

Newborn Critical Care Center (NCCC) Clinical Guidelines

Procedural Guideline for Intubation by House Staff

BACKGROUND

Neonatal intubation is a life-saving yet potentially dangerous procedure associated with severe adverse events such as severe oxygen desaturations, cardiac compressions lasting < 1 minute, laryngospasm and esophageal intubation with delayed recognition.¹ Additionally, training level of the first airway provider is associated with the success of the first intubation attempt as well as success within two intubation attempts.

PURPOSE

To provide guidance to those working in the Newborn Critical Care Center regarding the number of times house staff should be permitted to attempt an intubation before the Fellow / Attending / NNP takes over the procedure. The development of competency among house staff in the performance of endotracheal intubation requires repeated performances of this procedure. However, decisions regarding when they should attempt the procedure and how many times they should attempt the procedure on an individual patient should be made with consideration of patient safety as a high priority. Before each delivery, one person should be assigned by an experienced staff member (attending, fellow or NNP) to manage the airway based on these guidelines. Following assignment of responsibility, a determination should be made regarding the number of attempts permitted if the procedure is not initially successful. The supervising physician may choose to allow more intubation attempts than are stated in these guidelines at his/her discretion.

RECOMMENDATIONS BY SITUATION AND/OR DIAGNOSIS

1. Recent Upper Airway Surgery:

For example, esophageal atresia / tracheoesophageal fistula repair or cricoid split.

All intubation attempts MUST be performed by the most experienced provider available.

2. Extremely Low Birth Weight Infants:

An experienced provider should perform intubations of ELBWs in the delivery room and for the first 72 hours of life.

3. High Risk or Critical Situations:

For example, in the delivery room: congenital diaphragmatic hernia, severe arthrogyrosis, or antenatal concern for airway anomaly.

For example, in the NCCC: fentanyl-induced chest wall rigidity, severe subglottic stenosis, or premature infants with significant O₂ requirement/respiratory instability.

The procedure should not be attempted by interns; residents may be allowed at most two attempts at senior provider discretion if there is adequate time to administer pre-medications and/or the resident has had multiple successful intubations previously.

4. Low Risk Situations:

For example, elective intubations for surgery/procedures, respiratory distress in term infants, or intubations in otherwise stable preterm infants.

Interns or senior residents should be allowed up to two attempts after administration of the intubation pre-medications.

PROCEDURAL GUIDELINES

Premedication can mitigate some of the adverse effects of laryngoscopy and intubation including bradycardia, hypoxemia, and increased intracranial pressure leading to intraventricular hemorrhage (see [Intubation Premedication](#)). The following are general guidelines for the selection of the correct sized tube and the correct insertion depth.

To estimate the distance between the lip and mid-trachea (the desired location of the tip of the endotracheal tube):

$$\text{Patient's Weight (kg) + 6 = Measurement at the lip in cm}$$

This technique for estimation is less reliable in infants weighing less than 750g.

Ensure that all equipment and support staff are at the bedside prior to beginning an intubation attempt. Blood oxygen saturations should be monitored before and throughout the procedure. Limit each attempt to 30 seconds. Evaluate breath sounds and chest rise along with color change on CO2 detector to determine correct ETT placement.

Weight	Gestational Age	ETT Size	Blade Size
<1000 g	< 28 weeks	2.5	00 / 0
1,000 - 2,000 g	28 - 34 weeks	3.0	0
2,000 - 3,000 g	34 - 38 weeks	3.5	0/1
> 3,000 g	> 38 weeks	4.0	1

**2.0 ETTs are stocked in the NCCC. Some providers may consider the use of a 2.0 ETT in special circumstances such as: re-intubating an infant who had previously had a 2.5 ETT placed but is currently unable to fit a 2.5 ETT due to airway edema from prior intubation/extubation attempt or as a temporary measure in an infant with an airway anomaly that requires ENT to provide a more stable airway. Some providers may consider the use of 2.0 ETT in ELBWs who are too small to fit a 2.5 ETT; however, this decision should not be made alone and should be discussed with RT prior to intubation given the mechanical difficulties of ventilating an infant with a 2.0 ETT (particular with HFJV).*

