

Pediatric tracheostomy care: What home care nurses need to know

Learn about evidence-based practices that help ensure safe care.

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CHILDREN with tracheostomy tubes can benefit from home care but require specialized nursing to prevent complications and emergencies. The artificial airway increases risk, especially in children with upper airway disorders. To provide safe and effective care, home care nurses must be skilled in respiratory assessment, routine tracheostomy management, and tracheostomy emergency response. They also need to apply proven strategies that help prevent complications and must be prepared to respond effectively to tracheostomy-related emergencies.

If you're caring for a child with a tracheostomy, make sure you know the reason for the tracheostomy and the status of the child's upper airway. Children commonly require tracheostomies to bypass airway obstructions or to allow chronic mechanical ventilation. Airway obstruction may stem from trauma, tumors, infections, or structural airway abnormalities. Neurologic or neuromuscular disorders

put children with weak gag reflexes at risk for choking and aspiration, and progressive muscular weakness or degeneration may hamper their ability to breathe. These children may need tracheostomies to manage secretions, avoid aspiration, and allow mechanical ventilation. Premature infants and children with chronic

lung disease may need tracheostomies for long-term mechanical ventilation.

Evidence-based tracheostomy management

The American Thoracic Society (ATS) and the American Academy of Otolaryngology (AAO) have published guidelines for tracheostomy management. Supported by nursing research, these guidelines replace harmful traditions with safe, effective practices. Two primary evidence-based practice changes are safer, more effective suctioning and discontinuation of saline instillation into the tracheostomy tube.

Safer suctioning

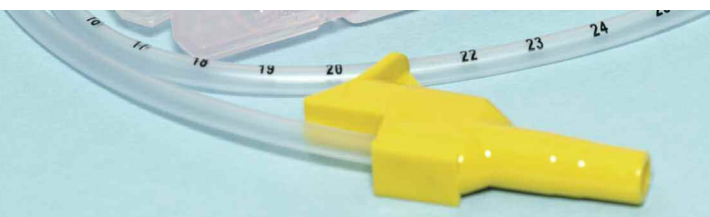
Current nursing and respiratory-



Suction pressure recommendations

The following tracheostomy suction pressures are based on evidence:

- Neonates: 60 to 80 mm Hg
- Infants and children: 80 to 100 mm Hg
- Adolescents: 80 to 120 mm Hg



Tracheostomy emergencies in the home: How to intervene

The four most common pediatric tracheostomy emergencies are accidental decannulation, difficult tracheostomy tube insertion, mucus plug, and water in the tube.

Accidental decannulation

Accidental decannulation of the tracheostomy tube may occur if trach ties are loose, trach sponges are too thick, the child pulls at the tube, or ventilator tubing isn't secured. If this emergency occurs, use this stepped approach:

1. Loosen trach ties.
2. Hyperextend the child's neck.
3. Insert the same tracheostomy tube.
4. Attach a resuscitation bag to the tube to deliver breaths and confirm tube placement.
5. Secure the ties.
6. Perform a respiratory assessment.
7. Monitor and document the child's response.

Difficult tube insertion

This may occur if airway growths (granulomas or papillomas), tracheomalacia (soft-tissue collapse), or tracheal stenosis develop; the stoma is scarred, distorted, or obstructed by granulation tissue; or the stoma is hard to visualize. When inserting a tracheostomy tube, always use an obturator. Liberally coat the tube's exterior with water-based lubricant before insertion. Use this stepped approach:

1. Confirm the child is connected to pulse oximetry.
2. Hyperextend the child's neck to visualize the stoma.
3. Attempt tube reinsertion.
4. If the attempt fails, insert a tube that's a half-size smaller.
5. If you're unable to insert a smaller tube, call 911.
6. If the child has a functional, open upper airway, cover the stoma with gauze and administer manual breaths via face mask attached to a resuscitation bag.
7. If the child lacks a functional upper airway and is breathing through the stoma, closely monitor his or her respira-

tory status while awaiting emergency help.

8. If the child stops breathing, deliver mouth-to-stoma breaths until emergency help arrives.

Know that if the child loses consciousness at any time, muscles around the stoma and in the airway will relax, which may allow reinsertion of the tube. Once the tube is inserted successfully, closely monitor the child's respiratory status.

Mucus plug

Inadequate humidification, dehydration, and infection may lead to mucus plug formation. Here's a stepped approach to take in this emergency:

1. If copious secretions are visible, suction the child. Otherwise, go directly to step 2.
2. "When in doubt, take it out." Perform an emergency tracheostomy change if the child is in respiratory distress.
3. Attach a pulse oximeter to the child and perform respiratory assessment.
4. Administer supplemental oxygen if available and needed.

