

TRACHEOSTOMY CARE

PRACTICE GUIDELINE[®]

DOCUMENT SUMMARY/KEY POINTS

- Tracheostomies are most often indicated to provide a stable airway for infants and children with a congenital or acquired airway obstruction and to provide long term mechanical ventilation.
- The aim of the guideline is to outline the principles of management for children with a new or existing tracheostomy for clinicians.
- All Registered Nurses, Enrolled Nurses and designated carers (AINs and parents who have completed a training and competency program) can perform tracheostomy cares in the general ward areas.
- Bedside equipment and supplies required for effective tracheostomy care should be prepared in advance when anticipating admission or transfer of a child with a new or existing tracheostomy.
- Emergency equipment is patient specific and should include spare tubes, suction catheters and all equipment required for a tube change.
- Children with new tracheostomies need continuous humidification via a wet circuit for at least the first few days. Heat Moisture Exchange (HME) also known as a Swedish nose should be in situ once off invasive ventilation.
- Tracheostomy tapes are not changed and loosened without the presence of the ENT surgeon or ENT registrar and/ or appropriate CNC's during the first week following a new tracheostomy.

KPI: Clinicians should refer to the guidelines to assist them in the management of children with a tracheostomy. Adverse Patient Incidents reported to ims+ in relation to tracheostomy care will be monitored every 6 months.

This document reflects what is currently regarded as safe practice. However, as in any clinical situation, there may be factors which cannot be covered by a single set of guidelines. This document does not replace the need for the application of clinical judgement to each individual presentation.

Approved by:	SCHN Policy, Procedures and Guidelines Committee	
Date Effective:	1 st April 2024	Review Period: 3 years
Team Leader:	Clinical Nurse Consultant	Area/Dept: ENT/ Tracheostomy

CHANGE SUMMARY

- Due for mandatory review
- Change of format
- Consolidation of information

READ ACKNOWLEDGEMENT

- All clinical staff caring for patients with tracheostomy should read and acknowledge they understand the contents of this document.

This document reflects what is currently regarded as safe practice. However, as in any clinical situation, there may be factors which cannot be covered by a single set of guidelines. This document does not replace the need for the application of clinical judgement to each individual presentation.

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Introduction

A tracheostomy is a surgical opening into the trachea below the larynx through which a tube is placed to bypass or overcome an upper airway obstruction, to facilitate mechanical ventilatory support and to assist in the removal or management of tracheo-bronchial secretions.

Common indications for a tracheostomy

1. Upper airway obstruction

This may be caused by an obstruction in the oral, nasal or naso-pharynx such as an enlarged tongue, micrognathia or one of the following¹:

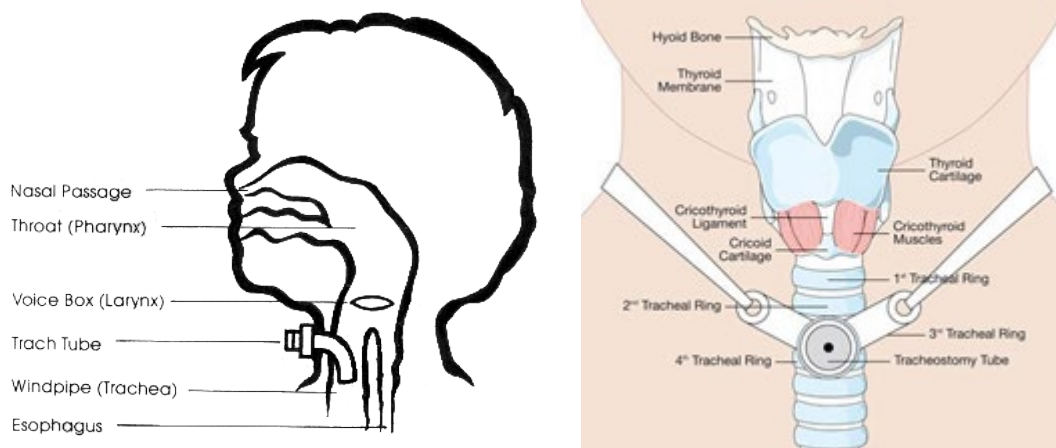
- **Cyst** – a sac filled with fluid
 - **Lymphatic Malformation** – an abnormality in the lymphatic system causing a soft, smooth non-tender mass in the neck which can cause an upper airway obstruction.
 - **Haemangioma** – a mass containing abnormal blood vessels. This normally reduces in size as the child grows.
 - **Laryngomalacia** – an abnormality of the larynx where the structure is soft and collapses inwards on inspiration. This condition may improve as the child grows and the stricture becomes more rigid.
 - **Papillomatosis** – an obstruction caused by a type of benign wart (caused by Human Papilloma Virus) which may present as a very large lesion or several smaller lesions. Although these can be removed (laser), they have a tendency to grow back.
 - **Subglottic stenosis** – a narrowing of the upper airway (below the glottis or vocal cords) which can be due to a congenital malformation or acquired through prolonged intubation.
 - **Tracheal stenosis** – narrowing of the trachea.
 - **Tracheomalacia** – an abnormality of the trachea where the structure is soft and collapses in on itself. This condition may improve as the child grows and the trachea becomes more rigid.
 - **Vocal cord palsy** – an abnormality where the vocal cords remain in a closed position even when the child is not speaking, causing a narrow airway. This can be congenital, neurological in origin or caused by intubation.
2. Need for long term ventilation or long-term respiratory support
3. Trauma (e.g. transection of the trachea)
4. Pulmonary toileting to assist secretion management

