



GUIDELINE

Intubation

Scope (Staff):	Nursing and Medical Staff
Scope (Area):	NICU KEMH, NICU PCH

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](#)

Please refer to the [Difficult Airway \(Neonatal\) Guideline](#) If you are encountering a Difficult Airway

Content

Intubation.....	1
Aim	2
Risk.....	2
Key Points.....	2
Premedication	3
Ventilator-acquired Pneumonia (VAP) Prevention Strategies	3
Equipment required for Intubation	3
ETT Size & Depth Guide.....	4
Table 1: Tracheal Tube Guide	4
ETT Insertion Procedure.....	5
Common Pitfalls during intubation procedure.....	6
Appendix 1: Insertion of an Oral and Nasal ETT	9
Appendix 2: Securing of Endotracheal Tubes	10
Securing an Oral ETT Using Brown Tape (Leukoplast)	10
Securing an Oral ETT Using Neobar®.....	11
Securing a Nasal Endotracheal Tube with Brown tape	12

Aim

To help clinical prepare for and perform endotracheal intubation through a standardized and structured approach. Promote good communication, teamwork and situational awareness. Reduce complications associated with intubation.

Risk

Endotracheal intubation is one of the highest risk procedures in newborns, with adverse events being common. Adverse tracheal intubation associated events can be categorized as non-severe or severe:

- Non-severe events can include desaturation, oesophageal intubation with immediate recognition and no cardiac compressions required, mainstem bronchus intubation, gum or dental trauma, vomiting without aspiration and pain or agitation.
- Severe events can include cardiac arrest, oesophageal intubation with delayed recognition, hypotension, laryngospasm, vomiting associated with aspiration, pneumothorax and/or pneumomediastinum and direct airway injury.
- Other risks also include ventilator-acquired pneumonia, which may be introduced during the procedure.

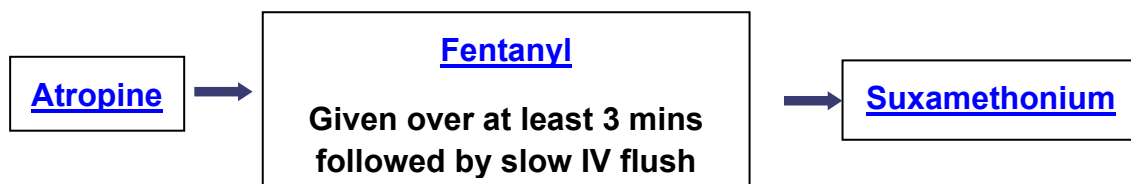
Key Points

- Factors associated with intubation success and reduced adverse events are:
 - Provider experience¹
 - Premedication (non-emergent intubations)^{2, 3}
 - Video laryngoscope^{1, 3, 4} (when inexperienced providers are being instructed by experienced staff)
 - Teamwork, communication and preparation.⁵
- In an emergency situation where there is difficulty ventilating or oxygenating the infant, the priority is to [Recognise and Respond to the Clinical Deterioration](#) and proceed directly to intubation.
- The Team Leader should stand back and maintain situational awareness at all times and alert the intubator of the baby's condition. The assignment of roles is to occur as the team arrive at the bedside.
- If unfamiliar with intubation and able to ventilate adequately via face mask, wait until more experienced help arrives.
- Nasotracheal intubation should be performed only under special circumstances and by experienced senior registrars or consultants.
- Consider using size 3.0mm cuffed ETT for surgical and cardiac infants as well as those with suspected or confirmed respiratory viruses if the infant is > 35 weeks gestation > 2.7 Kg. This will avoid the need for reintubation in theatre by the anaesthetists, for whom cuffed ETT is the preferred option. 3.0mm Cuffed ETT could also be used if there is significant leak on 3.5 uncuffed ETT.

- Haemodynamic monitoring and stability are paramount. If a prolonged period of hypoxia or bradycardia occurs during an attempt at intubation, the procedure should be stopped and the infant stabilised.
- Patient positioning and condition, equipment selection and operator factors should be addressed prior to any further attempt.