Water in the tube

Water may enter the tracheostomy tube if excessive water builds up from the humidification system or from swimming, water play, or bathing. To deal with this emergency, use this stepped approach:

1. Suction the child.
2. Place the child on pulse oximetry and assess respiratory status.
3. Administer oxygen.
4. Use the child's assistive coughing device as prescribed.
5. Administer prescribed respiratory treatment as needed.
6. Perform a respiratory assessment and monitor the child continuously until he or she returns to respiratory baseline status.

care literature recommends a specific suctioning technique for children with tracheostomies—one that's different from that used for adults. An infant's airway diameter is 25% smaller than an adult's. Also, an infant's trachea is supported by soft cartilage that's more pliable. In addition, small, collapsible air passages leave children vulnerable to respiratory distress.

Routine high-pressured, deep suctioning for long durations has detrimental effects for pediatric patients. Deep suctioning is defined as inserting the catheter un-

til it meets resistance at the carina, followed by withdrawing the catheter slightly before applying suction. Studies have found damaged tracheal tissue and inflammation where deep suctioning has been performed. In children, harmful effects include tracheal edema, inflammation, ulceration, bleeding, necrotizing tracheobronchitis, and pneumothorax. Documented physiologic risks of deep suctioning in children include atelectasis, hypoxemia, laryngospasm, bronchospasm, infection, decreased lung compliance, increased intracranial pressure,

hypertension, hypotension, and arrhythmias.

Be aware that applying high levels of negative pressure during suction may cause tissue damage, hypoxia, and atelectasis. Higher negative pressures don't extract larger amounts of secretions, so negative pressure should be applied at the lowest level to prevent serious consequences. (See *Suction pressure recommendations*.)

Although suctioning traditionally is done every 2 hours for children with tracheostomies, evidence indicates it should be done only when secretions are present. Audible se-

cretions, decreased oxygenation, or diminished breath sounds signal the need for suctioning. If the child doesn't need suctioning during the day, the ATS recommends once-daily suctioning at bedtime to ensure patency of the tracheostomy tube. In children without secretions, it recommends minimal suctioning at morning and bedtime to check patency.

To ensure your suctioning practice for pediatric patients is based on the most recent evidence, follow these guidelines:

- Suction catheters must be pre-measured to no more than 0.5 centimeters beyond the end of the tracheostomy tube.
- Use a multi-holed suction catheter with side holes close to the distal end to remove secretions from a greater surface area.
- A rapid technique is safer and more effective. When inserting and removing the suction catheter, apply suction for no more than 5 seconds to prevent atelectasis.
- Twirling the catheter between your fingers and thumb rather than stirring it with your hand and wrist reduces friction and removes secretions from

all areas of the tube.

- A larger catheter removes secretions more effectively than a smaller one. Use the catheter that is closest in size to the diameter of the trach tube, yet is easy to insert.

Perils of instilling saline solution

Normal saline instillation involves instilling a bolus of 3 to 10 mL normal saline solution directly into the child's trach tube before suctioning. It's mistakenly advocated as a way to improve oxygenation, remove secretions by thinning them, and stimulating coughing to loosen secretions. Extensive research shows that this practice doesn't thin or mobilize secretions; instead, it reduces oxygenation, increases airway-infection risk, and heightens patient anxiety, dread, dyspnea, or pain.

To help mobilize secretions, stimulate coughing, and improve oxygenation, use the following evidence-based practices:

- Maintain adequate airway humidification and systemic hydration, and administer prescribed respiratory medications and treatments to thin secretions.
- Replace bolus saline instillation with nebulized saline treatment for safer, more effective humidification of the bronchial tree.
- To mobilize secretions, use cough-assistive devices, vibration vests, and prescribed respiratory treatments and medications.

Dealing with tracheostomy emergencies

About 11% of pediatric patients with tracheostomies die at home. A child with a tracheostomy is at risk for a respiratory emergency at any time. To be prepared for an emergency, develop a prevention strategy and a planned response, and use your technical and critical-thinking skills to ensure a calm, stepped approach. Re-

member—in the patient's home, you're the child's life-support system. (See *Tracheostomy emergencies in the home: How to intervene.*)

Building bridges

Home care nurses who are critical thinkers and use evidence-based protocols are invaluable to the pediatric patients who depend on them to stay safe and healthy. Consistent, effective, and intelligent nursing practice builds bridges of trust, respect, and confidence between you and the patient and family. As the child's home care nurse, you can bridge the gap between the primary care provider and family caregivers. To promote safe, high-quality care and reduce hospital admissions, evaluate the learning needs of family caregivers (and the patient, if old enough to perform self-care) and provide education about tracheostomy care. ★

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