

# TRACHEOSTOMY: CARE OF THE PATIENT - CHILDREN'S INTENSIVE CARE UNIT (CICU) - SCH

## PRACTICE GUIDELINE<sup>®</sup>

### DOCUMENT SUMMARY/KEY POINTS

[Paediatric Intensive Care Patient in CICU Clinical Practice Guideline](#) forms the foundation for all other CICU departmental policies and readers should be aware of its content when referring to Tracheostomy: Care of the Patient - CHILDren's Intensive Care Unit (CICU) - SCH document.

- This document provides clinical management of a patient with a newly formed tracheostomy in the immediate postoperative period and ongoing care in CICU prior to their first transfer to ward care.
- This document should be read in conjunction with [SCHN Tracheostomy Care CPG](#) as it provides additional guidance to staff regarding principles of management of a patient with a tracheostomy tube in-situ.
- Care delivery during the first seven (7) days following the formation of the tracheostomy centres on maintaining the patency of the new tracheostomy tube. It is essential that the tracheostomy tube stays in situ long enough for the tract to form, avoiding a difficult and possibly dangerous first tracheostomy tube change.
- Any staff member undertaking to care for a patient with a tracheostomy in-situ must have successfully completed the SCH, Randwick and CICU Learning And Assessment Plans listed in this document
- First tracheostomy tube change is a high risk procedure and should be performed by the ENT team under anaesthetic, usually in the operating theatre. Selected patients may be considered for first tracheostomy tube change in CICU at the discretion of the CICU consultant
- A patient with a new tracheostomy will be sedated and/or muscle relaxed for a varying length of time post-operatively. **Muscle relaxed patients with a 'critical airway' (e.g. newly placed tracheostomy, subglottic stenosis) must be nursed 1:1 and never left unattended.**

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, Procedure and Guideline Committee	
<b>Date Effective:</b>	1 <sup>st</sup> January 2020	<b>Review Period:</b> 3 years
<b>Team Leader:</b>	Clinical Nurse Consultant	<b>Area/Dept:</b> CICU SCH

- Need for in-line ETCO<sub>2</sub> monitoring will be determined on an individual patient basis by CICU Staff Specialists. If used, in-line ETCO<sub>2</sub> monitoring may no longer be required once muscle relaxation has ceased.
- Safety sutures are routinely place to help facilitate re-placement of a dislodged tube and are taped to the patient's upper chest and labelled "Left" and "Right" or "Bottom" and "Top"; additional taping should include wording "DO NOT REMOVE"
- All patients with newly formed tracheostomy require surgical tracheostomy tray and emergency tracheostomy equipment set up post operatively. Decision will be made following subsequent tracheostomy tube changes when surgical tracheostomy tray is no longer required at bedside.
- CICU staff are to be aware of the role of safety sutures in an emergency situation, action required to make the stoma opening more visible and how they assist in tracheostomy tube reinsertion.
- Due to the risk of the tube becoming dislodged during the tape changing process, **tapes securing the tracheostomy tube are not to be changed during the initial seven (7) day period, unless requested by CICU/ENT due to constriction to neck or, wound breakdown.**
- Patient must be fasted for **4 hours** for their first tracheostomy tube change. **2 hours** is appropriate for subsequent tube changes.
- Lowest vacuum pressure possible should be used for suctioning secretions as high pressure can cause mucosal damage and atelectasis due to the negative pressure. If suction vacuum pressure is higher, no more secretions are removed but the amount of trauma is increased
- The same suction catheter must not be used to suction the mouth and then the tracheostomy tube as contamination of airway with potentially harmful bacteria may result
- Measurement of suction depth should be documented and accessible at the patient's bedspace at all times
- In a cuffed tracheostomy tube, only enough air to prevent air escaping should be used (*usually identified by the patient being able to speak or gurgling in the mouth*) thereby minimising development of tracheal stenosis
- Velcro™ collars (*eg Tracheostomy Necktape*) should be used with great caution and are only to be used for patients whose tracheostomy is well established. These patients must have been previously cared for either in ward setting or at home.
- Staff competent in the management of a patient with a tracheostomy must always be available to support other staff members or parents/main carers

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## CHANGE SUMMARY

- Document due for mandatory review.
- Only change in practice is inclusion of new statement re decision making regarding use of inline ETCO<sub>2</sub> monitoring
- Emergency number updated to reflect current practice
- Inclusion of information regarding TRACOE® mini extension tubing
- Inclusion of appendices
- References updated

## READ ACKNOWLEDGEMENT

- All CICU nursing and medical staff are required to read and acknowledge they understand the contents of this document

