**SUCTIONING ARTIFICIAL AIRWAYS**  
(ENDOTRACHEAL AND TRACHEOSTOMY TUBES)

**PURPOSE**

Endotracheal tube and tracheostomy tube suctioning is performed to remove secretions, maintain a patent airway and promote oxygenation and ventilation.

**STANDARDS**

Patients with artificial airways are suctioned as necessary (PRN) at the discretion of the RN, LPN (Sunny Hill Health Centre), respiratory therapist (RT), physician, and/or physiotherapist (PT) as determined by chest auscultation, SpO$_2$ readings, and/or child’s respiratory distress indicators,

Except:
- if ordered by physician for a specific frequency
- endotracheal (ETT) and tracheostomy tubes 3.5 or smaller are suctioned every 2-3 hours and PRN

For patients who are on a home tracheostomy program and admitted to hospital, continuity of care is maintained as per home routine or as per Respiratory Clinic Protocol for the patient.

Routine instillation of normal saline is **NOT** recommended as research to date indicates that it is unlikely to be beneficial in loosening secretions and it can contribute to ventilator associated pneumonia (VAP).

**SITE APPLICABILITY**

BC Children’s Hospital (BCCH): Critical Care areas and patient areas where ETT/tracheostomy trained staff are available to provide care.

Sunny Hill Health Centre (SHHC): Cared for in patient areas where tracheostomy trained staff are available to provide care. Refer to Sunny Hill admission requirements policy. If further support is needed or questions arise, the following supports are available:
1. SHHC inpatient Clinical Nurse Coordinator or Educator or Child’s physician;
2. Respiratory Therapist in BCCH PICU: available through paging 2161, pager 41-01002, or via telephone 604-875-2133.

**PRACTICE LEVEL/COMPETENCIES**

**BCCH AND SHHC:** Suctioning ETT and Tracheostomy tubes is a specialized skill that requires knowledge, skill and clinical decision making acquired through education and clinical practice on the care and management of patients with artificial airways.

Competencies include:
- ability to assess a patient with an ETT or tracheostomy and determine when it is appropriate to suction
- identify equipment, supplies and monitoring to provide care for patients requiring ETT or tracheostomy suctioning
- demonstrate the correct suctioning technique
- discuss appropriate strategies to prevent or manage complications
- performance of manual ventilation

**DEFINITIONS**

**Closed suction:** A enclosed suction catheter system that is connected to the ventilator circuit; an internal catheter is introduced through an access port into the artificial airway for removal of secretions.

**Open suction:** A single sterile-wraped catheter that is attached to either wall or portable suction via connecting tubing. Utilized mainly for non-ventilated patients.

**EQUIPMENT**

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<th>Open Suctioning Technique (ETT or Trach)</th>
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Patients (ETT or Trach)

- clean gloves
- mask and goggles
- gown (if indicated)
- appropriate sized manual ventilation bag attached to appropriate oxygen flow (if needed)
- blue pad
- sterile suction catheter of appropriate size
- Note suction depth measurement on sign located on suction cart as well as on patient kardex for reference
- suction source (wall-mounted or portable)
- suction regulator and tubing attached to collection jar
- stethoscope
- container with sterile Normal Saline for flushing catheter

PROCEDURE

1. **DETERMINE** need for suctioning – Indications include:
   - Visible or audible secretions – rattling or bubbling sounds, audible with or without stethoscope
   - Patient complains of feeling secretions in the chest
   - Increased airway pressure when ventilated
   - Altered chest movement
   - Restlessness
   - Decreased SpO2
   - Hemodynamic alterations (hypertension, tachycardia, tachypnea)
   - Diminished air entry (diminished breath sounds on auscultation)
   - Sustained coughing or inability to generate effective spontaneous cough
   - Change in colour (cyanosis, redness, pallor)
   - For assessment of airway patency, cough reflex stimulation
   - Sputum specimen collection
   - Preset tidal volume not being delivered
   - Suspected aspiration of gastric or upper-airway secretions

2. **IDENTIFY** patient and **EXPLAIN** procedure to patient and family. **ENSURE** child and family understand procedure and questions are answered.