Tracheostomy Tubes Used

The most common types of tracheostomy tubes used in the hospital are:

- Shiley single lumen tubes (cuffed/uncuffed) used in infants and children
- Shiley double lumen tubes (cuffed / uncuffed, fenestrated/ unfenestrated) used in older children and adults
- Bivona single lumen tubes used in children (cuffed / uncuffed)
- Portex double lumen tubes used in older children and adults (cuffed/ uncuffed)

Figure 1: Tracheostomy



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Figure 2: Shiley Tracheostomy Tubes



Figure 3: Bivona cuffed Tracheostomy Tubes – air cuff (left), water cuff (right)



Figure 4: Adult Tracheostomy Tubes – Portex (left), Shiley (right)

Post Operative Care in PICU/CICU

- Patients with new tracheostomies will be managed in Intensive Care for the initial post-operative days or until the patient is clinically stable. The patient will be transferred to an appropriate ward in collaboration with the ENT team, ICU Nurse Manager, the Bed Manager and Nursing Unit Manager of the designated ward.
- The ENT Clinical Nurse Consultant will coordinate care of tracheostomy patients (except for ventilated and rehabilitation patients who may have a relevant CNC acting as case manager). The CNC will assess staff needs and provide instruction and education for families.
- The child will be managed in ICU for at least 7 days, until the first tracheostomy change. The ENT surgeon/registrar will communicate personally with the Intensivist of the day to discuss findings and appropriate post-operative care. This information includes procedure to be conducted if there is an accidental dislodgement of the tracheostomy tube and need for sedation.
- On return from theatre, all children with new tracheostomies will have 'Stay Sutures' (black silk sutures) attached to the sides of the tracheostomy opening, to facilitate re-insertion of another tracheostomy tube should accidental decannulation occur. These 'stay sutures' will be secured by steristrips to the child's chest and must be clearly labelled "do not remove" as well as "Right and Left". Should accidental decannulation occur, place patient's neck into a hyperextended position by placing a rolled towel underneath the patients' shoulders. The sutures are to be pulled up and out to raise the trachea to the surface and enable easier insertion of the tube. Stay sutures are removed 7 - 10 days post-insertion during the first tube change, either by or after consultation with the ENT team.
- A portable chest x – ray should be performed immediately after return to ICU to check the position of the tube and check for presence of complications such as surgical emphysema and pneumothorax.
- The child should have a "New Tracheostomy" Card at the bedside until the first tube change.
- Tracheostomy ties are not to be changed during the first week following the tracheostomy formation / insertion and not before the first tube change is done. This will avoid the risk of accidental decannulation before a patent tract has been formed.
- It is important that tracheostomy ties are tight and secure in the first week to ensure that accidental displacement does not occur. These should be tight enough to prevent dislodgement, but not so tight as to cause head and neck swelling and suffusion.

Sedation

- All children need adequate analgesia postoperatively.
- Sedation is used to inhibit movement which might cause tracheostomy tube dislodgement.

- If the child is excessively mobile despite adequate analgesia and sedation, then muscle relaxation may be administered (usually 24 hours of muscle relaxation is sufficient). Muscle relaxation must be discussed with the Intensivist.
- Children who have a difficult airway may already be sedated and muscle relaxed on return to PICU/CICU. The level of sedation should be discussed between the ENT Consultant and the Intensivist once the child has returned to PICU/CICU.
- Young children with new tracheostomies transferred to the wards may need to have their arms splinted to prevent them from pulling the tracheostomy tube out.

Immediate postoperative complications

- Bleeding
- Blockage of tube
- Pneumothorax
- Subcutaneous and mediastinal emphysema
- Dislodgement of the tube
- Granulation tissue
- Tracheo oesophageal fistula

Suctioning the tube after return from theatre

- The tracheostomy tube should be suctioned frequently during the initial hours after the tracheostomy formation to maintain patency of the tube. Following surgery, a combination of secretions and presence of old blood has the potential to cause blockage of the tube.
- Although blood-stained secretions are common in the first few hours, contact ENT team if bleeding is continuous.

Stoma care

- Care of the stoma is commenced in the immediate postoperative period and is ongoing. The stoma should be observed regularly during the first 24 hours after surgery. Check the tension of the tapes immediately after the child returns from theatre and during the first week to ensure that the tube is not at risk of falling out and the child does not have undue discomfort due to tapes which are too tight.
- Care of the stoma includes routine observation of the site and accurate documentation of the findings including:
 - Redness
 - Swelling
 - Exudate
 - Granulation tissue
- Observe for neck / face swelling or if the child complains / appear to be in discomfort, pain and having difficulty in breathing. This may be due to an air leak around the tube in the surrounding tissue (surgical emphysema).

- Clean the stoma site regularly with saline to remove any old blood, crust or secretions. A suitable dressing such as Mepilex Lite or Telfa, can be inserted behind the flange of the tracheostomy tube to protect the skin. Avoid bulky dressings, particularly in neonates as this may compromise the stability of the tube causing accidental decannulation.