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## GENERAL INFORMATION

- The size of the trachea dictates that a cartilage window should not be used in children, to avoid creating a stenotic segment at the site of the tracheostomy. Instead, a vertical tracheostomy is used, which may hinder replacement of blocked, or dis-lodged, tube until stoma maturation is complete.
- 'Maturation sutures' are used to accelerate this process, and 'stay sutures' are sited on either side of the vertical tracheostomy to aid opening of the lumen in an emergency, before the planned first tube change
- **Gentle upward retraction of the stay sutures allows for rapid identification of the newly created tracheostomy stoma in the event of accidental decannulation, allowing fast replacement of the tube**
- Due to the small tracheal diameter, paediatric tracheostomy tubes are generally uncuffed and do not have an inner tube, to avoid reducing the internal diameter of the tracheostomy tube lumen further.
- Cuffed tubes are occasionally required if high ventilation pressures are needed or if there is a high risk of aspiration
- Tracheostomy care in children is a complex, truly multidisciplinary process
- There should be increased awareness of the neurodevelopmental impact associated with tracheostomies in all domains of development

## Standard of Care

1. Any staff member undertaking to care for a patient with a tracheostomy must have completed the SCH, Randwick and CICU Learning And Assessment Plans:
  - Administration Of Intravenous Medications & Fluids
  - Care of the Paediatric Patient Receiving Opioids
  - Care of the Paediatric Patient with a Central Venous Access Device (CVAD)
  - Care of the Paediatric Non-ventilated HDU Patient in CICU
  - Care of the Stable Ventilated Paediatric Patient in CICU
  - Care of the Paediatric Patient with Invasive Haemodynamic Monitoring
  - Care of the Paediatric Patient Requiring Neuromuscular Blockade
2. A thorough respiratory assessment is to be performed upon admission and whenever a patient is repositioned. Additional assessment should be at the discretion of the clinician based on the patient's clinical condition. This assessment should include as a minimum:
  - Respiratory effort, air entry and chest movement
  - Inspired oxygen and Oxygen saturations (SpO<sub>2</sub>)

- Ventilator settings – set and measured parameters
  - Suction –frequency, colour and consistency of secretions
  - Verification that the tracheostomy tube is secure ie safety sutures are present, labelled and taped to chest and cotton tapes are not overly tight or loose (*movement limited to one finger space*)
  - Verification that the tracheostomy tube has flange secured with sutures
3. These observations should be continuously monitored and **RECORDED HOURLY** along with parameters of heart rate, blood pressure (*either via arterial line or non-invasive*) and temperature. Frequency of observations may be reduced when the patient's condition dictates and only after agreement from CICU Consultant at which time this decision must be documented by MO.
  4. A portable chest x-ray must be obtained immediately on patient's return to the CICU in order to confirm the position of the tube.
  5. Any concerns or marked changes to the patient's condition should be reported immediately to the NUM / Team leader and MO.
  6. During CICU admission, an **individualised emergency management plan** is to be completed and attached to bed that is specific for each patient based on their condition
  7. Functioning safety equipment, individualised CICU resuscitation chart and a completed Individual Record Tracheostomy Emergency Box form (*See Appendix 1*) must be readily available at the bedside at all times, checked at the commencement of each shift and if necessary updated.
  8. The **MINIMUM** safety requirement at each patient bedside must include:
    - i. Standard resuscitation equipment comprising suitably sized self-inflating bag and mask with PEEP valve and manometer; oxygen tubing.
    - ii. Completed Individual Record Tracheostomy Emergency Box form (*See Appendix 1*), Tracheostomy surgical tray and tracheostomy equipment set with spare tracheostomy tubes including the same size 'ready to use' in container, same size in box and one half (0.5) size smaller than the patient's.
      - **Tracheostomy equipment must be checked when the full safety check of equipment is undertaken at the start of every shift.**
        - *Collaborative decision will be made following subsequent tracheostomy tube changes to determine when surgical tracheostomy tray is no longer required at bedside.*
    - iii. Suction equipment
    - iv. Twin-O-Vac system and cylinder - 15litre oxygen flow metre and suction tubing.
  9. Individualised CICU resuscitation chart
  10. A ventilator connected to a power source and battery charging
  11. Monitor alarms must always be audible, alarms on and set at appropriate limits consistent with patients clinical condition and age

Tapes securing tracheostomy tube are not changed during the initial 7 day period due to the risk of the tube becoming dislodged during the tape changing process.

