

PAEDIATRIC NURSING PRACTICE MANUAL
SECTION 7

CARE OF THE CHILD WITH A RESPIRATORY CONDITION

7.4 CARE OF THE CHILD WITH A TRACHEOSTOMY

7.4.3 SUCTION OF A TRACHEOSTOMY TUBE

Aim

Suction should maximise removal of secretions while minimising tissue damage and hypoxia in order to maintain a PATENT airway and allow effective ventilation.^{1, 2, 3, 4, 5, 6}

Key points

1. The nurse caring for a child with a tracheostomy tube must be able to demonstrate a sound knowledge and skill level in respiratory assessment and tracheostomy care before accepting responsibility for care.^{2, 3}
2. If suctioning is performed improperly, it can cause complications such as hypoxia, atelectasis, bradycardia, trauma and infection.¹
3. Suction depth should be adequate to remove secretions.^{5, 7} A depth of 0.5cm below the end of the tracheostomy tube (routine suction), deep suction and suction to the depth of the carina can be used.^{2, 5, 8, 9, 10, 11, 12, 13} The routine suction depth will be recorded on the child's airway profile. When a child regularly needs deep suction to the carina this depth will be added to the Airway Profile.
4. Some patients with distal airway granulation or specific airway abnormalities may have orders to only suction to a specific depth.^{14, 15} This will be documented in the post operative orders and airway profile and should be documented in the Nursing Care Plan.⁹
5. Deep suction may be required more frequently for some children due to their medical condition ie. the child with poor/absent cough, muscle weakness, thick or copious secretions.^{5, 8, 11, 14}
6. Suction can raise intracranial pressure and should be used with caution in children with a head injury.^{3, 15}
7. It is recommended that children with no evidence of secretions, minimal secretions or who can cough and clear their secretions independently should be suctioned morning and night (unless ordered more frequently than this) to assess the patency of the tracheostomy tube.^{5, 6, 16}
8. It is common that children with a tracheostomy have increased or copious secretions upon waking in the morning. Suction and/or normal saline instillation prior to bedtime and during the night can assist in managing this.
9. *For Thick Secretions:* Ensure hydration and humidification are adequate.^{3, 6, 12, 15} Use 0.9% sodium chloride nebulisation refer to [PNPM 7.1.1](#) and assess affect on removing secretions. Normal Saline instillation may assist in the removal of thick secretions.^{7, 9, 10, 11, 17, 18}
10. If difficulty is encountered in passing a suction catheter this is an indication that the tracheostomy tube may be blocked, refer to [PNPM 7.4.5](#) for management.
11. All patients with a tracheostomy require an appropriate size self inflating bag and mask located at the bedside. The function of the bag should be checked at the beginning of each shift (as per [PNPM 4.2](#) Checking Resus Trolley).
12. Some patients may require administration of oxygen or an increase in oxygen before and after suction.^{3, 7, 12} This should be documented in the Nursing Care Plan.
13. Suction can cause lung and airway collapse. Restoration of lung volume, using a self inflating bag

with oxygen, may be required pre and post tracheostomy suctioning.^{3, 5, 7, 8} Ventilated children are more likely to require manual inflation pre and post suction.^{3, 5} Document this in the Nursing Care Plan.

14. To suction a fenestrated tracheostomy tube, replace the non-fenestrated inner cannula first to prevent the suction catheter passing through the fenestrations and causing trauma to the tracheal mucosa.⁶
15. In accordance with PMH Infection Control Policy No. 2.1 (Standard IC Precautions) masks, protective eye wear and gloves should be worn when suctioning a patient.

Equipment

Adjustable high pressure suction with a gauge	Gloves, goggles and mask
Sterile disposable suction catheters, appropriate size	Oxygen supply
Normal saline ampoules and syringes	Container of tap water
Rubbish bag	

Indications for Suction Include:^{2, 3, 12, 14, 15}

- Audible rattling sounds or secretions visible in the connector.
- Decreased air entry or secretions on chest auscultation.
- Signs of respiratory distress ie.

Tachypnoea	Tachycardia	Rib/Sternal Recession
Nasal Flaring	Sweaty	Colour Change
Restlessness	Unrelieved Coughing	
Decreased airflow out of tracheostomy opening		
- Vibrations felt with tactile fremitus of the chest.
- Decreased oxygen saturations.
- Suspicion of blocked or partially blocked tracheostomy tube.
- Child requests suction.
- Increase in ventilation pressures/decrease in tidal volumes.
- Prior to tracheostomy tube change, tape change, feeding, speaking valve use or before/after a procedure or after vomiting.
- If the patient is able to cough up their own secretions this should be encouraged.