3. **OBTAIN** assistance from a second person (nurse, respiratory therapist, or physiotherapist).

4. **MONITOR** child’s vitals signs and indications of

Rationale

- clean gloves
- gown and other PPE (if indicated)
- appropriate sized manual ventilation bag attached to 100% oxygen flow
- appropriate sized closed-suction catheter
  - Note suction depth measurement on sign located on suction cart as well as on patient kardex for reference
- suction source (wall-mounted or portable)
- suction regulator and tubing attached to collection jar
- stethoscope
- sterile Normal Saline in disposable vial for flushing catheter

**Failure to correctly identify patients prior to procedures may result in errors.**

**Reduces child and family’s anxiety; evaluates and reinforces understanding of previously taught information.**

**Suctioning alone is not recommended due to risk. (e.g. accidental extubation, traction on endotracheal tube).**

**Identifies indicators for suctioning pre-procedure and**
inadequate oxygenation and ventilation before, during and after suctioning.

identifies signs and symptoms of complications from suctioning during and post procedure, such as decreased oxygen saturation, cardiac arrhythmias, bronchospasm, respiratory distress, increased blood pressure, increased intracranial pressure, and anxiety.

5. **PERFORM** hand hygiene and **DON** personal protective equipment, including clean gloves, mask, eye protection and gown (as indicated).

Standard/routine precautions; reduces risk of exposure to and transmission of microorganisms.

6. **AUSCULTATE** chest before suctioning if indicated (i.e. if urgent suctioning is needed)

Verifies patency and tube placement. A comparison is necessary for post-suctioning auscultation.

7. Consider **SUCTIONING** oropharynx and nares with appropriate size yankaur/neosucker prior to tube suction as needed.

Prevents contamination of the lower airways with upper airway organisms.

**Open Suctioning Technique**

8. **ATTACH** appropriate sized sterile suction catheter to suction tubing.

A catheter that is too small will not aspirate the secretions efficiently and a catheter that is too large will block off too much of the airway during suction, making the child bradycardic and reducing oxygen saturation levels.

9. **MEASURE** the length of the catheter to be inserted against the suction reference at the bedside or read markings on catheter to facilitate inserting catheter to appropriate depth.

Advancement of the suction catheter beyond the pre-measured length or depth into the trachea to the point of resistance may cause tissue damage and can trigger vagal stimulation and induce bradycardia.

**NOTE:** suction depth = length of hub (2 cm) + length of cannula (per packaging and/or noted in patient care plan/kardex) + 0.5 cm

10. **TURN** gauge on suction regulator to **ADJUST** vacuum to read between 60 and 150 mmHg with suction catheter vent occluded.

Guideline pressures are:
- 60–75 mmHg for pre-term-1 month
- 75-90 mmHg for 0-3 years
- 90–112 mmHg for 3-10 years,
- 112–150 mmHg for 10 and older

Sufficient pressure should be applied for effective removal of secretions.

High pressures can result in greater damage to tracheal epithelium or can lead to atelactasis. Low pressures are less effective and prolong suction time

11. **POUR** a small amount of 0.9% normal saline into paper cup. **SUCTION** a small amount of fluid from the container.

Prepares flush solution for catheter; assures properly functioning equipment.

12. Assistant **APPLIES** clean gloves, mask and goggles; assistant **CHECKS** oxygen flow to manual ventilation device.

13. With the catheter vent open, **INSERT** catheter in tracheostomy/ETT and quickly **ADVANCE** to pre-measured depth.

Suctioning removes oxygen, only apply as needed to remove secretions. Advancement of the suction catheter to the point of resistance causes tissue damage. Suctioning is not applied during insertion of catheter because this can cause tracheal trauma.

14. **APPLY** suction continuously by covering the catheter vent while withdrawing the catheter from the tracheostomy/ETT. As catheter is withdrawn, rotate

Provides adequate removal of secretions.

To enable gas flow between suction catheter and airway
the catheter with a twisting motion with the thumb and forefinger.