## Immediate Post-op period

There are no universally agreed standards of care for early postoperative tracheostomy care; however there are common trends in the management and care:

1. Safe transport and accompaniment by the ENT team to the paediatric ICU
2. Effective handover to PICU team by ENT team including communicating tracheostomy type and size, cuff inflation, suction depth and back up tracheostomy tube size. This may also include a difficult airway algorithm card placed at the bedside in case of accidental decannulation
3. Detailed aspects of care of the patient including sedation and analgesia should be undertaken following principles and guidance outlined in [Paediatric Intensive Care Patient in CICU Clinical Practice Guideline](#)
4. Frequent saline tracheostomy suctioning to appropriate depth to prevent trachea plugging from secretions and blood
5. Maintain supported ventilator tubing to prevent excessive pulling or decannulation of the tracheostomy tube
6. Monitoring tightness of tracheostomy tapes every 4 hrs, by checking the tension of the ties to allow that one finger will fit snugly/firmly between the skin and the ties, adjust if necessary
7. Application of thin layer of paraffin wax eg Vaseline® under the tapes reduces friction from tapes onto skin and can reduce the risk of skin breakdown.
8. Dressing changes are to be undertaken PRN in first seven (7) days after tracheostomy formation. After first tracheostomy tube change, dressing to be undertaken daily
9. Daily wound and skin checks for pressure ulcers, infections and appropriate healing
10. Limit patient movement and tracheostomy manipulation as much as possible during the healing process to avoid accidental decannulation
11. If first tracheostomy tube change demonstrates easy exchange with a well healed stoma, retraction sutures are removed and standard PICU care may be undertaken
12. Early co-ordinated teaching and training of tracheostomy care to all care providers including family and relatives.



## Emergency Management Prior To First Tube Change

Dislodgement of a tracheostomy tube within the first 7 days after surgical insertion is a **MEDICAL EMERGENCY** as the tract is not fully formed and can close easily.

### TRACHEOSTOMY TUBE OCCLUSION IS A SERIOUS COMPLICATION WHICH IS LIFE THREATENING AND MAY RESULT IN CARDIAC ARREST

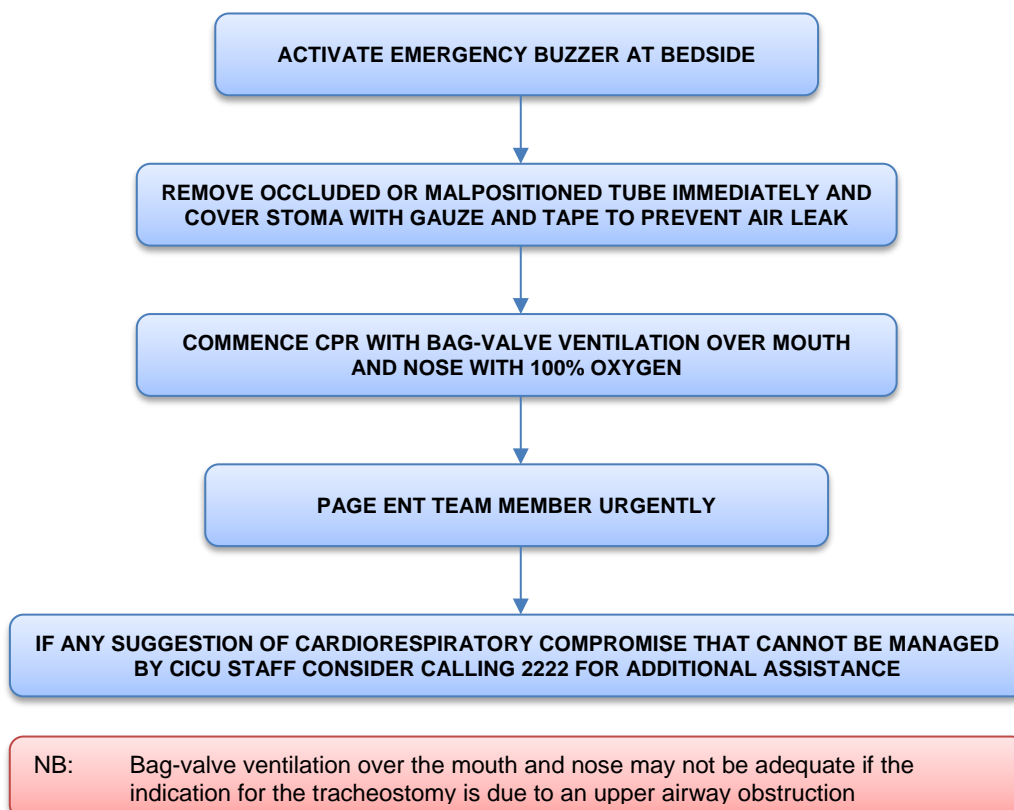
Patients with thick or large amounts of secretions are particularly prone to occlusion and should be suctioned as clinically indicated. The following are signs of occlusion:

1. Increased difficulty in breathing
2. Unable to pass a suction catheter easily down the tube
3. Signs of cyanosis or oxygen desaturation
4. Patient distress

#### **Safety sutures are routinely placed to help facilitate re-placement of a dislodged tube.**

These are taped to the patient's chest and labelled "Left" and "Right" or "Bottom" & "Top"; additional taping should include wording "DO NOT REMOVE"

In event of an emergency, CICU staff can gently retract these in the appropriate direction to make the stoma opening more visible and help tracheostomy tube reinsertion.



