

# TRACHEOSTOMY CARE

## PRACTICE GUIDELINE<sup>®</sup>

### 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.
- Clinicians have a legal and ethical obligation to ensure that the care of children with a tracheostomy is carried out to maximise safety for the child.
- The aim of the guideline is to outline the principles of management for children with a new or existing tracheostomy for clinicians.
- 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.
- Only designated carers (ENs, AINs and parents) who have completed a training and competency program can suction a patient in the general ward areas.
- Selection of suction catheter size is important: it should not be larger than half of the lumen of the tube enabling the child to breath during the procedure and prevent hypoxia.
- Decisions regarding required level of supervision and required clinical observations are to be documented clearly in the medical record by the treating team.
- Children with new tracheostomies need continuous humidification for at least the first few days. Ventilated children will have this in-line in their ventilation circuit.
- Tracheostomy tapes are not changed and loosened without the presence of the ENT surgeon or ENT registrar during the first week following a new tracheostomy.
- 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.

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.

<b>Approved by:</b>	SCHN Policy, Procedures and Guidelines Committee	
<b>Date Effective:</b>	1 <sup>st</sup> November 2016	<b>Review Period:</b> 3 years
<b>Team Leader:</b>	Clinical Nurse Consultant	<b>Area/Dept:</b> ENT/ Tracheostomy

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

## CHANGE SUMMARY

- New SCHN Practice Guideline; replaces CHW and SCH versions.
- No major changes to practice.

## READ ACKNOWLEDGEMENT

- All clinical staff should read and acknowledge they understand the contents of this document.

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## 1 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.

### 1.1 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 following<sup>1</sup>:

- **Cyst** – a sac filled with fluid
- **Cystic Hygroma** – 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 or several 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)

### 1.2 Homecare Guideline

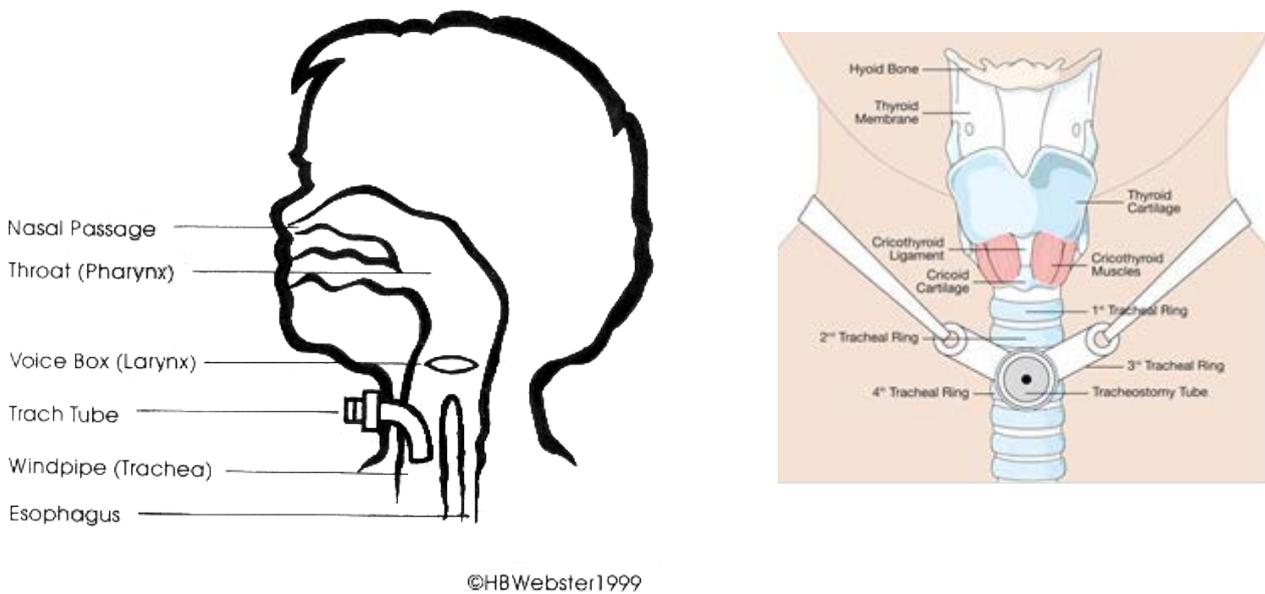
- **Tracheostomy Homecare Guideline** is available at:  
<http://chw.schn.health.nsw.gov.au/o/documents/policies/homecare/2016-9060.pdf>

## 2 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 for those children requiring ventilation
- Bivona tubes (cuffed / uncuffed)
- Portex tubes (single/double lumen, cuffed/ uncuffed)