Routine Tracheostomy Care

Emergency equipment required to be with patient at all times

- Spare identical tracheostomy tube
- Tracheostomy tube 1 size smaller (at CHW – PICU only, SCH – all wards)
- Resuscitation bag
- Short 12Fg Y-suction catheter (CHW only practice: for use as a tracheal dilator in ward areas)
- Heat and moisture exchanger (Swedish nose)
- Suction catheters
- Scissors
- Tracheostomy Tape/Cotton Ties
- Syringe if tube is cuffed
- Stitch cutter if sutured in
- KY jelly (to facilitate reinsertion if required)
- Portable suction unit (when transporting patient)

Supervision and Monitoring

It is recommended that each child with a tracheostomy be assessed on an individual basis by the treating medical/surgical and nursing team taking into consideration the following factors:

- Age of child
- Clinical state
- Nature of airway problem
- Ability to breathe and maintain their airway in the event of accidental decannulation
- Ventilation requirements

Accurate clinical observations can help prevent and identify potential complications that can occur postoperatively and for children with an established tracheostomy. Decisions regarding required level of supervision and required clinical observations should be guided by the following risk factors:

- Combative or uncooperative child at risk of pulling the tube out

- Requiring frequent suctioning
- Nature of upper airway is such that the child will rapidly deteriorate if the tube is dislodged
- A child who is unable to summon help if required
- Receiving escalating respiratory support

If the child is out of sight of a parent/carer or nursing staff they should have continuous saturation monitoring with appropriate alarms set.

Patients with a well-established tracheostomy in the general clinical areas can have designated carers (includes AINs and parents) who have undertaken tracheostomy care training and competency assessment. These carers will be under the supervision of a Registered or Enrolled Nurse.

Humidification

- A tracheostomy bypasses the upper airway and therefore prevents normal humidification and filtration of inhaled air. Unless the air inhaled via the tracheostomy is externally humidified, the epithelium of the trachea and bronchi will become dry, which increases the potential for blockage. Dry air can cause damage to the airways, which includes damage to the cilia, thickened secretions, and a drop in body temperature in the smaller child.
- Tracheal humidification can be provided by a heated humidifier or Heat and Moisture Exchanger (HME) e.g. HumidiventTM, TrachyventTM
- Children with new tracheostomies will require continuous humidification: delivering warm, moist air to the lungs through a humidifier for at least the first few days. Ventilated children will have this in-line in their ventilation circuit.

Tracheal Suctioning

Tracheal suctioning is necessary to remove mucus, maintain a patent airway and prevent tracheostomy tube blockages.

- All Registered Nurses, Enrolled Nurses and designated carers (AINs and parents who have completed a training and competency program on suctioning) can do the procedure in the general ward area.
- Pre-oxygenation may be required for neonates and infants with a recently inserted tracheostomy or for patients with known cardio-respiratory problems.
- Frequency of suction will vary with the age of the patient, underlying condition, amount of mucus produced and how long the tracheostomy has been in situ. As a general rule tracheostomy suction should only be performed as indicated by the child's clinical condition and NOT as a routine.

- **Signs that a child requires suction of the tracheostomy may include:**
 - Rattling secretions not cleared by a cough.
 - Visible bubbling of secretions from the tube.
 - Increased respiratory rate, work of breathing.
 - Increased heart rate.
 - Nasal flaring, retractions, restlessness.
 - Dry, raspy breathing or whistling noises from the tracheostomy.
 - Desaturation
 - Pale, dusky or cyanosed lips (late sign).
- Suction pressure should be 60-80 mm Hg (8-10 kPa) for the neonate and should be no more than 120mm Hg (20 kPa) for a child. Excessive pressure may cause structural and tissue damage.
 - **At CHW-only:** Saline should only be used when secretions are thick and *should not be used routinely*. Instillation of saline may increase risk of hypoxia. Between 0.2 and 0.5 mL of normal saline can be used when secretions are thick and proving difficult to remove.²
- Insert the suction catheter gently to just about 2mm beyond the tip of the tracheostomy tube to prevent damage to the carina and ensure that the secretions at the end of the tube have been cleared. Measure out the distance before inserting the suction catheter.
- Suction is only applied on withdrawal of the suction catheter from the tracheostomy tube. The suction should take no longer than the person would be able to hold their breath (usually within 5 – 10 seconds), as it can cause hypoxia when the catheter is left in the tube for a longer period.
- Allow the patient to recover between passes of suction catheter and document in the patient notes number of passes and consistency of secretions.
- Suction catheters are to be used once only unless immediate further suctioning is required within a single suctioning episode.
- Changes in secretions such as blood-stained or yellow/green secretions may indicate infection and/or trauma of the airway. A specimen for culture and sensitivity may need to be collected if secretion changes persist for over twenty-four hours. Notify the medical team in the case of blood-stained secretions.

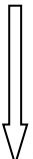
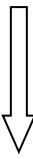

Suctioning Equipment Required at Bedside

- Suction pack
- Y-suction catheter (appropriate size)
- Gauze swabs/cotton buds for cleaning around stoma
- Sterile water (used for flushing suction catheter)
- Appropriate PPE – Non-sterile gloves, Mask and Goggles

- **CHW only** - Additional equipment:
 - 1mL syringe
 - Sterile normal saline solution

NOTE:

Selection of suction catheter size is important - it should not be larger than half the diameter of the internal lumen of the tube to enable the child to breath during the procedure and to prevent hypoxia.