Cyanosis, bradycardia and apnoea are late signs of oxygen deficiency. Suctioning should be given promptly before these signs.

Suction Catheter Size

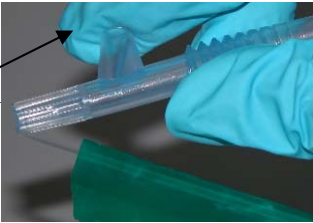


Double the internal diameter (ID) of the tracheostomy tube to determine the size of the suction catheter and always round down ie. Size 3.5mm tracheostomy = Size 6 Fg catheter.
 Size 5.0mm tracheostomy = Size 10 Fg catheter.

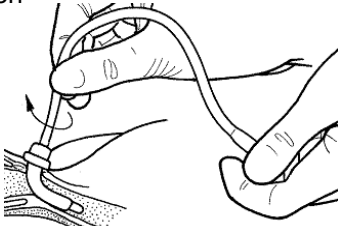

This is so that the size of the catheter does not exceed half the ID of the tube allowing space between the catheter and inside wall of tracheostomy tube.^{2,3,6,8, 20} Physiotherapists, critical care nurses and situations where secretions removal is difficult may warrant the use of a larger catheter.³


PROCEDURE	ADDITIONAL INFORMATION
<p>Oxygenation:</p> <p>Consider administering oxygen or increasing flow prior to suction if child desaturates with suction.^{3, 6, 7}</p> <p>Pre and post bagging with oxygen may be required.^{5, 7, 8, 15} – see medical orders or discuss with the Coordinator, CDN or CNC Technology Dependent Children.</p>	<p>To maintain adequate oxygenation and to reduce desaturation.^{3, 7}</p> <p>Consideration particularly important in children using ventilators and/or if unstable during suctioning.^{4, 5, 12}</p>

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Suction of a Tracheostomy Tube
 Care of the Child with a Tracheostomy
 Paediatric Nursing Practice Manual (PNPM)
 Princess Margaret Hospital
 Perth, Western Australia

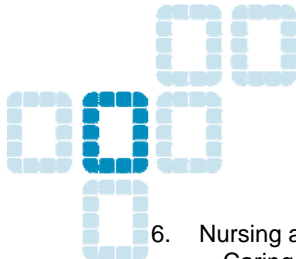
PROCEDURE	ADDITIONAL INFORMATION
Position the child allowing access to the tracheostomy tube.	A young child may be placed on their back exposing the tracheostomy tube. An older child may prefer to sit.
Attach the suction catheter to suction tubing and turn on the suction.	
<p>Suction Pressure: The suction unit should have a pressure gauge.⁸ Place a thumb over the port and kink the flexible catheter just below the port.</p>  <p>Adjust gauge to read not higher than 150mmHg or 20Kpa.^{9, 19}</p>	<p>Higher pressure may cause alveolar collapse, mucosal damage or catheter collapse.^{2, 3, 12} Inadequate suction pressure may not remove enough secretions resulting in increased number of catheter passes.^{2, 3}</p>
<p>To determine the depth: Routine suction depth for is 5mm below the end of the tracheostomy tube. This will be recorded on the child's Airway Profile. OR: Using a spare tracheostomy the same size as the child's, insert a suction catheter so the tip protrudes 5mm out of the end of the tracheostomy tube and cut to this length.</p>  <p>Cut a piece of paper tape measure to this length and attach to the child's bed or equipment trolley.</p>	<p>If suctioning through a Bodai™ (90° connector with suction slit) measure with a spare Bodai™ attached and cut a piece of tape measure to this length and attach to bed or equipment also. A Bodai must be wiped with an alcohol swab prior to suction.</p>  <p>Suction of secretions from connector of the trache tube or wiping connector with a tissue may be all that is required for a child with an adequate cough.</p>
Patients should be observed during the procedure for signs of respiratory and cardiovascular instability and discomfort. ^{3, 14, 15}	If this occurs suction may need to be discontinued.
<p>1. Routine Suction: Measure the length of the suction catheter against the tape measure.</p>	<p>Maintain sterility of the catheter tip by using the included sleeve and not allowing the tip to contact anything.^{8, 15} It is recommended to use the included green sleeve. If using a <i>glove only</i>, maintain sterility by avoiding contact with the end of the catheter that will be inserted into the tracheostomy tube to maintain sterility.</p>
If a fenestrated tube is in situ, a non-fenestrated inner cannula should be inserted prior to suctioning. ⁶	It is possible to insert the catheter through the fenestrations causing damage to the tracheal mucosa adjacent to these holes.

