

Department:	Neonatal Intensive Care Unit (NICU)		
Document:	Multidisciplinary Policy and Procedure		
Title:	Suctioning of the Endotracheal Tube		
Applies To:	All NICU Staff and Respiratory Therapists		
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1. PURPOSE:

- 1.1 The presence of an ETT causes irritation to tissue and increased secretions. ETT suctioning is done to clear the tracheobronchial tree from secretions to facilitate respiratory functions and prevent lung infection that can result from accumulated secretions.
- 1.2 Take safe precautions to avoid the potential risks of this procedure.

2. DEFINITIONS:

- 2.1 **Endotracheal suctioning** is the aspiration of secretions from the tracheobronchial tree and artificial airway through a catheter connected to a suction machine or wall outlets.
- 2.2 Abbreviations: ETT: Endo-Tracheal Tube, O₂: oxygen.

3. POLICY:

- 3.1 Suctioning is done by an experienced neonatology staff nurse or respiratory therapist, with or without written physician order.
- 3.2 Indications:
 - 3.2.1 Suctioning is done once every shift and if required based on the infant's needs not to exceed every 3-4 hours. The need for suctioning include the following.
 - 3.2.1.1 The need to remove accumulated pulmonary secretions as evidenced by one of the following:
 - 3.2.1.1.1 Visible secretions in ETT.
 - 3.2.1.1.2 Increased respiratory effort.
 - 3.2.1.1.3 Increased O₂ or mechanical ventilation requirements.
 - 3.2.1.1.4 Desaturation or agitation with no known cause.
 - 3.2.1.1.5 Coarse, congested breath sounds.
 - 3.2.1.1.6 Some cases need more frequent suctioning and this requires physician written order e.g. Meconium Aspiration Syndrome, atelectasis.
 - 3.2.1.2 The need to obtain a sputum specimen for culture and sensitivity.
 - 3.2.1.3 To maintain the patency of the airway. During high frequency ventilation, it is not always obvious when suctioning is needed, so, closed suctioning is done every 4-6 hours.
 - 3.2.2 If possible suctioning should not be performed on a neonate within the first 24 hours of life and for 2-4 hours after surfactant administration.
 - 3.3 Precautions: ETT suctioning can be associated with complications such as hypoxemia, bradycardia, Atelectasis, mucosal trauma, pneumothorax and intraventricular haemorrhage, accidental extubation, infection, hypertension and hypotension. ETT suctioning must be done carefully to avoid its potential complications:
 - 3.3.1 Connect infant to vital signs monitor and document vital signs and O₂ saturation, before, during and after suctioning and infant tolerance to suctioning.
 - 3.3.2 Pre-oxygenate the infant with 10-20% FiO₂ above baseline requirements to avoid hypoxemia.

- 3.3.3 Measure the maximum insertion depth of the suctioning catheter to prevent damage of the airway.
- 3.3.4 Limit suction process to 5 seconds, not more than 10 seconds.
- 3.3.5 Limit suction pressure to the lowest effective in cleaning secretions (60-80 mmHg with a maximum of 100mmHg) to avoid pneumothorax and tissue damage.
- 3.3.6 Adequate systemic hydration and humidification of inspired gases aid in thinning secretions.
- 3.3.7 ETT suctioning causes abrupt elevations in arterial blood pressure that is sometimes accompanied by increased cerebral blood flow velocity, also elevations in cerebral venous pressure. If done vigorously, it can lead to intra-ventricular hemorrhage in preterm infants.
- 3.3.8 Introduction of microorganisms into blood stream through injured mucosa during suctioning can lead to sepsis, and into the lungs can lead to ventilator associated pneumonia. Suctioning must be done under aseptic technique with strict adherence to infection control precautions.

3.4 Change tubing connected to the suction catheter and extending to the collection vessel after each use when used with different patients and every 24 hours when used for the same patient. Suction collection canisters are cleaned every 24 hours and replaced if full.