Tracheostomy Tube Size	Suction Catheter Size
3.0 mm inner diameter (ID) 3.0 mm Neo 3.0 mm Paed. 3.5 mm inner diameter (ID) 3.5 mm Neo 3.5 mm Paed.	 Size 6 Y suction
4.0 mm inner diameter (ID) 4.0 mm Neo 4.0 mm Paed 4.5 mm inner diameter (ID) 4.5 mm Neo 4.5 mm Paed.	 Size 8 catheters
5.0 mm inner diameter (ID) 5.0 mm Paed. 5.5 mm inner diameter (ID) 5.5 mm Paed.	 Size 8 – 10 catheters

Procedure

Note: When performing a tracheostomy suction [hand hygiene](#) and [aseptic non touch technique \(ANTT\)](#) principles must be adhered to. “The aim of aseptic technique is to prevent the transmission of micro-organisms to wounds or susceptible sites, to reduce the risk of infection.”³

- ANTT refers to the identification of ‘key parts’ by not touching them either directly or indirectly. This is the single most important step in achieving asepsis⁴.
- Key parts refer to the parts that if contaminated with micro-organisms increase the risk of infection. The length of the suction catheter that is inserted into the tracheostomy tube should not be touched.
- ANTT is achieved by using sterile equipment and ensuring that the sterile component of the product does not come into contact with a non-sterile surface.⁵
- ANTT includes performing hand hygiene at the following times:
 - *prior* to setting up for the procedure and

- *prior* to application of non-sterile and
 - *at completion of the procedure*. This is to protect the practitioner and patient from cross-contamination as per standard precautions.
1. Explain procedure to parent and child.
 2. Assemble equipment. Consider need for PPE such as goggles, mask or yellow gown.
 3. Wash hands.
 4. Prepare suction pack and other sterile supplies as per [ANNT Guideline](#) and use clean, non-sterile gloves.
 - Note:** A sterile glove should only be worn if there is any likelihood of touching the part of the suction catheter that would enter the tracheostomy tube.
 5. Pour water for irrigation into the gallipot.
 - **At CHW only:** when saline is required, draw up 0.5mL normal saline.
 6. Turn on suction -8 – 10 kPa for neonates, -20 kPa for all other children.
 7. Wash hands then put on goggles and gloves.
 8. Take sterile catheter and connect it to the suction tubing, ensuring not to touch the section of catheter to be inserted into the tracheostomy tube
 9. Check suction by dipping end of suction catheter into water (gallipot).
 10. Without occluding Y piece, gently insert catheter into the tracheostomy tube, approximating the length of the tracheostomy (shallow suction) up to about 2mm beyond the tip of the tube, keeping fingers close to but not touching the outer part of the tube. This distance should be considered before inserting the catheter into the tracheostomy tube. Shallow suction prevents trauma and ulceration of the tracheal lining and the carina.
 11. To initiate suction, occlude Y piece with the thumb of the other hand and then slowly withdraw catheter by gently rotating it between thumb and first finger. Suction only on withdrawal to prevent collapse of the lung segments.
 12. **Do not leave catheter inside the tracheostomy tube longer than 5 seconds for neonates and 10 seconds for older children, as this can cause airway obstruction. This is particularly important for those children who are dependent on the tracheostomy for breathing.** Allow patient to catch their breath in between suction passes. Suctioning also aspirates air from the lungs and can result in severe hypoxia, bradycardia and even respiratory arrest in a severely compromised child.
 13. Flush catheter with sterile water (gallipot) to clear it of mucus that can adhere to the tip of the catheter.
 14. Repeat suctioning until airway is clear.
 - **At CHW only:** If unable to clear secretions, instil 0.2 - 0.5mL of normal saline to loosen up secretions. *NB: not routinely performed.*

15. If required, clean the skin around the tracheostomy tube with a gauze swab moistened with normal saline, then dab dry. Hold flange of the tracheostomy tube firmly while doing this to prevent accidental displacement of the tube.
16. Dispose soiled equipment, remove gloves and then wash hands.
17. Replace equipment on trolley and maintain sterility for immediate use as required.
18. Record any change in the colour and consistency of the secretions. Normal secretions are loose and white to creamy in colour. Notify the medical team immediately for blood-stained secretions.

Tracheostomy velcro tape change and skin care

- There is a potential risk for tracheostomy tube dislodgement when attending to daily tape changes, therefore **a minimum of two people who are** competent in tracheostomy care are required to undertake tracheostomy tape/tie changes. All emergency equipment should be checked and easily accessible prior to tape changes just in case of accidental decannulation.
- Older children with a well-established tracheostomy can use velcro hook-and-loop tapes but this should be undertaken with caution. Tightness of the velcro tapes must be checked regularly as tapes that are too loose can increase the risk of accidental decannulation. Be careful when undressing a child as the velcro tape can attach itself to clothing. If using tapes rather than cotton ties it is necessary to clean and change them every day.
- If skin irritation is present a non-bulky dressing, such as Meplix Lite, Lyofoam™ or Telfa™ may be applied underneath the tracheostomy flange.

Equipment

- Clean tapes
- Rolled towel or baby blanket
- Assistant
- Suction unit
- Suction catheter
- Cream or ointment as instructed

Procedure

- Wash hands
- The assistant suctions the child if required
- Small children or babies may need to be swaddled to keep their arms still during the procedure
- Lie the child down and place in a slight hyper-extended position using a rolled towel under the shoulders
- Assistant holds the tracheostomy tube firmly in place

- Remove the old tapes
- Clean the neck and apply any creams as prescribed if required (e.g. skin is red, broken down or excoriated). Dry the neck after cleaning.
- Reapply clean tapes and check the tension (tight enough to fit one small finger under)
- Re-check the tightness of the tapes once the child has settled (about one hour after the change)

Care of re-usable tapes

- Wash in warm soapy water taking care not to scrub or wring the tapes as this may lead to the fabric wearing and not functioning properly
- Allow to dry
- Ensure that the tape remains in good condition (if the re-usable tape is lifting at the ends the child may be able to pull it off or it may catch on their clothing leading to the possibility of the tube falling out). Tapes should be checked regularly to ensure they are secure and not catching on clothing.