**NOTE:** Use brief suction periods of **10 seconds or less** to minimize decreases in arterial oxygenation and to decrease airway trauma. If bradycardia or significant changes in vital signs or clinical appearance occur, withdraw the catheter and provide oxygen until the levels return to baseline.

15. **FLUSH** and **RINSE** suction catheter with flush solution, as needed.

16. **REPEAT** procedure as necessary up to 3 times, or as tolerated; allowing 30 second pauses between passes.

**NOTE:** If secretions remain in the airway after three passes, allow a rest period before additional passes are made.

17. **ASSESS** patient's condition after each suction attempt.

18. Once the tracheostomy/ETT is cleared of secretions, **SUCTION** oro-pharynx and nares as necessary.

19. **DISPOSE** of equipment in garbage container.

20. **ASSESS** breath sounds to determine whether any pertinent changes have occurred after suctioning.

21. **REMOVE** personal protective equipment and **PERFORM** hand hygiene.

### Ventilator Closed Suctioning Technique

22. **ATTACH** appropriate sized closed-suction catheter into ventilator circuit (French size should be 2 X ETT or trach tube size).

**NOTE:** Respiratory Therapist responsibility.

23. **DETERMINE** the proper catheter length for suctioning by reading instructions on catheter packaging.

24. **TURN** gauge on suction regulator to **ADJUST** vacuum to read between 60 and 150 mmHg with suction catheter vent occluded.

Recommended pressures are:
- 60–75 mmHg for pre-term-1 month
- 75-90 mmHg for 0-3 years
- 90–112 mmHg for 3-10 years,
- 112–150 mmHg for 10 and older

25. **ADVANCE** the catheter until the measured number is aligned with the lavage port (window). When the catheter is in the correct position, **DEPRESS** suction and hold while slowly withdrawing the catheter.

**NOTE:** Support the catheter at the ETT or trach tube wall thus preventing atelectasis

Prolonged suctioning results in hypoxia.

Rotating the catheter improves removal of secretions from inside the trach/ETT tube.

Assists in maintenance of catheter patency; rinsing decreases the chances of deposits of upper airway secretions in the lower respiratory tract.

To determine whether further suctioning is required

Prevents contamination of the lower airways with upper airway organisms.

Reduces risk of microorganism transmission.

Evaluates the effectiveness of suctioning.

Reduces transmission of infection; protects personal health.
with one hand while withdrawing the catheter to prevent extubation.

| 26. **ASSESS** | patient’s condition after each suction attempt. | To determine whether further suctioning is required |
| 27. **PROVIDE** | 30 seconds of rest between suctioning passes. | Allows for recovery of arterial oxygen saturations. |

28. To clean catheter:
- **WITHDRAW** the black tip of the catheter into the middle of the cleaning chamber (window).
- **DEPRESS** suction, and then gently squeeze saline solution into catheter.
- **flush the catheter between each pass of the catheter**

29. **LOCK** the suction catheter when finished suctioning and cleaning the catheter. Prevents inadvertent suctioning of ventilator flow

30. Once the ETT or tracheostomy tube is cleared of secretions, use another suction device to **SUCTION** the oral and nasal pharynx. Prevents contamination of the lower airways with upper airway organisms.

31. **ASSESS** breath sounds to determine whether any pertinent changes have occurred after suctioning. Evaluates effectiveness of suctioning.

32. **REMOVE** personal protective equipment and **PERFORM** hand hygiene. Reduces transmission of infection; protects personal health.

33. **CHANGE** closed suction set-up when visibly soiled or every 7 days. Reduces transmission of infection.

**DOCUMENTATION**

**DOCUMENT** in patient care plan/kardex type and length of tube patient has in situ.

**DOCUMENT** on appropriate record(s):
- date and time
- suctioning frequency
- pre-suctioning and post-suctioning assessment findings (including VS, breath sounds and work of breathing)
- colour, amount, consistency, odor of secretions
- patient’s response to suctioning
- comfort assessment and specific interventions provided
- patient and family education
- unexpected outcomes and related treatment.

**REFERENCES**