**Figure 1: Tracheostomy**



**Figure 2: Shiley Tracheostomy Tubes**



## 3 Tracheostomy Care

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

### 3.1 Post-operative Care

1. The child will be managed in ICU for 5-7 days or until stable. 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.
2. 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 nappy or 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 about 7 - 10 days post-insertion during the first tube change, either by or after consultation with the ENT team.
3. Children should have a theatre time booked for 7-10 days after the insertion of the tracheostomy if the first tube change to occur in theatres. This will be done by the ENT Registrar as soon as possible following the initial insertion procedure.
4. 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.
5. The child should remain **nil by mouth** for at least three hours after surgery. The vocal cords are immobilised by a paralysing agent during surgery and the effect of this agent can persist for up to three hours.

### 3.2 Sedation

- All children need adequate pain relief (analgesia) postoperatively.

- They also need sedation 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 CICU. The level of sedation should be discussed between the ENT Consultant and the Intensivist once the child has returned to 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.

### 3.3 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

Decisions regarding required level of supervision and required clinical observations are to be documented clearly in the medical record by the treating team. Accurate clinical observations can help prevent and identify potential complications that can occur postoperatively and for children with an established tracheostomy.

### 3.4 Immediate Postoperative Complications

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

### 3.5 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/tract. 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.

### 3.6 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 to ensure that the tube is not at risk of falling out and the child does not have undue discomfort.
- 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 non - adherent dressing such as Lyofoam™, 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.

### 3.7 Equipment Required at Bedside and when transporting patient

- spare identical tracheostomy tube
- tracheostomy tube 1 size smaller
- resuscitation bag
- skin retractors (ICU only)
- size 12 Y-suction catheter (for use as a tracheal dilator in ward areas)
- humidifier
- suction catheters
- scissors
- syringe if tube is cuffed
- stitch cutter if sutured in
- KY jelly (to facilitate reinsertion if required)
- Portable suction unit (when transporting patient)

### 3.8 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.: Humidivent™, Trachyvent™
- 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 on-line in their ventilation circuit. This is necessary for all intubated patients.

### 3.9 Skin Care

- The ENT team should apply a non-bulky dressing, such as Lyofoam™ dressing or Telfa™ underneath the tracheostomy flange when new tracheostomies are done. Tapes can be threaded through a silastic tube to prevent skin ulceration. Silastic tube can be used for subsequent tube changes to protect skin underneath the tapes
- It is important that tracheostomy tapes are tight and secured in the first week following a tracheostomy 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.
- Older children with a well established tracheostomy can alternatively use hook-and-loop tape ties but this should be undertaken with caution. Staff must ensure that they are using the correct lengths as overly long ties can increase the risk of accidental decannulation. Tightness of the hook & loop ties must be checked regularly. Be careful when undressing a child as the hook & loop can attach itself to clothing. hook & loop ties should not be used in patients with difficult airways due to the increase risk of the tracheostomy tube being dislodged with hook & loop ties.

### 3.10 Tape / Tie Changes

In PICU - CHW, where patients are usually in a supine position, tracheostomy tapes 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, refers to [Tracheostomy: Care of the Patient - CICU – SCH Practice Guideline](#).

1. Tapes 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.
2. 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.

3. Ensure that the team leader and medical officer are aware of the timing and plan to change the tapes.
4. Check the condition of skin underneath tapes, clean the skin, keep it dry and not to use creams or powders unless prescribed. Document observations in the patient's notes. Refer to the Wound Assessment and Management Practice Guideline if complications occur.
5. 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 tape changes. A younger child may require swaddling to help prevent excessive movement during the procedure.
6. Place a rolled up towel under the shoulders to hyperextend and thus expose the neck.
7. Place the new tapes behind the neck of the child, in the required positions before undoing the existing tapes.
8. The person assisting the procedure must hold onto the tube prior to the old tapes being cut. The assistant must not let go of the tube until the new tapes are on, and the tension of the new tapes have been checked.
9. The old tapes are removed and the tracheostomy site and neck should be cleaned with saline and gauze.
10. The new tape is then placed through the flange of the tube, tying the tape on the side further away from you first. Secure the tapes with three knots on this side. If hook & loop tapes are used the hook & loop is inserted through the flange of the tube securing on each side and at the back.
11. Ensure the tape is flush to the child's skin then thread the tape through the flange of the tube nearest to you. Tie the tape with one knot and a bow. Do not make further knots until you are sure that the tension of the tapes/ties is correct.
12. With the assistant holding the tube securely, raise the child to a sitting position to check the tension of the tapes at the back of the neck. You should be able to place one of your fingers comfortably between the tapes and the neck.
13. If the tension is wrong, undo the bow/tapes at the back and re-adjust the tapes, again tie a bow/secure tapes 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 using tapes. If the tension is correct the assistant can release the tube at this point.
14. Cut excess tape but ensure that about one centimetre remain to enable easy access to the tapes when the next tape change is performed.
15. Restock all equipment used.