- In patients with upper airway pathology, bedside sign will guide responders.
- Clinical situation may make it clear that deviation from the order of the guided responses in the algorithm is necessary.

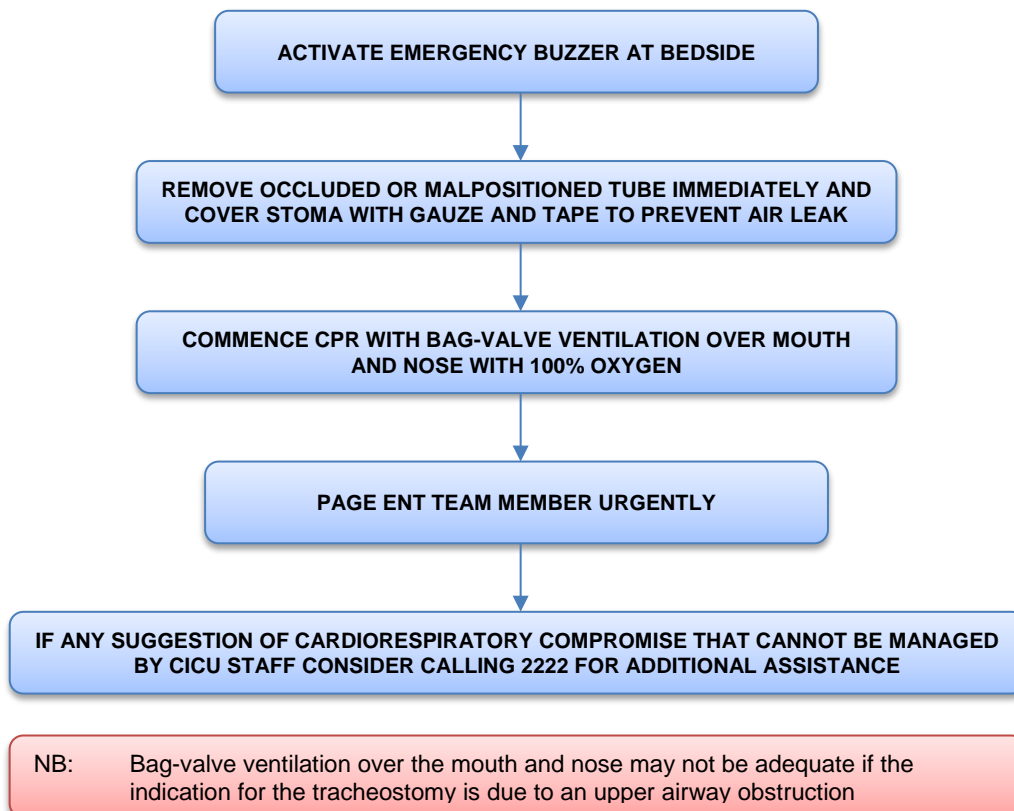


## Emergency Management In Event of an Occlusion

### TRACHEOSTOMY TUBE OCCLUSION IS A SERIOUS COMPLICATION WHICH IS LIFE THREATENING AND MAY RESULT IN CARDIAC ARREST

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## Humidification

The upper airway (nose, oropharynx, and trachea) functions to filter, humidify and warm inspired air and adds moisture to the air on inspiration and remove it on expiration. These benefits are lost when the patient has a tracheostomy and the resultant humidity deficit can cause loss of ciliary action, damage to mucous glands, disorganization of airway epithelium and basement membranes, cellular desquamation, and thickening of mucous secretions.

This can result in increased cough, increased drying of pulmonary secretions and increased risk of infection.

Tracheostomy tubes must have some form of humidification at all times. In order to mimic normal conditions, the inspired air needs to be artificially humidified by:

### **Water Humidifier**

Air and/or oxygen is directed through a heated bath designed to have a large water surface to air ratio. This is usually used with mechanical ventilation or CPAP and where the delivery tubes have heated wires and can deliver up to 100% humidity without causing condensation in the tubing.

- Excessive humidification of inspired gases may cause as much harm as under-humidification.
- The inspired temperature of heated humidification should range between 37-40°C.
- An inspired gas temperature of 41°C or more will cause mucosal damage.
- Heated humidified set measured temperature usually 37°C.

### **Passive humidifier**

Heat and Moisture Exchangers (HME) are made of several layers of water repellent paper or foam membranes, which trap heat and moisture during exhalation. The cold air on inspiration is then warmed and moistened thus maintaining the optimum respiratory tract environment.