Premedication

- Pre-diluted syringes of atropine, fentanyl and suxamethonium are available in for immediate use.
- The order of administration is:



- IV [Morphine](#) bolus remains an alternative opioid agent with provision of adequate time to produce analgesic effect of at least 10 mins.
- [Naloxone](#) (Opioid Antagonist) should be readily available in the rare event of chest wall rigidity.

Ventilator-acquired Pneumonia (VAP) Prevention Strategies

- A sterile towel is to be used to place any open intubation equipment when not in use. This can be placed on the airway trolley or in the patient bedspace.
- All intubation equipment is to remain in its packaging until required.
- A new ETT should be used with each intubation attempt.
- No intubation equipment should be placed on the infant's bedding/sheet unless it is protected by its packaging.
- Equipment should be replaced if contaminated or comes in contact with the infants bedding.
- Gloves are to be worn when intubating or encountering oral/respiratory sections.
- Oropharyngeal suction is to be performed prior to intubation or reintubation.

Equipment required for Intubation

1. Endotracheal Tube (see [Table 1 for sizes](#)), and one size above and below.
2. Laryngoscope - size zero is appropriate for the majority of term and preterm infants. Size 00 may be used at the very extremes of prematurity; a size 1 may be considered for marosomic infants >4.5 kg.
3. Suction
4. Set ventilation, mask and T-piece, back-up bag-mask
5. Pedi-Cap™ CO₂ detector and/or End Tidal CO₂ detector for ventilation circuit

6. Stethoscope
7. Goggles or face visor /N95 for suspected respiratory viruses
8. Securing device NeoBar® or Leucoplast and Hydrocolloid tape (Comfeel) x 2

Note: If using a NeoBar® Tube Holder to secure an oral ETT select the appropriate size colour coordinated with the measuring strip provided.

9. Skin preparation wipe
10. If nasal device: Black silk tie, Cotton buds
11. Optional adjuncts:
 - a. Magill forceps. Refer to [Reusable Medical Devices: Reprocessing, Tracking and Traceability](#) guideline.
 - b. The use of an introducer/stylet is discouraged for infants not thought to have an airway abnormality due to an increased risk of trauma. If an introducer is used ensure the tip does not protrude beyond the end of the ETT and that the introducer can be removed easily prior to intubation. Care should be taken when removing the introducer after successful intubation to ensure the ETT is not inadvertently dislodged.

ETT Size & Depth Guide

Gestational age or weight based formulary may guide ETT insertion depth, together with vocal cord guide (marked on ETT) and position on chest x-ray. In extremely preterm infants where a 2.0 mm ETT is used it may be desirable to change to a 2.5mm when possible due to undesirable high impedance to ventilation and frequency of tube occlusion.

Oral ETT depth = Weight (kg) + 6cm	Nasal ETT depth = 1.5 x Weight (kg) + 6cm
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Table 1: Tracheal Tube Guide

Corrected Gestation (Weeks)	Actual Weight (Kg)	ETT Depth at Lip (cm)	Uncuffed ETT Size (mm)	Cuffed ETT size (mm)
23-24	<0.6	5.5- 6.0	2.0- 2.5	N/A
25-26	0.7-0.8	6.0	2.5	
27-29	0.9-1.0	6.5		
30-32	1.1-1.4	7.0	2.5- 3.0	3.0
33-34	1.5-1.8	7.5		
35-37	1.9-2.4	8.0	3.0 - 3.5	
38-40	2.5-3.1	8.5		
41-43	3.2-4.2	9.0	3.5	