Equipment:

Laryngoscope

Correct sized blade for gestational age and weight of infant

Suction catheter (typically 8 Fr, but may need 6 Fr or 10 Fr)

Stylet

Appropriate size ETTs (backup at bedside and possibly one size smaller)

Tape to secure the ETT

Functioning suction

Stethoscope

NeoPuff (or other T-piece resuscitator) – assure proper settings for PIP / PEEP and function

*If considering using C-MAC video laryngoscope, available blade sizes include 1 and 0. Blades need to be sent to central sterile processing after each use.

Personnel Needed at Bedside:

Bedside RN

Respiratory therapist

Resident and Fellow (if resident performing intubation, fellow or NNP must be present)

NNP (only NNP needed if NNP intubating)

Technique :

1. Complete a pre-procedural time-out. Ensure all equipment and personnel are present and ready at the bedside. Discuss personnel roles (who will be monitoring vital signs and 30 second time limit, who will hand the ETT to the intubating provider, etc.). Discuss which ventilator device and settings will be used once the patient is intubated.
2. Consider premedication as per [Intubation Premedication](#) protocol if not an emergent intubation.
3. Ensure vital signs are normal prior to first attempt. This may require PPV and oxygen administration. Observation of vital signs is mandatory throughout procedure. Abort intubation attempts with any infant decompensation.
4. Slightly extend infant's head into "sniffing" position and maintain midline position. A neck roll may be utilized to establish this position.
5. Gently suction the oropharynx of secretions to optimize visualization.
6. The laryngoscope should be held in the left hand. With the right hand, open the infant's mouth and depress the tongue.
7. Insert laryngoscope sliding over the tongue until the tip of the blade is resting in the vallecula.
8. Lift the laryngoscope to open the mouth further and visualize the airway. Look for the vocal cords. When lifting the blade, raise the entire blade in the direction that the handle is pointing and be cautious **NOT** to rock the blade. Attempt should take no longer than 30 seconds.
 - a. *When using the video laryngoscope, the intubating provider should use the video screen to guide the intubation attempt and should not attempt a direct laryngoscopy view through the C-Mac.*
9. Suction as necessary to remove secretions with 8 Fr catheter.
10. Have an assistant apply gentle cricoid pressure as necessary to bring the larynx into view.
11. Once seen, maintain visualization of the vocal cords at all times.
12. Hold ETT in right hand and insert in the right side of the mouth outside of the laryngoscope blade.

13. Insert the ETT through the vocal cords to calculated depth, do **NOT** force through the cords.
14. If ETT appears too large or does not pass easily, decrease angle of neck extension and/or decrease ETT size.
15. Confirm appropriate position of ETT using a capnograph (CO₂ detector) and watching for color change from purple to yellow. Color change may not immediately occur if infant is an ELBW or in a code situation.
16. Auscultate the chest to ensure equal aeration of both lungs and observation of chest movement with positive pressure ventilation. If breath sounds are diminished over left lung, attempt pulling back ETT slightly as it may be positioned in the right mainstem bronchus.
17. Secure ETT with tape.
18. Attach appropriate ventilatory device with appropriate settings.
19. Order and evaluate a chest radiograph for correct placement. The ETT should ideally be located midway between the thoracic inlet and the carina. Make appropriate adjustments.
20. Obtain a post-intubation blood gas and adjust ventilator settings as necessary.
21. Document procedure appropriately.

References:

1. Foglia E, Ades A, Sawyer T et al. Neonatal intubation practice and outcomes: An international registry study. *Pediatrics*. 2019 Jan; 143(1): e20180902. PMID: 20538147.
2. Weiner, Gary (Ed.). (2022). *Textbook of Neonatal Resuscitation, 8th edition*. American Academy of Pediatrics.