## 4 Tracheal Suctioning

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

1. Designated carers (ENs, AINs and parents) who have completed a training and competency program on suctioning can do the procedure in the general ward areas but must work closely with a Registered Nurse, Clinical Educator and the Clinical Nurse Consultant ENT.
2. Pre-oxygenation may be required for neonates and infants with recently inserted tracheostomy or for patients with known cardio-respiratory problems.
3. 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.
  - o **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.
    - Pale, dusky or cyanosed lips (late sign).
4. Newborns and children less than a year old need to be closely observed when sleeping and may need suctioning at least 4 - 6 hourly to ensure tracheostomy tube is not obstructing (retained secretions)
5. 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.
6. **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 up to 0.5 mL of normal saline can be used when secretions are thick and proving difficult to remove. <sup>2</sup>
7. 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.
8. 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.

9. Allow the patient to recover between passes of suction catheter and document in the patient notes number of passes and consistency of secretions.
10. Suction catheters are to be used once only unless immediate further suctioning is required within a single suctioning episode.
11. Changes in secretions e.g. blood-stained or yellow/green secretions may indicate infection and/or trauma of the airway. Notify the medical team immediately for blood-stained secretions. A specimen for culture and sensitivity may need to be collected if secretion changes persist for over twenty four hours.

### ***Equipment Required at Bedside***

- Suction pack
- 2 non-sterile gloves
- Y-suction catheter (appropriate size)
- Gauze swabs/cotton buds for cleaning around stoma
- Sterile water for flushing
- Goggles
- **Additional equipment at CHW only:**
  - 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 

## 4.1 Procedure

**Note:** When performing a tracheostomy suctioning [hand hygiene](#) and aseptic technique **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.”<sup>3</sup>

- Aseptic technique refers to the identification of ‘key parts’ by not touching them either directly or indirectly. This is the single most important step in achieving asepsis<sup>4</sup>.
- Key parts refer to the parts that if contaminated with micro-organisms increase the risk of infection.
- Aseptic technique 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.<sup>5</sup>
- Aseptic technique includes performing hand hygiene at the following times:
  - *prior* to setting up for the procedure and
  - *prior* to application of non-sterile/sterile gloves<sup>6</sup> and

At completion of 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 local aseptic technique procedures and use clean, non-sterile gloves.  
**Note:** A sterile glove should be worn if there is any likelihood of touching on the part of the suction catheter that would enter the tracheostomy tube.
5. Pour water for irrigation into the gallipot.
6. **At CHW only:** when saline is required, draw up 1mL normal saline.
7. Turn on suction -8 – 10 kPa for neonates, -20 kPa for all other children. If patient is using a double lumen tube, remove inner tube and place in kidney dish. (Refer to "[Cleaning the Inner Tube of a Double Lumen Tracheostomy Tube](#)").
8. Wash hands then put on goggles and gloves.
9. 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
10. Check suction by dipping end of suction catheter into water (gallipot).
11. 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.
12. 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.
13. **Do not leave catheter inside the tracheostomy tube longer than 5 seconds for neonates, 10 seconds for other children, as this can cause airway obstruction particularly when the child is dependent on the tracheostomy for breathing.** Allow patient to catch his/her breath in between suction. Suctioning also aspirates air from the lungs and can result in severe hypoxia, bradycardia and even respiratory arrest in a severely compromised child.
14. Flush catheter with sterile water (gallipot) to clear it of mucus that can adhere to the tip of the catheter.
15. Repeat suctioning until airway is clear.
  - i. **At CHW only:** If unable to clear secretions, instil 0.2 - 0.5mL of normal saline to loosen up secretions. *NB: not routinely performed.*
16. 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.

17. Dispose soiled equipment, remove gloves and then wash hands.
18. Replace equipment on trolley and maintain sterility for immediate use as required.
19. 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.