ETT Insertion Procedure

Patient Preparation
1. Ensure infant is supine, well positioned, comfortable and in as optimal physiological condition as possible before attempting intubation. Ensure thermal care throughout.
2. Cardiorespiratory monitoring in situ, intravenous access secure and functioning. ECG, SpO2 and NBP
Team Preparation
1. Assign roles to clinical staff. Role allocations: <ul style="list-style-type: none"> • Team Leader • Airway Lead (Intubator) • Airway assistant • Medication nurse • Circulatory nurse • Scribe <p>NOTE: This is a full list, some roles may need to be combined when resources are limited.</p>
2. Check all equipment is present and in working order and place on sterile towel. Assistant to complete tracking and traceability requirements of RMD's as per Reusable Medical Devices: Reprocessing, Tracking and Traceability guideline.
3. Pre-procedural 'Time Out'. Nurse to read out 'Intubation Time Out' check list on MR493.00 (NEONATAL PRE-INTUBATION BRIEFING AND CHECKLIST)
Procedure
1. Clinician performing the intubation to don appropriate PPE. Surgical face mask, protective eyewear and gloves. See also Neonatal Viral Infections (CAHS Infection Prevention and Control Policy Manual) .
2. Premedications to be administered when ready to proceed Airway Lead to instruct when this is to be given
3. Aspirate gastric contents
Proof of Placement
<ul style="list-style-type: none"> • Visualisation of ETT placement through the vocal cords, with secondary confirmation from observer if video laryngoscope used • Chest movement with IPPV • Pedi-Cap™ colour change • Misting of ETT • Increasing Heart rate and saturations

<ul style="list-style-type: none"> • Auscultate to confirm bilateral equal air entry
4. Check depth of tube insertion at the lips (Table 1 or weight (kg) + 6cm) and/or vocal cord guide and adjust as necessary
5. Secure tube in place (Refer to Appendix 2 for securing Oral/Nasal ETT tubes)
6. Attach End Tidal CO ₂ monitor when placing on ventilation and obtain chest x-ray
7. Document procedure on the MR 493 Neonatal Intubation/Extubation record. Include <ul style="list-style-type: none"> • Use of premedication • ETT size and depth of insertion • Confirmation of tube placement, • Patient stability and any adverse events. <p>Complete documentation for any RMD's used. I.e, video laryngoscope, Magill's forceps, CMAC. See Reusable Medical Devices: Reprocessing, Tracking and Traceability guideline.</p>

Common Pitfalls during intubation procedure

Laryngoscope tip impinges on cords. <ul style="list-style-type: none"> • potential for trauma 	Use size 0 blade "Look see" technique with blade tip in vallecular
"Tyre levering of laryngoscope" <ul style="list-style-type: none"> • damage to upper alveolar margin • small mouth increases difficulty of intubation 	Appropriate use of laryngoscope, Take a firm grip on laryngoscope Stand up and stand back, don't bend knees Aim to move the handle towards the wall rather than ceiling
Placing ET tube in "viewing channel" <ul style="list-style-type: none"> • difficult tube insertion 	Appropriate use of laryngoscope, laryngoscope blade should be angled to the left side of mouth creating more room on the right side of the mouth for ETT insertion
Clumsy handling of ET tube <ul style="list-style-type: none"> • makes insertion more difficult 	Tube should be placed from right side at 90° to laryngoscope. Hold lightly between finger and thumb so can easily be rotated anteriorly.
ET tube dropped in bed and reused. <ul style="list-style-type: none"> • Sepsis risk 	Should be avoided

Related CAHS internal policies, procedures and guidelines

Neonatology Clinical Guidelines

- [Nursing Care of the Ventilated Neonate](#)
- [Recognising and Responding to Clinical Deterioration](#)
- [Surfactant Therapy](#)

- [Reusable Medical Devices: Reprocessing, Tracking and Traceability](#)

IPC Manual



[Neonatal Viral Infections \(health.wa.gov.au\)](http://health.wa.gov.au)