Cotton tie changes

In PICU - CHW, where patients are usually in a supine position, tracheostomy ties can be secured near the flange of the tube rather than at the back. This can prevent the risk of the tapes coming undone and not being observed. SCH staff, refer to [Tracheostomy: Care of the Patient - CICU – SCH Practice Guideline](#).

1. Place the child in supine position. The older more cooperative child may be able to help with the procedure by holding on to the tracheostomy tube, although this should not be encouraged until the child is used to tracheostomy tie changes. A younger child may require swaddling to help prevent excessive movement during the procedure.
2. Place a rolled-up towel under the shoulders to hyperextend and thus expose the neck.
3. Place the new cotton ties behind the neck of the child, in the required positions before undoing the existing tapes. Tracheostomy ties can be threaded through a silastic tube to prevent skin ulceration
4. The person assisting the procedure must hold onto the tube prior to the old ties being cut. The assistant must not let go of the tube until the new ties are on, and the tension checked.
5. The old ties are removed, and the tracheostomy site and neck should be cleaned with saline and gauze/cotton balls.
6. The new cotton tie is then placed through the flange of the tube, tying the tape on the side further away from you first. Secure the cotton tie with three knots on this side.
7. Ensure the cotton tie is flush to the child's skin then thread it through the flange of the tube nearest to you. Tie with one knot and a bow. Do not make further knots until you are sure that the tension is correct.
8. With the assistant holding the tube securely, raise the child to a sitting position to check the tension at the back of the neck. You should be able to place one of your fingers comfortably between the cotton tie and the neck.

- 9.** If the tension is wrong, undo the bow at the back, re-adjust the ties, again tie a bow /and sit the child up again to check the tension. If tension is correct, pull the bow into the second knot and then tie one further knot. You will have three knots on either side of the tube flange. If the tension is correct the assistant can release the tube at this point.
- 10.** Cut excess length but ensure that approximately one centimetre remains to enable easy access to the tapes when the next tape change is performed.
- 11.** Restock all equipment used.

Cleaning inner tube of a double lumen tracheostomy tube ⁷

- The inner tube must be cleaned at least 4 hourly to remove accumulated secretions ².
- The inner tube must not be out longer than 20 minutes. It is preferable that two inner tubes are available at the bedside so one can be put in place while the other one is being cleaned.
- When removing the inner tube, hold the outer tube in place securely in order to prevent movement of the tube in the trachea, and to avoid the risk of tube displacement.
- If the tracheostomy tube is fenestrated (for speaking), remove the fenestrated inner tube and put in the normal inner tube (without fenestration). This is to prevent trauma to the trachea from the suction catheter passing through the fenestrated holes.

Equipment

- Tracheostomy Brush/Pipe cleaners
- Saline
- Spare inner tube and storage container
- Appropriate PPE – Mask, Gloves, Goggles

Procedure

1. Hold the flange of the outer tube firmly and remove the inner cannula. For Portex™ tubes gently hold the outer tube while gently pulling the ring of the inner tube. It will click out. For Shiley tubes pinch the inner cannula to release it from the tracheostomy.
2. Put spare inner tube in until it clicks into position.
3. Clean inner cannula in saline and pass through with the tracheostomy brush or pipe cleaners to remove accumulated secretions.
4. Place clean inner tube in a clean, dry container.
5. This practice of alternating between two inner tubes for cleaning purposes facilitates the process and minimises the time that the child spends without an appropriate inner tube in situ.

Changing a tracheostomy tube

- The tracheo-cutaneous tract is usually well formed about a week after the initial tracheostomy procedure. Tracheostomy tubes (single lumen) should be changed at least weekly after this initial period of tract formation to:⁸
 - Prevent tube obstruction caused by build-up of accumulated mucous/secretions.
 - Minimise/prevent infection due to accumulated secretions within the lumen of the tracheostomy tube that can provide a good environment/medium for bacteria to multiply.
 - Minimise the formation of granulation tissue.
- Double – lumen tubes used in older children may be changed every 4 weeks. Inner tubes are removed and cleaned every 4 hours to ensure patency.

General Principles

Care should be taken to ensure that the tracheostomy tapes are well secured. During the first week following a new tracheostomy insertion, tracheostomy ties are not changed nor loosened without the presence of the ENT surgeon or ENT registrar. Tracheostomy changes are done within the following framework:

- First tube change is done in the intensive care unit by the ENT registrar/fellow. The "stay sutures" are usually removed during the procedure.
- Second tube change can be attended by the ENT Clinical Nurse Consultant in the ward or PICU Nurse Practitioner (if child remains in Intensive Care) once ENT team indicate they are happy after the first tube change.
- Third tube change and subsequent tube changes can be attended by a Registered/Enrolled Nurse or designated carer (AINs and parents who have completed a training and competency program)
- Routine tube changes are ideally done Monday - Friday (during office hours) when the ENT registrar and the ENT Clinical Nurse Consultant are available should a problem arise. However, some parents who are being prepared for discharge may request to change the tube after hours (for personal reasons or work commitments). The Team Leader should be informed of this arrangement to ensure appropriate clinical support can be put in place.