## 5 Cleaning inner tube of a double lumen tracheostomy tube <sup>7</sup>

- The inner tube must be cleaned at least 4 – hourly to remove accumulated secretions <sup>2</sup>.
- 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**

- Pipe cleaners
- Gallipot with 8.4 % sodium bicarbonate solution
- Suction pack
- Suction catheters
- Spare inner tube
- Gloves
- Goggles

### **5.1 Procedure**

1. Hold the flange of the outer tube firmly then gently rotate the external part of the inner tube by aligning the two dots of the inner and outer tube then remove gently. For Portex™ tubes gently hold the outer tube while gently pulling the inner tube it will click out
2. Put spare inner tube and lock into position by aligning the two dots of the inner and outer tube. For Portex™ tubes put the spare inner tube in until it clicks into position
3. Hold the inner tube under running water and pass through as many pipe cleaners as required to remove accumulated secretions.
4. If accumulated secretions are hard and difficult to remove, soak briefly in 8.4 % sodium bicarbonate solution to loosen up dried secretions, then repeat step three.
5. Place clean inner tube in a clean gallipot.

6. 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.

## 6 Tracheostomy Tape Change

If using tapes it is necessary to clean and change them every day.

### ***Equipment***

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

### **6.1 Procedure**

1. Wash hands
2. The assistant suctions the child
3. Small children or babies may need to be swaddled to keep their arms still during the procedure.
4. Lie the child down and place in a slight hyper-extended position using a rolled towel under the shoulders.
5. Assistant holds the tracheostomy tube firmly in place.
6. Remove the old tapes.
7. 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.
8. Reapply clean tapes and check the tension (tight enough to fit one small finger under the knot).
9. Re-check the tightness of the tapes once the child has settled (i.e. about one hour after the change).

### **6.2 Care of re-usable tapes**

- Washed in warm soapy water taking care not to scrub or wring the tapes as this may lead to the fabric and the hook & loop 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.

## 7 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:<sup>8</sup>
  - 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.

### 7.1 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 tapes 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 or theatre as part of review procedure. The "stay sutures" are usually removed during the procedure.
- Second tube change attended by the ENT Clinical Nurse Consultant in the ward or CICU Nurse Practitioners in child remains in Intensive Care, if ENT team is happy with first tube change.
- Third tube change and subsequent tube changes can be attended by a tracheostomy competent Registered Nurse
- 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 of potential complications/problems noted in the literature include:

- Difficulty in reinsertion of new tube
- 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.
- Use gloves and goggles.
- Discard used catheter and old tracheostomy tube appropriately.

## **7.2 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 competent Registered Nurse.
- A tube change requires staff/parents to suction, do the tube change, clean the neck and help hold the child.
- The ENT Clinical Nurse Consultant should be informed that the procedure is to be done, so support can be provided should problems occur (Ward areas). In ICU the Team Leader and medical officer should be aware of the plan to change the tube.
- Staff members need to ensure the correct size of tracheostomy tube is available. A spare tube of the same size must be available at the bedside at all times. Ensure all other emergency equipment is readily accessible prior to tube change including an additional tube that is one size smaller.
- Determine cuff pressure required (if using a cuffed tracheostomy tube) before the change, and have the syringe ready.

- 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.

### 7.3 Equipment

- Spare tracheostomy tube
- Size 12 short Y-suction catheter
- Sterile water soluble lubricant
- Dressing pack
- Normal saline sachet/tube
- Silastic tubing for tracheostomy tapes and track feeder (a straightened paper clip will do) cotton ties or adjustable tapes if appropriate
- Rolled nappy or towel
- Gloves
- Goggles
- Scissors
- Syringe (if tracheostomy is cuffed)

### 7.4 Procedure

#### **Assistant:**

1. Wash hands
2. Opens dressing pack and pour normal saline
3. Opens tracheostomy tube packet
4. Squeezes lubricant onto one side of the open/clean packet

#### **Person carrying out tube change:**

1. Feed silastic tubing onto tapes. Silastic tubing is applied to maintain good skin integrity by preventing the cotton tracheostomy tapes from digging into the skin. (Refer to [Tape / Tie Changes](#) section for alternative way of tying tapes for ICU patients only)
2. Insert tracheostomy tube introducer into the tracheostomy tube then dip the end of the tube in lubricant.
3. Assistant ensures that the child's clothes do not cover neck. The child's torso may need to be undressed
4. Assistant suction the tracheostomy if required.