- HME must be light weight for paediatric use to avoid traction on the tracheostomy site and possible decannulation.
- Internal volume of HME will add to the dead space and could increase the work of breathing.
- Secretions may collect inside the HME and manufacturers recommend that HME is changed daily or when contaminated.
- Oxygen attachments are available
- Sizes –
  - patient weight <10kg, 'mini vents' (*Humid-Vent mini™*) should be utilised –  
*NB: tidal volume recommendations 15-50mL are noted on the these HMEs*  
\* If patient's resp effort is ↑ on a 'mini-vent', consider utilising 'Swedish nose'
  - patient weight >10kg, 'Swedish nose' (*Portex Thermovent™*) should be utilised

### Nebulisers

- **Provide nebulised 0.9% sodium chloride only** - no fluid (0.9% sodium chloride or water for irrigation) should ever be instilled via a tracheostomy tube

#### If the patient requires oxygen therapy or has tenacious secretions:

Action	Rationale
Humidified oxygen should be supplied to the patient's tracheostomy using a humidifier system.	To maintain a patent tracheostomy and reduce the risk of dried secretions crusting and blocking the tube.
Water in the humidifier should be sterile and circuit changed every 7 days.	To reduce the risk of pseudomonas colonising equipment and contaminating the patient.
The tubing should be checked regularly for rain out ( <i>water collection</i> ) and emptied in direction away from patient.	Rain out increases the resistance to air flow and is a source of infection.

#### If the patient does not require oxygen and does not have tenacious secretions:

Action	Rationale
A heat moisture exchanger (HME) ie 'mini-vent' or 'Swedish Nose' should be attached to the tracheostomy tube.	Provide humidification for the inspired air without the need for oxygen by mimicking the natural mechanisms of the upper airways.
HME should be checked at least 4 hourly and replaced if soiled with sputum. If not changed due to soiling, the HME is to be changed daily.	Secretions inside the filter can block it, increasing the work of breathing and obstruct the airway.

## Tracheal Suctioning

Tracheal suction should be tailored to the individual patient and clinical situation and only be performed if the patient is unable to clear their own secretions.

- Suctioning of a tracheostomy is frequently necessary for two reasons:
  - Initially the tracheostomy tube may cause irritation, resulting in an increased production of sputum.
  - Tracheostomy prevents a patient from increasing their intra-abdominal pressure sufficiently to cough and clear any secretions from their airway.
- Suctioning should maximise removal of secretions with minimal tissue damage and hypoxia.
- Standard precautions should be applied including good hand hygiene and use of personal protective equipment (PPE).

- Staff should be aware of the psychological effect of suctioning on patients and that anxiety, fear, and/or distress levels are increased. This may create additional concern amongst parents/caregivers. If age appropriate, this may be alleviated by speaking about what is to be done and advising patient what suctioning will feel like. Consider distraction/ play therapy. If patient is capable based on age and clinical condition, following appropriate education they can be encouraged to undertake suctioning of tracheostomy tube themselves.
- Lowest vacuum pressure possible should be used for suctioning secretions as high pressure can cause mucosal damage and atelectasis due to the negative pressure. **If suction vacuum pressure is higher, no more secretions are removed but amount of trauma is increased.**
- Recommended suction vacuum pressures to be utilised:
  - 60-80 mmHg for infants < 12 months
  - 80-100 mmHg for children
  - 80-120 mmHg for adolescents
- The same suction catheter must not be used to suction the mouth and then the tracheostomy tube as contamination of airway with potentially harmful bacteria may result
- Measurement of suction depth should be documented and accessible at the patient's bed at all times

## Type of catheters

Multiple-eye suction catheters cause less damage because the small side holes suck in the secretions, while the single-eyed catheter pulls the mucosa as well as the secretions into its single side hole. Suction catheters with measurements may be available and their use is recommended

## Catheter depth

- In determining the depth (length) suction catheter should be inserted, a simple guide is to measure the length of the tracheostomy tube from the entry point to the tip. **This measurement should be documented and accessible at patient's bedspace at all times.** See Appendix 2

## Catheter size

- The size of the suction catheter depends on the size of the tracheostomy tube. If the suction catheter is too small it will not aspirate the secretions efficiently and if the catheter is too large it will block off too much of the airway during suction, making the patient bradycardic and reducing oxygen saturation levels.
- Ideally the suction catheter needs to be half the size of the lumen of the tracheostomy tube:
  - For neonatal and paediatric patients, the suction catheter size should be no more than double the internal diameter of the tracheostomy tube *e.g. 4.0mm tracheostomy tube requires 8Fg suction catheter*

- For tracheostomy tubes > 6.0mm, suction catheter size is calculated by subtracting '2' from the tracheostomy tube internal diameter and then multiply by '2'  
e.g. 6mm tracheostomy tube:  $6 - 2 = 4$  multiply this by 2 = requires 8Fg catheter