PROCEDURE	ADDITIONAL INFORMATION
<p>Insert the catheter gently to the predetermined length.⁶</p> <p>Apply thumb to suction port <u>only</u> when withdrawing the catheter.^{3, 6, 12, 20}</p> <p>Twist the catheter between 2 fingers as withdrawing to rotate the suction holes inside the tracheostomy tube.^{3, 4, 5}</p> <p>Assess the amount, colour and consistency of secretions removed.³</p> 	<p>If the catheter does not pass easily into the tracheostomy tube, suspect a blocked or partially obstructed tube refer to PNPM 7.4.5. Call for assistance.</p> <p>Don't force a catheter past an obstruction as this may lodge a plug into the lung. Consider normal saline instillation (information below) or undertake a tracheostomy tube change.</p> <p>Limit time per catheter pass up to 10 seconds.^{2, 3, 5, 6, 12, 15}</p>
<p>After each catheter pass, allow the child to take several breaths to recover and prevent hypoxaemia.³</p> <p>Adjust oxygen to maintain oxygen saturation.</p>	<p>Monitor SpO₂, respiratory rate, pattern, breath sounds and colour of the child.^{3, 12, 14, 15}</p>
<p>Assess for signs of remaining secretions.</p> <p>Repeat the procedure if necessary.</p> <p>Do not contaminate the catheter tip between passes.</p>	<p>The suction catheter may be reused and discarded on completion of an episode of suctioning ie. one catheter for several passes until tracheostomy tube is clear of secretions, provided it is not contaminated between suction passes.</p>
<p>2. Deep Suction:</p> <p>Indications</p> <p>If symptoms of secretions persist after using Routine Suction.⁵</p> <p>Insert suction catheter slightly more than 0.5cm ie. 1cm or more.^{5, 8, 10, 11, 12}</p> <p>Assess the amount of secretions removed.</p> 	<p>Indications:</p> <ul style="list-style-type: none"> ● Widespread crackles on auscultation ● Decreased SpO₂ ● Generalised decreased air entry ● Suspected blocked or partially obstructed tube ● Associated w chest physio ● Ensure tube patency <p>Paralysed patients or patients who lack or have a weak cough or who have copious or thick secretions require more frequent use of deep suction to remove secretions.¹²</p>
<p>3. Deep Suction - If signs of secretions persist:</p> <p>Gently insert suction catheter until you reach the carina (when resistance is felt).¹²</p> <p>Withdraw suction catheter slightly, approx 0.5cm.</p> <p>Apply suction.</p> <p>Assess for signs of secretions.</p>	<p>Resistance to insertion or coughing is indicative of contact with the carina.¹²</p> <p>Touching the carina may stimulate the child to cough which assists in removal of secretions.^{3, 12}</p> <p>Note: Touching the carina may cause vagal nerve stimulation which can lead to bradycardia and hypotension.¹²</p>

PROCEDURE	ADDITIONAL INFORMATION
<p>Normal Saline Instillation (NSI) ^{2, 7, 8, 9, 10, 11}</p> <p>Indications</p> <p>To stimulate a cough.⁷ If secretions are thick and/or sticky.⁷</p> <p>Volumes¹⁰</p> <p>Infant (0-1yr): 0.2 - 0.5mL Child (1-8): 0.5 - 1.0mL Adult (8yr+): 1.0 - 1.5mL</p> 	<p>Use NSI for cough stimulation before using the deep suction method.⁸</p> <p>Begin by using the <u>smallest</u> volume and assess secretion removal.</p> <p>Increase volume if required and assess effectiveness.</p>
<p>Technique:</p> <p>Using an aseptic technique draw up normal saline.</p> <p>Instil desired amount slowly into tracheostomy tube opening. Allow child to take a few breaths, then suction.</p>	<p>Open a new syringe and normal saline ampoule at the beginning of each shift.</p> <p>Don't occlude opening of tube with syringe.</p>
<p>Comfort the child on completion of the procedure.³</p>	<p>The oxygen saturation levels will return to normal more quickly once the child stops crying.</p>
<p>Discard the suction catheter. Suction tap water through the suction tubing.</p>	
<p>Post Suction Assessment:</p> <p>Use 1 x ✓ on the observation chart to indicate one pass of the catheter into the tracheostomy.</p> <p>Record colour, consistency, amount of secretions and if there is an odour at least once a shift and when changes occur.³</p>	<p>Important to allow assessment of frequency of suctioning a child is requiring.</p> <p>Secretions should be clear and white.³</p> <p>Yellow, green or odorous secretions may indicate infection.³</p> <p>A <i>small</i> amount of blood streaking may occur. Pink frothy secretions may indicate pulmonary oedema.³</p>
<p>Report abnormalities to a medical officer.</p>	<p>Consider taking a specimen for culture and sensitivity.</p>