5. Assistant holds the child in sitting position and holds the tracheostomy tube in position to prevent accidental displacement.
6. Small children may need to be swaddled prior to tube change.
7. Person changing the tube cuts the tape near the knot at back of neck and brings tapes to the front.
8. Patient is placed supine with a rolled towel/nappy under shoulders to hyperextend neck slightly. Neck is cleansed with saline. Creams and ointments are not routinely used as they make the area wet and macerated (soggy-like).
9. Deflate tube cuff if cuffed tracheostomy tube.
10. The person changing the tube takes the sterile tracheostomy tube in the dominant hand, and then removes the old tracheostomy tube with the other hand. The new tube is inserted directing 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.
11. If you are unable to insert the same sized tracheostomy tube, try to pass a lubricated size 12 short Y-suction catheter to dilate stoma and then try reinserting the same sized tracheostomy. Ensure that the child is in a slightly hyper-extended position. In ICU 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.
12. 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 using a stethoscope. 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 tie the tapes until this is established. Monitor oxygen saturations and end-tidal CO<sub>2</sub> if available and appropriate.
13. Inflate tube (if tube is cuffed) according to recommended volume.
14. Assistant holds the tube in place then sits child up. The person who did the tube change ties the tapes at the back of the neck using a reef knot (tying the tapes left over right and under, then right over left then under). (Refer to [Tape / Tie Changes](#) section for alternative way of tying tapes if ICU patient). If tapes used attach ties to flange pass around the neck and attach to other side. Check tightness of tapes with patient sitting up whilst tracheostomy held in place by assistant
15. Tapes should only allow one little finger in between the skin and the knot. 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. Trim the tapes about 8-10cm from the knots.
16. Document in the child’s notes the time and date of the procedure, operator 1 and assistant as well as any difficulty encountered.

### **Figure 3**





## 8 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.
- Laryngobronchoscoesophagoscopy (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 ICU for elective decannulation. The ENT Registrar will organize a bed to be available in ICU.
- 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 head injured children, 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 (i.e. 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 registrar of the day prior to all decannulations and would be called on 2222 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/plugging the tube with an occlusion device that can easily be seen and removed<sup>9, 10</sup>. 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). A 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.

## 8.1 Indications for decannulation<sup>9, 10</sup>

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

## 8.2 Optimal outcome

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

## 8.3 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 Registrar 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) organized through the area Nurse Manager.

## 8.4 Equipment

- |   |   |
|---|---|
| • Spare tracheostomy tube plus one size smaller tube  | • Suction equipment                                 |
| • Fullers Tube (Size 16Fg or Size 18Fg) with appropriate endotracheal connector (packaged together in CSSD) | • Saturation monitor                                |
| • Resuscitation bag   | • Small gauze                                       |
| • Lubricant (KY Jelly)  | • 1 inch Micropore™ tape                            |
| • Size 12 Y suction catheter (short catheter)   | • Gloves  |
|   | • Goggles   |
|   | • Emergency trolley (placed outside patient's room) |
|   | • Scissors  |

## 8.5 Pre-Decannulation – SCH only <sup>9</sup>

1. Patient is down sized tracheostomy size usually 3-5 days , make sure coping with this. Can be done on the ward/at home, depending on ENT preference.
2. Trial capping with a non permanent cap 1 hrs periods on a ward setting and upgrade. Observe patient respiratory assessment and sat's monitoring to ensure the patient is coping. Patient gets use to the tracheostomy being capped. The child's progress should be assessed by the ENT team regarding next stage to 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 sats monitoring by the sleep team to see the oxygen saturations etc overnight. The patient will have hrly respiratory observations throughout this period. The patient would be on a continues pulse oximetry and close to the nursing desk. The patient would be nurse 3-4 patient ratio on a ward. Any signs of respiratory distress is reviewed.

## 8.6 Procedure – CHW and SCH <sup>10</sup>

1. Ensure child is fasted for at least 2 hours prior to procedure.
2. Explain procedure to child and parent.
3. Set up emergency equipment including spare tube, Fullers tube (opened and tapes placed), suction at bedside.
4. Suction child if required 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.

## 8.7 Post Decannulation <sup>9</sup>

**At CHW only:** A registered nurse experienced in tracheostomy care 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  $\frac{1}{2}$  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 or the Fullers tube (to dilate stoma) can be used. Once the airway has been established after inserting the Fullers tube, connect the endotracheal connector to facilitate oxygenation and resuscitation if needed.
- 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 (e.g. head injured children). 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. A formal swallow dye test may be required to detect any abnormalities in the child's ability to swallow.
- Older children are encouraged to cough regularly to assist in clearing their airway.
- The child is usually discharge 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.

## 9 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 breaths 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: *white* Passy-Muir valve for *non-ventilated patients* and the *aqua* Passy-Muir valve for *in line ventilated patients* use.



### 9.1 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.

## 9.2 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 (on-line speaking valve used as per Respiratory Support Service)

## 9.3 Possible contraindications

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

## 9.4 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.

## 9.5 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.

## 9.6 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.

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