Optimal Outcome

It is optimal for tracheostomy changes to occur following adequate planning and hence when appropriate clinical support is available. This will minimise the risk of complications and will facilitate the appropriate and timely management of complications should they occur. This will obviously result in a more favourable outcome for the patient.

Hazards

Patient Related: Some potential complications noted in the literature include:

- Insertion of tube into a 'false tract'
- Pneumothorax
- Bleeding
- Desaturation / hypoxia particularly with newly tracheostomised children, neonates and children with cardio-pulmonary problems.
- Difficulties in re-inserting the tracheostomy tube can occur at any time. These difficulties usually occur as a result of one of the following:
 - False tract
 - Patient distress/agitation
 - Spasm of the tracheal opening
 - Partial closure of the stoma due to granulation tissue
 - Skin flaps
 - Structural airway abnormalities eg. tracheo-bronchomalacia

Infection Control

- Hands are washed prior to and after completion of procedure.
- Wear mask, gloves and goggles.
- Discard used catheter and old tracheostomy tube appropriately.

Staff Responsibility

- Except in an emergency, it is recommended that a minimum of 2 nursing staff (or two nursing staff plus parents) attend the procedure. Parents and other designated carers who have completed training and competency can undertake the procedure with supervision from the ENT Clinical Nurse Consultant or Registered or Enrolled Nurse.
- A tube change requires staff/parents to perform suction, attend to tube change, clean the neck and help hold the child when necessary.
- Staff members need to ensure the correct size of tracheostomy tube is available. Ensure all other emergency equipment is readily accessible prior to tube change.
- Determine cuff pressure required (if using a cuffed tracheostomy tube) before the change and have the syringe ready to deflate/re-inflate the cuff.
- Document problems or difficulty encountered during and after the procedure and refer accordingly to the appropriate medical officer or the appropriate CNC.
- Some tracheostomy tubes (Bivona™) can be reused and should be sent to CSSD for re – sterilization. If the tube is sterilisable, care must be taken to ensure the introducer remains with the tracheostomy either at the bedside or when sent to CSSD.

Equipment

- Spare tracheostomy tube
- Size 12 short Y-suction catheter
- Sterile water-soluble lubricant
- gauze or cotton balls – a dressing pack can be used if preferred.
- Normal saline
- Velcro tapes or cotton ties
- Rolled baby blanket or towel
- Appropriate PPE – Mask, Gloves, goggles
- Scissors
- Syringe (if tracheostomy is cuffed)

Procedure

1. Wash hands.
2. Pour normal saline over cotton balls or open dressing pack and pour normal saline onto gauze.
3. Open tracheostomy tube packet and squeeze lubricant onto one side of the open/clean packet. If using cotton ties, attach ties to either side of flange.
4. Insert introducer into the tracheostomy tube, then dip the end of the tube in lubricant without touching the tube distal to the flange.
5. Assistant ensures that the child's clothes do not cover neck. The child's torso may need to be undressed.
6. Assistant suction the tracheostomy if required.
7. Small children may need to be swaddled prior to tube change. Place a towel or baby blanket under the child's shoulders to hyperextend their neck.
8. If cotton ties are used, the assistant holds the child in sitting position and holds the tracheostomy tube in position to prevent accidental displacement. The person changing the tube cuts the ties near the knot at the back of the neck and brings ties to the front. The child is then placed supine for the tracheostomy change.
9. Deflate tube cuff if cuffed tracheostomy tube.
10. The assistant holds the tracheostomy tube whilst the person who will insert the tube removes the tracheostomy tapes. The assistant continues to hold the tracheostomy tube securely until both are ready for the change.
11. Pick up the new tracheostomy tube in the dominant hand.
12. The assistant removes the old tracheostomy tube.

13. The new tube is inserted directing in positioning it back and downwards, gently along the same path that the existing tube was removed from. Once the tube is in place, the introducer is immediately removed.
14. If you are unable to insert the same sized tracheostomy tube, try to pass a lubricated size 12 short Y-suction catheter to dilate the stoma and then try reinserting the same sized tracheostomy. Ensure that the child is in a slightly hyper-extended position. In PICU a smaller size tube can be inserted if a similar problem is encountered. Call the appropriate CNC and /or ENT Registrar for assistance in replacing the original sized tube.
15. **SCH only:** On all wards at SCH, a tracheostomy tube that is one size down should be attempted if the same sized tube is unable to be inserted. This tube size will be indicated in the child's tracheostomy emergency plan and the tube should be placed and present in the child's emergency tracheostomy kit.
16. Ensure child is breathing and airway is established, by checking for air exchange and observing presence of secretions. If unsure, listen for air entry by auscultating the chest. Suction to demonstrate the presence of secretions if child has not coughed spontaneously. This is to ensure that the new tube has not gone through a "false tract". Do not secure tapes/ties until this is established. Monitor oxygen saturations and end-tidal CO₂ if available and appropriate.
17. Inflate tube (if tube is cuffed) according to recommended volume. Note the cuff may be a water cuff or an air cuff.
18. Clean stoma and neck with saline and attach velcro/cotton tapes.
19. Tapes should only allow one little finger in between the skin and the tape. Loose tapes can cause tube to be easily displaced. It may be necessary to re-check tightness of the tape after the child has settled.
20. If using cotton ties, attach the cotton ties to each side of the flange prior to inserting the tube. After the tube has been inserted the assistant holds the tube in place and sits child up. The person who did the tube change ties the cotton ties at the back of the neck using a reef knot (tying the tapes left over right and under, then right over left then under). Check tightness of tapes with patient sitting up whilst tracheostomy held in place by assistant.
21. Document in the child's notes the time and date of the procedure, operator 1 and assistant as well as any difficulty encountered.