References:

1. McClean B. Tracheal suctioning in children with chronic tracheostomies: A pilot study applying suction while inserting and removing the catheter. [Level III-1]. Journal of Pediatric Nursing.27(1):50-54; 2012.
2. Wilson M. Tracheostomy management. [Expert opinion]. Paediatric Nursing.17(3):38-44; 2005.
3. Moore T. Suctioning techniques for the removal of respiratory secretions [Expert opinion]. Nurs Standard.18(9):47-55; 2003.
4. Pollard C. Endotracheal suction in the infant with an artificial airway [Level I]. Nurs Crit Care.6(2):76-82; 2001.
5. American Thoracic Society. Care of the child with a chronic tracheostomy. [Expert opinion]. Am J Resp Crit Care Med.161:297-298; 2000.

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6. Nursing and Midwifery Practice Development Unit [NHS Quality Improvement Scotland]. Best practice statement - Caring for the patient with a tracheostomy [Expert opinion]. 2007. Available from: http://www.nhshealthquality.org/nhsqis/files/TRACHEOREV_BPS_MAR07.pdf. Accessed: 16 February 2010
 7. Brooks D, Anderson CM, Carter MA, Downes LA, Keenan SP, Kelsey CJ, et al. Clinical practice guidelines for suctioning the airway of the intubated and nonintubated patient. [Level I]. *Can Resp J*.8(3):163-181; 2001.
 8. Oberwaldner B & Eber E. Tracheostomy care in the home [Expert opinion]. *Paediatric Resp Rev*.7:185-190; 2006.
 9. Vijayasekaran S. Emergency resuscitation of a patient with a tracheostomy [Expert opinion]. Perth, WA: Personal communication; n.d.
 10. Wilson A, Suction of a tracheostomy tube [Expert opinion]. In: Tracheostomy Working Party, editor. Fellow, Otolaryngology Department, Paediatric ENT Services. Princess Margaret Hospital for Children. Perth; n.d.
 11. Duncan A, Emergency resuscitation of a patient with a tracheostomy [Expert opinion]. In: Head, Paediatric Intensive Care Unit. Princess Margaret Hospital for Children. Perth; n.d.
 12. Day M, Farnell S & Wilson-Barnett J. Suctioning: a review of current research recommendations. [Literature Review]. *Intensive Crit Care Nurs*.18(2):79-89; 2002.
 13. Spence K, Gillies D & Waterworth L. Deep versus shallow suction of endotracheal tubes in ventilated neonates and young infants. [Level I]. *Cochrane Database of Systematic Reviews*.3:1-6; 2003.
 14. Place B & Fell H. Clearing tracheobronchial secretions using suction [Expert opinion]. *Nursing Times*.94(47):54-56; 1998.
 15. Joanna Briggs Institute. Tracheal suctioning of adults with an artificial airway [Level I]. Best Practice Information Sheet 2000. Available from: http://www.joannabriggs.edu.au.pklibresources.health.wa.gov.au/pdf/BPISEng_4_4.pdf. Accessed: 13 November 2009
 16. Davies GM. Tracheostomy in children [Expert opinion]. *Paediatric Resp Rev*. (Suppl 1):S206-9; 2006.
 17. Celik SA & Kanan N. A current conflict: use of isotonic sodium chloride solution on endotracheal suctioning in critically ill patients. [Literature Review]. *Dimens Crit Care Nurs*.25(1):11-14; 2006.
 18. Paratz J & Stockton K. Efficacy and safety of normal saline instillation: A systematic review. [Level I]. *Physiotherapy*.95(4):241-250; 2009.
 19. Knight G, Tracheostomy Suction Pressures [Expert Opinion]. Perth: Paediatric Intensive Care Unit. Princess Margaret Hospital for Children In: Paediatric Intensivist, PICU. Princess Margaret Hospital for Children; 2012.
 20. Joseph R. Tracheostomy in infants: Parent education for home care. [Expert Opinion]. *Neonatal Network*.30(4):231-242; 2011.