ACTION	RATIONALE
If suction indicated, collect equipment needed for the procedure	Suction equipment must be working correctly and ready for use at all times.
Choose appropriate size suction catheter <i>See suction catheter size calculation (See Appendix 2)</i>	If the catheter is too large it will occlude the tracheostomy which may cause hypoxia, cardiac arrhythmias and severe distress to the patient. If it is too small the secretions may block the catheter.
Confirm appropriate depth of catheter insertion <i>See suction catheter depth calculation (See Appendix 2)</i>	Prevents inadvertent damage to the mucosal area which potentially leads to trauma and subsequent formation of granulation tissue.
Explain the procedure to the patient. Obtain assistance from colleague or if appropriate parent/carer. Ensure the privacy of the patient during the procedure	To ensure patient safety and reduce distress to the patient It is important to maintain the patient's dignity.
Decontaminate hands using appropriate solution, apply PPE including goggles/ face shield.	Reduce the risks of cross infection
Monitor oxygen saturations before, during and after suctioning. Pre-oxygenate for 30-60 seconds if not contraindicated: 100% oxygen in paediatric patients and 10% increase from baseline in neonates.	Maintain adequate arterial oxygen and reduce the risk of hypoxia and arrhythmia. <i>Contraindications to pre-oxygenation include patients with shunt-dependant pulmonary blood flow (who may become hypotensive with high FIO<sub>2</sub>) and premature infants at risk of retinopathy of prematurity.</i>
If the tube is fenestrated, the fenestrated inner tube should be changed to a non-fenestrated tube prior to suctioning. The outside of the tracheostomy tube should be held firmly while the inner cannula is removed and the replacement inner cannula inserted.	Suctioning with a fenestrated inner tube in situ can cause mucosal damage. The catheter may pass through the fenestration & not effectively remove sputum. Holding the outside stabilises the tracheostomy tube to reduce the risk of displacement and for patient comfort
Turn on the suction apparatus and attach a sterile suction catheter. Ensure that the pressure is checked prior to use. <ul style="list-style-type: none"> <li>● <b>60-80 mmHg for infants &lt; 12 months</b></li> <li>● <b>80-100 mmHg for children</b></li> <li>● <b>80-120 mmHg for adolescents</b></li> </ul>	Lowest vacuum pressure possible should be used for suctioning secretions as high pressure can cause mucosal damage and atelectasis due to the negative pressure.
Introduce the suction catheter into the tracheostomy tube. <b>DO NOT APPLY SUCTION AT THIS POINT.</b> Gently but quickly insert to approx. 3mm beyond the end of the tracheostomy tube.	<b>Gentleness is essential.</b> Damage to the mucosal area can cause trauma and infection. The catheter should go no further than the carina.

Withdraw the tip of the catheter approximately 0.5 cm <b>BEFORE</b> applying suction. Withdraw the catheter slowly with continuous suction applied. <b>DO NOT SUCTION FOR MORE THAN 10 SECONDS</b>	Continuous suction is most effective in clearing secretions but the catheter must be kept moving to reduce the risk of mucosal damage. Prolonged suction will result in hypoxia
Release the suction, remove the suction catheter and glove and discard, reapplying the patient's oxygen supply immediately if used	To reduce the risk of further hypoxia and to restore oxygenation as soon as possible
Observe the patient throughout the activity for any signs of distress or discomfort and document same	To monitor the patient's response/tolerance to suction therapy.
Observe and document colour, volume and consistency of secretions on flow chart	This provides an indication of the patient's condition, any changes that may be occurring <i>e.g. development of an infection</i>
Rinse the suction tubing with non-sterile water	To clean the tubing to reduce the risk of cross infection
Change the suction tubing <b>DAILY</b> ; ensure the suction container is not overfilled	To reduce the risk of bacterial growth in the water and tubing
Clear away equipment. Dispose of PPE in clinical waste bin, decontaminate hands with appropriate solution.	To minimise risk of infection

## Cuffed Tracheostomy Tubes

- Cuffed tracheostomy tubes are used to protect the airway and decrease flooding of secretions i.e. bulbar dysfunction and may be used for patients requiring mechanical ventilation via a tracheostomy tube
- Tracheostomy tubes have a low-pressure cuff that removes the need to deflate the cuff on a regular basis.
- Main complication of cuffed tubes is tracheal stenosis usually due to excessive cuff pressures. Only use enough air in the cuff to prevent air escaping around the tube (*usually identified by the patient being able to speak or gurgling in the mouth*).
- All cuffed tracheostomy tubes should have cuff pressure checked **12 hourly** maintaining pressure between 15–25 cmH<sub>2</sub>O using a manometer.
  - *If cuff pressure is <15cm H<sub>2</sub>O, aspiration may occur or a severe leak may cause hypoventilation*
  - *If cuff pressure >30 cmH<sub>2</sub>O, damage to the tracheal mucosa due to tracheal capillary obstruction may occur*
- If large amounts of air are required in the cuff to prevent air escaping then the cuff may be faulty or the tracheostomy tube too small; in either case medical staff should be informed and the tracheostomy tube should be changed as soon as possible.