References and related external legislation, policies, and guidelines

1. Foglia EE, Ades A, Sawyer T, et al. Neonatal Intubation Practice and Outcomes: An International Registry Study. *Pediatrics*. Jan 2019;143(1)doi:10.1542/peds.2018-0902
2. Ozawa Y, Ades A, Foglia EE, et al. Premedication with neuromuscular blockade and sedation during neonatal intubation is associated with fewer adverse events. *J Perinatol*. Jun 2019;39(6):848-856. doi:10.1038/s41372-019-0367-0
3. Pouppirt NR, Nassar R, Napolitano N, et al. Association Between Video Laryngoscopy and Adverse Tracheal Intubation-Associated Events in the Neonatal Intensive Care Unit. *J Pediatr*. Oct 2018;201:281-284.e1. doi:10.1016/j.jpeds.2018.05.046
4. O'Shea JE, Thio M, Kamlin CO, et al. Videolaryngoscopy to Teach Neonatal Intubation: A Randomized Trial. *Pediatrics*. Nov 2015;136(5):912-9. doi:10.1542/peds.2015-1028
5. Hatch LD, Grubb PH, Lea AS, et al. Interventions to Improve Patient Safety During Intubation in the Neonatal Intensive Care Unit. *Pediatrics*. Oct 2016;138(4)doi:10.1542/peds.2016-0069
6. Kumar P, Denson SE, Mancuso TJ. Premedication for nonemergency endotracheal intubation in the neonate. *Pediatrics*. Mar 2010;125(3):608-15. doi:10.1542/peds.2009-2863
7. Barrington K. Premedication for endotracheal intubation in the newborn infant. *Paediatr Child Health*. Mar 2011;16(3):159-71. doi:10.1093/pch/16.3.159
8. Muniraman HK, Yaari J, Hand I. Premedication Use Before Nonemergent Intubation in the Newborn Infant. *Am J Perinatol*. Jul 2015;32(9):821-4. doi:10.1055/s-0034-1543987
9. Carbajal R, Eriksson M, Courtois E, et al. Sedation and analgesia practices in neonatal intensive care units (EUROPAIN): results from a prospective cohort study. *Lancet Respir Med*. Oct 2015;3(10):796-812. doi:10.1016/s2213-2600(15)00331-8
10. Lago P. Premedication for non-emergency intubation in the neonate. *Minerva Pediatr*. Jun 2010;62(3 Suppl 1):61-3.
11. Allen KA. Premedication for neonatal intubation: which medications are recommended and why. *Adv Neonatal Care*. Apr 2012;12(2):107-11. doi:10.1097/ANC.0b013e31824c1583
12. Pereira e Silva Y, Gomez RS, Marcatto Jde O, Maximo TA, Barbosa RF, Simões e Silva AC. Morphine versus remifentanil for intubating preterm neonates. *Arch Dis Child Fetal Neonatal Ed*. Jul 2007;92(4):F293-4. doi:10.1136/adc.2006.105262
13. Choong K, AlFaleh K, Doucette J, et al. Remifentanil for endotracheal intubation in neonates: a randomised controlled trial. *Arch Dis Child Fetal Neonatal Ed*. Mar 2010;95(2):F80-4. doi:10.1136/adc.2009.167338
14. Badiie Z, Vakiliamini M, Mohammadizadeh M. Remifentanil for endotracheal intubation in premature infants: A randomized controlled trial. *J Res Pharm Pract*. Apr 2013;2(2):75-82. doi:10.4103/2279-042x.117387
15. Welzing L, Roth B. Experience with remifentanil in neonates and infants. *Drugs*. 2006;66(10):1339-50. doi:10.2165/00003495-200666100-00003
16. Welzing L, Kribs A, Huenseler C, Eifinger F, Mehler K, Roth B. Remifentanil for INSURE in preterm infants: a pilot study for evaluation of efficacy and safety aspects. *Acta Paediatr*. Sep 2009;98(9):1416-20. doi:10.1111/j.0803-5253.2009.01364.x
17. Crawford MW, Hayes J, Tan JM. Dose-response of remifentanil for tracheal intubation in infants. *Anesth Analg*. Jun 2005;100(6):1599-1604. doi:10.1213/01.Ane.0000150940.57369.B5
18. Avino D, Zhang WH, De Villé A, Johansson AB. Remifentanil versus morphine-midazolam premedication on the quality of endotracheal intubation in neonates: a noninferiority randomized trial. *J Pediatr*. May 2014;164(5):1032-7. doi:10.1016/j.jpeds.2014.01.030