De-cannulation or extubation of a tracheostomy tube

- Decannulation is a planned intervention for the permanent removal of the tracheostomy tube. The patient is admitted to hospital for the procedure.
- Parents are notified in advance about the plan. The patient must be generally well for the procedure.
- Patient will be decannulated in the clinical area designated by the ENT Surgeon, Respiratory Physician and the ENT Clinical Nurse Consultant.
- Laryngo-Broncho-Oesophagoscopy (LBO) usually precedes decannulation, particularly for long term tracheostomies to determine that the upper airway is intact and that the reason for the tracheostomy has been corrected or resolved. LBO also confirms that there are no complications present due to the tracheostomy such as granulation tissue or oedema. Decannulation is usually done 24 hours after the LBO to allow any oedema caused by the procedure to settle.
- The respiratory team should be consulted on all children with known respiratory problems (Chronic Lung Disease, Oxygen dependent). In selected cases, the Respiratory Physician and the ENT surgeon may consider that the child is admitted/transferred to PICU for elective decannulation.
- An assessment from the Speech Pathologist is required to determine the patient's ability to manage/swallow secretions after removal of the tracheostomy. This is particularly important in children with a traumatic brain injury, trauma patients, rehabilitation patients, and patients with other neurological problems.
- The ENT team will inform the appropriate CNC about the plan at least 24 hours prior to the procedure. The appropriate CNC will discuss with relevant Unit Manager about the plan, specific patient's needs and need for an experienced registered nurse to "special" the child following decannulation.
- It is recommended that decannulations are performed as early as possible during a week day (before 1330 hours) to ensure appropriate clinical support from the ENT registrar and appropriate CNC is available should problems arise following the procedure.
- Both the ENT registrar and the appropriate CNC will perform the procedure.
- The appropriate CNC will notify the anaesthetic registrar and ICU Nurse Practitioner prior to all decannulations. 2222 should be called in the event of an emergency following the procedure.

NOTE: Some children may benefit from a weaning process prior to decannulation. This may involve downsizing the tracheostomy tube then blocking the tube with an occlusion device that can easily be seen and removed^{9, 10}. During this time, nursing staff must closely monitor the child, observing the child's pulse and respiratory effort for 24 hours (hourly when awake and half hourly when asleep). Pulse oximetry is used to monitor the child's oxygen saturation level when asleep. The child's progress should be assessed and reviewed by the ENT team and the appropriate CNC regarding progress to the decannulation stage.

Indications for decannulation ^{9, 10}

- The primary and secondary reasons why the tracheostomy was inserted has been corrected or resolved.¹⁰
- The upper airway is intact and the child can manage their secretions (coughing, swallowing)
- No complication associated with the tracheostomy has been identified (granulation tissue, tracheal flap).

Optimal outcome

The patient is decannulated in a safe environment, where appropriate equipment and clinical support is made available in order to prevent and manage potential problems that arise.

Staff responsibility

- ENT registrar and the appropriate CNC will attend and monitor progress.
- ENT registrar will review the child before leaving the hospital and document progress in the medical records.
- Ensure relevant clinical staff are notified (ICU Nurse Practitioner and Anaesthetic Registrar), these need to be aware of the decannulation procedure in order to attend any problems both in hours and after hours.
- **At CHW:** A Registered Nurse to “special” the child after decannulation (usually until the following morning post decannulation) organised through the area Nurse Manager.

Equipment

- Spare tracheostomy tube
- Tracheostomy tube one size smaller
- Resuscitation bag
- Lubricant (KY Jelly)
- Size 12 Y suction catheter (short catheter)
- Suction equipment
- Saturation monitor
- Small gauze
- 1 inch Micropore™ tape
- Gloves
- Goggles
- Scissors

Pre-Decannulation – SCH only ⁹

1. Patient has tracheostomy downsized 3-5 days prior; ensure they are tolerating this change. Can be done on the ward or at home depending on ENT preference.
2. The patient should then have a 1-hour trial of having the tracheostomy capped. This should be done with a semi-permanent cap. The patient should be observed in a ward setting monitoring saturations and performing respiratory assessments. If this is tolerated by the patient, the ENT team can discuss progressing to the next stage of decannulation.

3. Patient is then capped over next day for duration of 24hrs to make sure they tolerate the tracheostomy being capped. The patient will have a downloadable saturations monitoring by the sleep team to see the oxygen saturations and other observations overnight. The patient will have hourly respiratory observations throughout this period. The patient would be on continuous pulse oximetry and close to the nursing desk. The patient would be nursed 3-4 patient ratio within the ward. Any signs of respiratory distress will be reviewed by a medical officer.

Procedure – CHW and SCH ¹⁰

1. Ensure child is fasted for at least 2 hours prior to procedure.
2. Explain procedure to child and parent.
3. Ensure all emergency equipment and suction is at the bedside. .
4. Suction child prior to decannulation.
5. Tracheostomy tube is usually removed by the appropriate CNC. Child sometimes prefers the parent to remove tube.
6. The stoma is then covered by an occlusive or gauze dressing folded into small square then secured by micropore™ tape.
7. Observe closely for signs of respiratory distress. The child should remain on the ward for 24- 48 hours.