- Cuff leak may be resolved by repositioning the tracheostomy tube. This involves suctioning the trachea and oropharynx, deflating the cuff, repositioning the tube and re-inflating the cuff. *Only staff experienced in tracheostomy care should attempt this procedure due to risk of tracheostomy tube dislodgement*

## Assessing Cuff Pressure

Action	Rationale
<b>Every 12hrs</b> the cuff should be checked using a manometer with pressure maintained between <b>15 and 25 cm H2O</b> unless directed and documented otherwise.	Too much pressure within the cuff can cause trauma to the tracheal mucosa. Too little pressure may mean that cuff fails to make adequate seal against the trachea and patient is at risk of aspiration, or a severe leak develops causing hypoventilation.
Decontaminate hands using appropriate solution and apply PPE including goggles/ face shield.	To reduce the risk of cross infection
Connect the gauge by inserting the male luer connection into the female luer mount of the tube inflation line and insert 3-way tap.	To make the two chambers of the tube meet and gauge pressure.
To achieve a good seal, instil 0.5mL air into the tracheal cuff by a series of small instillations of air with a syringe. Immediately release the pressure to a point in the range indicated by the green section on the dial and turn 3-way tap off to cuff.	To ensure the minimum volume of air is used to achieve cuff inflation
Note the pressure indicated on the gauge and document same on flow chart	For clinical documentation
Dispose of PPE in clinical waste bin, decontaminate hands using appropriate solution	To reduce risk of cross infection



## Oxygen Administration

Oxygen administration is available for spontaneously breathing patients who require oxygen flow rates < 4L/minute

**Oxy-Vent® with tubing:** adaptor sits over the HME and the tubing attaches to oxygen source with use of a flow meter



## Tracheostomy Tapes and Dressings

Tapes securing the tracheostomy tube are not changed during the initial seven (7) day period due to the risk of the tube becoming dislodged during the tape changing process.

Action	Rationale
Two RNs who have successfully completed requisite CICU Tracheostomy L&A plan OR one RN who has successfully completed requisite CICU Tracheostomy L&A plan and experienced person <i>eg parent/carer</i>	To reduce the risk of tube displacement whilst the tapes are not secure.
Explain the procedure to the patient and parent/carer. Consider distraction/ play therapy etc.	To gain informed consent and co-operation and reduce anxiety, distress and/or fear.
Pull curtains around the bed space	To ensure privacy.
Decontaminate hands with appropriate solution, prepare equipment and apply PPE including goggles/ face shield	To reduce the risk of cross infection to patient and self.
Place new cotton tapes through the openings of the flanges of new tracheostomy tube to be inserted and secure the tape to the flange by looping the cotton tapes through it	Ensures security of tape
Position patient comfortably with their neck slightly extended <i>e.g. roll under shoulders see Fig 1</i>	Allows easier access and view of patient's tracheostomy site

Assistant to hold existing tracheostomy tube in position	Reduce risk of displacement
Tape changer should cut the ¼" cotton tapes between the knot and the flange on the further side first and then the near side of the tube and carefully remove the dirty ties and the split dressing	To release the dirty ties and remove the old dressing
Inspect stoma site and neck creases. Clean stoma site with 0.9% sodium chloride and gauze, then dry. Clean neck creases with 0.9% sodium chloride and gauze, then dry. Ease new split dressing into place around the tube over the stoma site and under the flanges of the tracheostomy tube.	To maintain hygiene and comfort and remove any debris. To observe the areas for infection or skin breakdown. Swab site for MC&S if concerned. Dressing aids comfort and absorbs exudate.
Thread the new ¼" cotton tape around the back of the patient's neck and secure both sides by tying two plain knots on each side. Ensure the ¼" cotton tape is flat to the patient's skin.	If one knot works loose then two will hold the tube securely.  Twisted tape will cause skin breakdown.
Check ¼" cotton tape tension by sitting the patient up whilst the assistant continues to hold the tube securely. With patient's head bent forward it should be possible to slip one finger comfortably between the tapes and the patient's neck. <i>See Fig 2</i>	This will allow the tapes to be checked for the correct tension for maximum security and comfort
If the tapes are too tight or too loose lay the patient down, undo the knot and readjust. Re-check the ¼" cotton tape tension.	If tapes are too tight it can reduce venous return from the head causing oedema. Tightness may also irritate the skin.
If the tension is correct, lie the patient down and add a third knot. Cut off excess ¼" cotton tape, leave 2cm.	To maintain security of tube and allow sufficient tape to grasp for next tape change.
Assistant may only release the tracheostomy tube when told to do so by lead clinician	To maintain safety
Check the patient is breathing comfortably after the procedure	To check the tube has not been dislodged or caused any respiratory irritation.
Clear away equipment, wash hands and discard PPE	To minimise risk of infection
Record the tape change in the patient's medical record	To maintain accurate records
Check all equipment at bedside is replaced and restocked as necessary	In preparation for next procedure



Fig 1



Fig 2

Velcro™ collars (*eg Tracheostomy Necktape*) should be used with great caution and are only to be used for patients whose tracheostomy is well established. **These patients must have been previously cared for either in ward setting or at home.** It is possible for patients who wear a Velcro™ collar (*eg Tracheostomy Necktape*) to pull their tracheostomy tube out and this could lead to their death. The Velcro™ collar (*eg Tracheostomy Necktape*) must be the correct size to hold the tube securely. If the collar is too loose there is a risk of dislodgement or decannulation. Be aware that the Velcro™ collar ties (*eg Tracheostomy Necktape*) can adhere to the patient's clothing and the tube may be pulled out when the clothing is removed.