19. Chay PC, Duffy BJ, Walker JS. Pharmacokinetic-pharmacodynamic relationships of morphine in neonates. *Clin Pharmacol Ther.* Mar 1992;51(3):334-42. doi:10.1038/clpt.1992.30
20. Norman E, Wikström S, Hellström-Westas L, Turpeinen U, Hämäläinen E, Fellman V. Rapid sequence induction is superior to morphine for intubation of preterm infants: a randomized controlled trial. *J Pediatr.* Dec 2011;159(6):893-9.e1. doi:10.1016/j.jpeds.2011.06.003
21. Wheeler B, Broadbent R, Reith D. Premedication for neonatal intubation in Australia and New Zealand: a survey of current practice. *J Paediatr Child Health.* Nov 2012;48(11):997-1000. doi:10.1111/j.1440-1754.2012.02589.x
22. Fleming B, McCollough M, Henderson HO. Myth: Atropine should be administered before succinylcholine for neonatal and pediatric intubation. *Cjem.* Mar 2005;7(2):114-7. doi:10.1017/s1481803500013075
23. Shah V, Ohlsson A. The effectiveness of premedication for endotracheal intubation in mechanically ventilated neonates. A systematic review. *Clin Perinatol.* Sep 2002;29(3):535-54. doi:10.1016/s0095-5108(02)00019-2
24. Kempley ST, Moreiras JW, Petrone FL. Endotracheal tube length for neonatal intubation. *Resuscitation.* Jun 2008;77(3):369-73. doi:10.1016/j.resuscitation.2008.02.002
25. The Australian and New Zealand Committee on Resuscitation ANZCOR Guideline 13.5 – Tracheal Intubation and Ventilation of the Newborn Infant
26. Sakhuja P, Finelli M, Hawes J, Whyte H. Is It Time to Review Guidelines for ETT Positioning in the NICU? SCEPTIC-Survey of Challenges Encountered in Placement of Endotracheal Tubes in Canadian NICUs. *Int J Pediatr.* 2016;2016:7283179. doi:10.1155/2016/7283179
27. Gill I, Stafford A, Murphy MC, et al. Randomised trial of estimating oral endotracheal tube insertion depth in newborns using weight or vocal cord guide. *Arch Dis Child Fetal Neonatal Ed.* Jul 2018;103(4):F312-f316. doi:10.1136/archdischild-2017-312798
28. French N, Kelly R, Vijayasekaran S, et al. Voice abnormalities at school age in children born extremely preterm. *Pediatrics.* Mar 2013;131(3):e733-9. doi:10.1542/peds.2012-0817
29. Reynolds V, Meldrum S, Simmer K, Vijayasekaran S, French N. Laryngeal pathology at school age following very preterm birth. *Int J Pediatr Otorhinolaryngol.* Mar 2015;79(3):398-404. doi:10.1016/j.ijporl.2014.12.037

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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: Insertion of an Oral and Nasal ETT

Oral

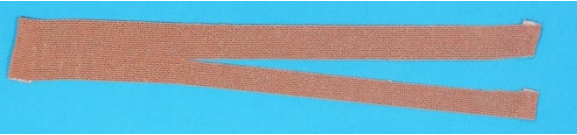



1. Laryngoscope in left hand, gently open mouth and insert laryngoscope, watch the blade advance over surface of the tongue to identify the epiglottis.
2. Once identified angle the handle of the blade to 30-45 degrees and continue to advance until the tip sits in the vallecular.
3. Lift up and forwards with laryngoscope until cords come into view.
4. If adequate visualisation is not achieved within 30-40 secs remove laryngoscope gently, provide IPPV and reassess patient positioning and condition, equipment selection and operator factors. Substitution with a more senior experienced operator should occur after no more than two attempts or if initial attempt was associated with patient instability.
5. Hold tube lightly between index finger and thumb of right hand and introduce at 90o from the right side of the mouth.
6. When tube at cords rotate anticlockwise and advance until cord markers at appropriate level.
7. Maintain tube position with right hand while withdrawing laryngoscope blade.
8. Secure ETT as per Appendix 3



