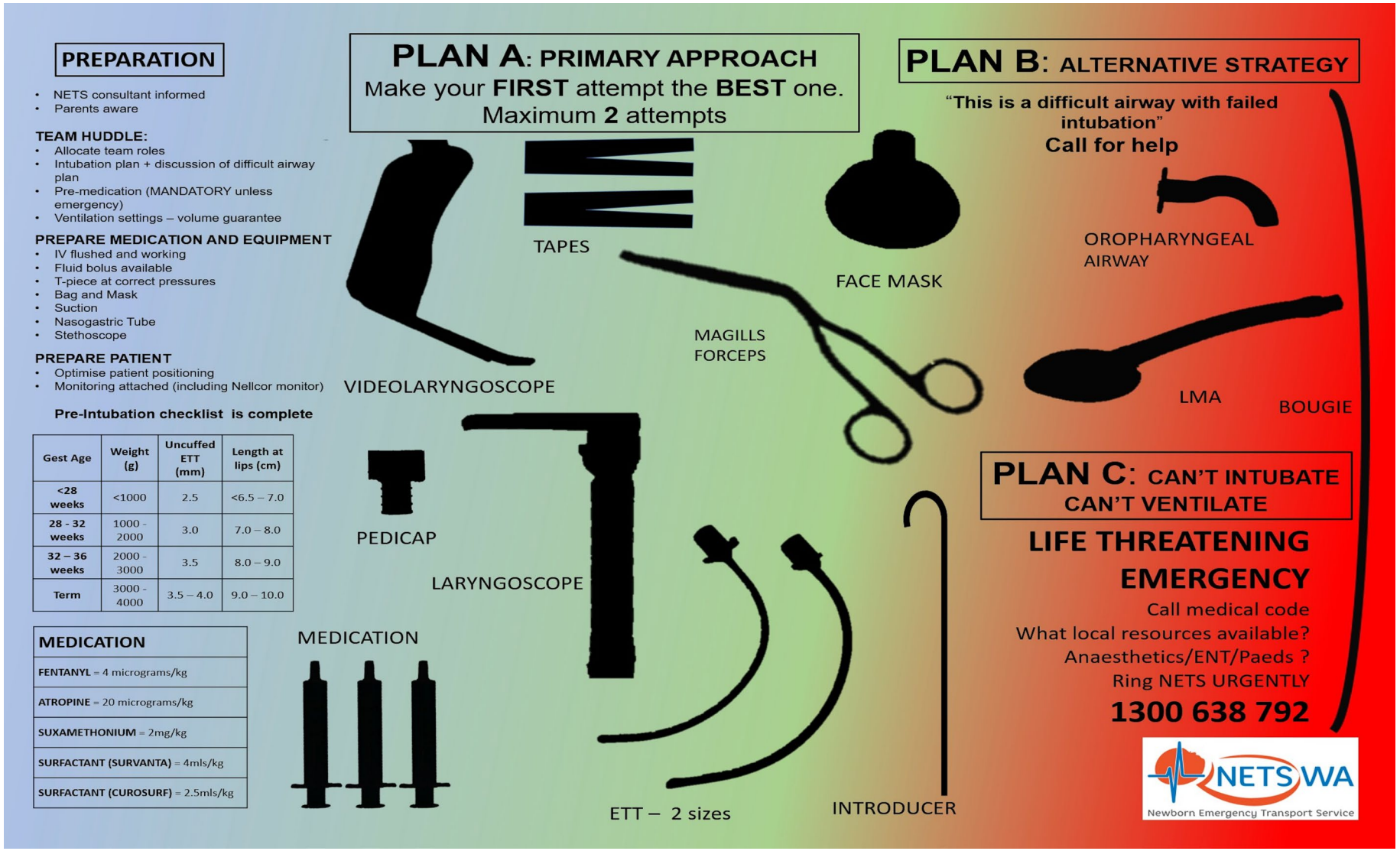
Healthy kids, healthy communities

Compassion | Excellence | Collaboration | Accountability | Equity | Respect

Neonatology | Community Health | Mental Health | Perth Children's Hospital

Appendix 1: NETS WA Intubation Dump Kit



Gest Age	Weight (g)	Uncuffed ETT (mm)	Length at lips (cm)
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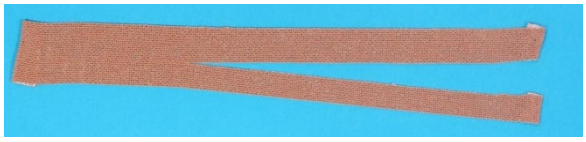
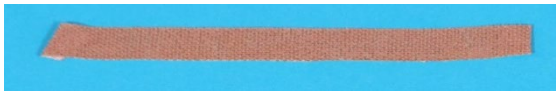
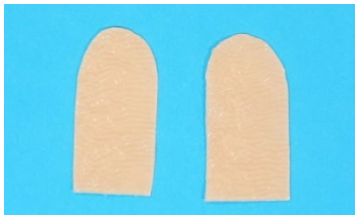
MEDICATION
FENTANYL = 4 micrograms/kg
ATROPINE = 20 micrograms/kg
SUXAMETHONIUM = 2mg/kg
SURFACTANT (SURVANTA) = 4mls/kg
SURFACTANT (CUROSURF) = 2.5mls/kg

Appendix 2: Securing of Endotracheal Tube

Tapes Required

2 x Trouser Leg	
Anchor Tape	
2 x Comfeel Tape	
Black Silk Suture (NASAL only)	

Securing an Oral ETT Using Tape

Steps	Additional Information
Place hydrocolloid tape (Comfeel) to both cheeks from the edge of the mouth.	

Steps	Additional Information
Place the oral ETT to one corner of the mouth. Place anchor tape from the side of the ETT on the cheek and extend up the ETT.	
Place the first trouser leg tape with the non-split end on the cheek from the corner of the mouth where the ETT is. Place the upper leg across the top of the lip and then the lower leg is wrapped around the ETT in a spiral fashion.	
Place the second trouser leg tape on the opposite cheek from the corner of the mouth. The lower leg is placed across the lower lip and the upper leg is then wrapped around the ETT in a spiral fashion.	

Securing a Nasal Endotracheal Tube

Steps	Additional Information
Place hydrocolloid tape (Comfeel) to both cheeks from the edge of the mouth.	
Tie a double knot with a black silk suture around the base of the ETT at the depth it is to be secured, taking care not to occlude the tube. Hold both ends of the black silk across the cheeks.	
Place the anchor tape from the forehead, down the bridge of the nose and extend up the ETT.	

Steps	Additional Information
Place the first trouser leg tape with the non-split end to the cheek that is on the same side as the nostril with the ETT. Place the lower leg across the top of the lip, to the other cheek securing the knot in the tie and ensuring the black silk is covered. The upper leg is then wrapped around the ETT in a spiral fashion.	
Place the second trouser leg tape on the opposite cheek. The upper leg is taken across the bridge of the nose to the other cheek. The lower leg is taken under the ETT and is wrapped around the tube in a spiral fashion. The other nostril should not be occluded by any tape or silk tie.