4. PROCEDURE:

4.1	PROCEDURE	RATIONALE
	1. Assess the infant's vital signs, O_2 saturation and auscultate the chest	Suctioning can cause hypoxemia, arrhythmia and hypotension.
	2. Assemble equipment: 2.1 Use proper size suction catheter: <ul style="list-style-type: none"> • For ETT size 2.5 , use suction catheter 5 or 6 Fr. • For ETT size 3, 3.5,4, use suction catheter 6 or 8Fr. 2.2. Verify that suction pressure is at negative 60-80mmHg, 2.3. Ensure resuscitation bag is functioning and connected to oxygen source. 2.4 Sterile normal saline for possible ETT installation and for rinsing suction catheter between suction passes	Using high pressure suction can cause trauma to the airways and pneumothorax. Hypoxemia and bradycardia can occur requiring resuscitation
	3. Scrub as per aseptic procedure (for 2 minute). Don sterile gloves. Don gown and surgical mask as required for isolation patients.	Infection control precautions. Suctioning is done under aseptic technique.
	4. Position infant in position that limits the possibility of accidental extubation. Keep head in midline; do not turn the baby's head during suctioning.	Sharply turning the head to the side occludes the jugular vein and increase cerebral venous pressure, which is at its lowest when the head is in the midline or slightly elevated position.
	5. Keep the dominant hand sterile throughout the procedure. Attach sterile catheter to suction unit. Change catheter or dominant hand glove at any time if their sterility is broken.	The sterile hand maintains sterility of the catheter, while the glove on non-dominant hand prevents transmission of the microorganisms to the healthcare worker.

<p>6. Measure the maximum insertion depth of suction catheter which is = total length of ETT +2 cm (length of ETT adaptor). Read the ETT at the lip +measure lip to ETT end + 2 cm and then use measuring tape (after disinfecting it) to measure the length of the suctioning catheter before opening its package (to keep the sterility of the catheter).</p>	<p>Too deep insertion of catheter can cause significant trauma to the airway,</p>
<p>7. Increase oxygen (FiO₂) by 20% and as required based on the patient's response.</p>	<p>To avoid hypoxemia</p>
<p>8. Moisten tip of catheter with sterile saline. Introduce the catheter to the measured length. Do not apply suction during introducing the catheter.</p>	
<p>9. Apply suction with thumb and count to "two", then withdraw catheter in a rotating movement counting to 5 (5 seconds) as you withdraw.</p>	<ul style="list-style-type: none"> - Limiting suction duration to a maximum of 10 seconds ensures that the procedure does not exceed the infant tolerance. - Failure to rotate catheter may result in damage to tracheal mucosa.
<p>10. Normal saline instillation is not routine. It is used only if there is increased tenacious secretions or with high frequency ventilation. Install 0.2-0.5ml of sterile NS, provide 3-4 breath by ambu bag then do suction.</p>	<ul style="list-style-type: none"> * Routine use of NS may contribute to lower respiratory tract colonization and nosocomial pneumonia. * Studies have shown that mucous is not miscible with saline, even with shaking. * Attention must be paid to adequate humidity in the ventilator circuit.
<p>11. Discontinue suction if heart rate decrease by 20 bpm or increase by 40bpm or if any cardiac ectopy is observed.</p>	<ul style="list-style-type: none"> -Cardiac dysrhythmia may result from myocardial hypoxia or vagal stimulation secondary to tracheal irritation. -It can be prevented by pre-oxygenation and proper suctioning technique.
<p>12. If suction needs to be repeated, allow infant to recover between passages of catheter. Assess vital signs and connect the infant to the ventilator between suctioning using FiO₂ up to 100% if necessary.</p>	<ul style="list-style-type: none"> - Repeated suctioning of a patient in a short time interval predisposes to hypoxemia, as well as being tiring and traumatic to the patient. -The oxygen removed by suctioning must be replenished before suctioning is attempted again
<p>13. Rinse catheter with sterile saline between suction passes.</p>	
<p>14. Continue suction passes until the airways are clean of accumulated secretions but no more than 4 passes per suctioning episode.</p>	
<p>15. Return FiO₂ to baseline</p>	
<p>16. Remove gloves and wash hands</p>	

17. Document the time of suctioning, vital signs before, during and after suctioning, the color, volume and consistency of secretions and the suction pressure used in the nurses' progress notes	
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5. MATERIALS AND EQUIPMENT:

- 5.1 Adjustable portable or wall suction machine with tubing and collection receptacle and pressure gauge,
- 5.2 Sterile gloves,
- 5.3 None sterile gown and surgical mask as indicated.
- 5.4 Sterile normal saline for installation if needed,
- 5.5 Sterile saline for irrigation of catheter,
- 5.6 Sterile suction catheter (6-8 French for infants),
- 5.7 Functioning resuscitation bag connected to oxygen source,
- 5.8 Stethoscope.
- 5.9 Sputum trap, if specimen is to be collected.
- 5.10 Cardiopulmonary and oxygen saturation monitor

6. RESPONSIBILITIES:

- 6.1 Physician
- 6.2 Nurse
- 6.3 Respiratory therapist

7. APPENDICES:

N/A

8. REFERENCES:

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- 8.3 Lund CH. Nursing Care. Assisted Mechanical Ventilation of the Neonate. Goldsmith JP, Karotkin EH. fifth edition. 2011. 121-139

8. APPROVALS:

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