Nasal



1. Patient and team preparation as above
2. A size 6 suction catheter is passed through the ETT and initially passed via the nasal passage into the pharynx ensuring patency for the ETT and correct passage inferiorly. This should occur prior to administration of muscle relaxation in the event of difficult passage necessitating transition to an oral ETT.
3. Moisten the end of the ETT using sterile lubricant or sterile water, if necessary, to ease the passage of the tube reducing the mucosal trauma.
4. Position the infant supine in the neutral position. Gently tilt the infant's head into a sniffing position.
5. Feed the ETT along the suction catheter into the nostril to a depth of only 1-1.5 cm.
6. Visualise the suction catheter in the pharynx using the laryngoscope.
7. Advance the ETT along the floor of the nose into the pharynx and once visualised withdraw the suction catheter.
8. Using the Magill's forceps position the ETT in the trachea with reference to the vocal cord marker and reference guide depth= $(1.5 \times \text{Weight (kg)} + 6\text{cm})$. [See table 1](#)
9. Secure ETT as per [Appendix 2](#)

Appendix 2: Securing of Endotracheal Tubes

Securing an Oral ETT Using Brown Tape (Leukoplast)

<p>2 x Trouser Leg</p> 	<p>Anchor Tape</p> 
<p>2 x Comfeel Tape</p> 	<p>Black Silk Suture (NASAL only)</p> 

<p>Step 1 Place hydrocolloid tape (Comfeel) to both cheeks from the edge of the mouth</p> 	<p>Step 2 Place the oral ETT to one corner of the mouth and place anchor tape from the side of the ETT on the cheek and extend up the ETT</p> 
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<p>Step 3 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</p> 	<p>Step 4 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</p> 
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Securing an Oral ETT Using NeoBar®

1. Ensure the surrounding skin is prepared appropriately. Clean the area and dry, apply skin preparation and allow to dry.
2. Apply heat to tabs of the NeoBar® to facilitate adhesion.
3. NeoBar® should never come into contact with the infant's lips i.e. should be 5 mm from the lips and centred at the corners of the mouth.
4. Place ET tube **underneath** the stabilising platform to minimize trauma to the palate.
5. Place tabs anterior to the ears along the maxilla, hold in place for 60 seconds to ensure adhesion.
6. Wrap leucoplast tape once around the ETT, then once around the platform to secure.

Note: If using a NeoBar® Tube Holder to secure an oral ETT select the appropriate size colour coordinated with the measuring strip provided.

Securing a Nasal Endotracheal Tube with Brown tape

Step 1 - Place hydrocolloid tape (Comfeel) to both cheeks from the edge of the mouth



Step 2 - 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

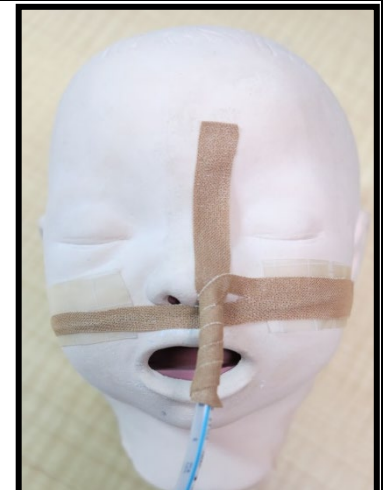


Step 3 - Place the anchor tape from the forehead, down the bridge of the nose and extend up the ETT



Step 4 - 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.



Step 5 - 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