Post-Decannulation ⁹

At CHW only: A tracheostomy trained RN will act as 'special' and remain with the child for 16 hours at all times. The 'special' will be relieved on staff meal breaks.

- The ENT registrar and the appropriate CNC will remain with the patient until satisfied that the child is stable.
- Pulse oximetry to determine child's baseline saturation should be taken before the tube is removed and immediately after removal of the tube. Oxygen saturation will be continuously monitored when the child is asleep.
- Close observation of the child's colour, respiratory effort, and presence of stridor and any obvious early signs of respiratory distress is important in the first few minutes following removal of tube. Any signs of respiratory distress need to be reported urgently to the ENT registrar. The tube may need to be replaced if respiratory distress occurs in the first few minutes following the removal of the tube. If the child remains stable, pulse and respiratory rate are checked and recorded ½ hourly for two hours then hourly overnight including changes to the saturation level when child is asleep.
- The tracheo - cutaneous tract will start to close approximately half an hour following tube removal. Should failure occur in the first hour and the tube needs to be replaced, the spare tube can be reintroduced easily. After about two hours, the smaller tube prepared at the bedside can be used.
- Oral fluids may be reintroduced about an hour post decannulation, and if tolerated normal diet can resume. A contraindication to this is when children are unable to swallow or have swallowing difficulties. These children may need to remain nil by mouth for up to 24 hours post-decannulation. The ENT Consultant will indicate this in the clinical record.

- Older children are encouraged to cough regularly to assist in clearing their airway.
- The child is usually discharged 24 - 48 hours after a successful decannulation. The ENT team decides timing of follow-up. A contact number is provided to parents for advice if they are worried following discharged.

Speaking Valve

A speaking valve is a one way valve that fits over the tracheostomy tube with a 15mm attachment. The main function of the speaking valve is to allow exhaled air to flow up the normal upper airway for speech. The valve opens as the child breathes in and on expiration, directs air up through the vocal cords and out of the mouth, to create sounds with articulation.

Several companies distribute valves. However, the only speaking valve available is the Passy-Muir™ valves: clear/purple Passy-Muir valve for non-ventilated patients and the aqua Passy-Muir valve for in line ventilated patients use.



Selection Criteria

The patient must be referred by a Medical Officer for assessment and trial of a speaking valve. The patient must be medically stable. The child must have an intact and clear upper airway as assessed by an ENT specialist. The child must have the potential and ability to communicate verbally.

Contraindications

- Upper airway obstruction (i.e., severe subglottic stenosis, vocal cord paralysis, severe laryngeal papilloma, haemangioma, severe laryngomalacia and tracheomalacia, acute burns)
- Severe tracheal stenosis
- Unconscious or serious illness
- Cuffed tracheostomy without a fenestrated tube
- Need for frequent suctioning
- Copious secretions
- Premature infants
- Children with gross developmental disability or severe neurological deficit with no communicative intent
- Ventilated children (in-line speaking valve used as per Respiratory Support Service)

Possible contraindications

- Less than 6 months of age
- Known chronic thick secretions (may be trialled after discussion with managing specialist)

Procedure

Pre-speaking valve trial

1. Clearance from the treating Team to assess for suitability of speaking valve.
2. ENT consultation to determine that status of the upper airway is appropriate for trial of speaking valve.
3. ENT Clinical Nurse Consultant assessment has been conducted.
4. Speech Pathologist for consultation has been conducted to assess communication skills, oral motor function and management of oral secretions / swallowing function.
5. Family and ward staff are informed of the plan to trial a speaking valve.

Speaking valve trial

1. Ward Nurse, appropriate CNC, Speech Pathologist and parent/ carer are to be present.
2. Suction equipment should be at bedside.
3. Pulse oximeter is applied to monitor the child's oxygen saturations.
4. The child needs to be awake, alert and oriented and sitting supported in an upright position.
5. Procedure explained to child and parents.
6. The appropriate speaking valve should be placed on the child's tracheostomy.
7. Child is encouraged to breathe normally.
8. Oral and pharyngeal secretions and oximetry are monitored.
9. Child is encouraged to vocalise on exhalation, starting from imitation of 'ah', single syllable words etc.
10. Initial trial should not exceed 15 minutes, as tolerated. This can be graded up each session according to the child's tolerance and condition.
11. Subsequent trials should be supervised by either the appropriate CNC or the Speech Pathologist until the child is able to tolerate use of the speaking valve consistently when awake and supervised.
12. Ensure the valve is only used when the child is awake and supervised.

Care of the speaking valve

1. Clean the valve daily with mild soapy water.
2. Rinse thoroughly with cool to warm water. Do not use hot water as it may damage the valve.
3. Let the valve dry completely before using again.
4. Do not use alcohol, bleach or any other cleansing agents on the valve.
5. Replace the valve when it becomes sticky or noisy.

Post Speaking Valve Trial

- Inform managing team of results and document in the child's medical record.
- The appropriate CNC and Speech pathologist determine a joint plan for further trials.

Homecare Guideline

- **Tracheostomy Homecare Guideline** is available at:
<https://webapps.schn.health.nsw.gov.au/epolicy/policy/5042>

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