## Changing a Tracheostomy Tube

Ideally this should be undertaken as an elective planned procedure. The first tube change is a high risk procedure and should be performed by the ENT team under anaesthetic, usually in the operating theatre. Selected patients may be considered for first tracheostomy change in CICU at the discretion of the CICU consultant.

If a decision is made to carry out the first tube change in CICU, the following procedures must be followed:

- Prepare the required equipment including a spare tracheostomy tube of the same size and one that is half (0.5) size smaller
- Resuscitation trolley and tracheostomy tray together with difficult airway trolley and/or intubating bronchoscope if requested by lead clinician.
- In-line ETCO<sub>2</sub> monitoring must be available
- Patient must be fasted for 4 hours for their first tracheostomy tube change. 2 hours is appropriate for subsequent tube changes.
- Pre-oxygenation prior to procedure (*unless contraindicated*): 100% oxygen in paediatric patients and 10% increase above baseline in neonates.
  - Contraindications include patients with shunt-dependant pulmonary blood flow (*who may become hypotensive with high FIO<sub>2</sub>*) and premature infants at risk of retinopathy of prematurity
- Consideration should be given to railroading the tracheostomy tube over a FLEXIBLE stylet *e.g. bougie* & applying traction to stay sutures if present to open the tracheostomy.

Action	Rationale
Two RNs who have successfully completed requisite CICU Tracheostomy L&A plan OR one RN who has successfully completed requisite CICU Tracheostomy L&A plan and experienced person <i>eg parent/carer</i>	To ensure patient safety and reduce distress to the patient
Stop any feed 2 hours ( <i>4 hours if first tube change</i> ) prior to tracheostomy tube change. If feeds not ceased within this time frame and nasogastric (NG) tube in-situ, aspirate prior to procedure	The airway is unprotected when the tube is removed. Stopping the feed or aspirating the NG tube will reduce the risk of aspiration
Explain the procedure to the patient and parent in age appropriate manner with rationale for the tracheostomy tube change. Consider distraction/ play therapy etc.	Patient should give informed consent for the procedure ( <i>unless patient is too young, sedated, unconscious or tracheostomy change is an emergency</i> ). Age appropriate explanation will significantly reduce anxiety, distress and/or fear
Position patient comfortably with their neck slightly extended. The younger patient may be laid down and swaddled with a rolled towel under their exposed shoulders. The older patient may prefer to sit up.	Extending the neck allows for easier removal and insertion of the tracheostomy tube. Patient should feel as relaxed and comfortable as possible to reduce anxiety, distress and/or fear
Decontaminate hands using appropriate solution, prepare equipment and apply PPE including goggles/ face shield	To reduce the risk of contamination
Pre-oxygenate for 2 minutes ( <i>unless contraindicated</i> ) 100% oxygen in paediatric patients and 10% increase above baseline in neonates.	During the tracheostomy change the patient will not receive oxygen therapy therefore could be at risk of hypoxia and arrhythmia. <i>Contraindications to pre-oxygenation include patients with shunt-dependant pulmonary blood flow (who may become hypotensive with high FIO<sub>2</sub>) and premature infants at risk of retinopathy of prematurity.</i>
Two RNs who have successfully completed requisite CICU Tracheostomy L&A plan OR one RN who has successfully completed requisite CICU Tracheostomy L&A plan and experienced person <i>eg parent/carer</i> should perform the procedure ( <i>one to hold the tube in place when not secured, whilst the second removes the old tube and inserts the new tube</i> )	To enable the procedure to be as clean and swift as possible. The tube must be held securely as the procedure will cause coughing and the tube may be dislodged.
One person should open the new tracheostomy tube onto the opened dressing pack and apply sterile gloves	To reduce the risk of contamination
If there is an introducer, insert introducer and check it can be removed easily	To be familiar with removing the introducer prior to insertion to aid efficiency of procedure

<b><i>If the tube is UNCUFFED:</i></b>	
Lubricate the outer curve of the tracheostomy tube with water-soluble lubricant	Facilitate insertion
Suction if necessary.	Remove secretions and reduce active coughing
Place new tapes behind the patient's neck. Release the cotton tapes by cutting between the knot and flange and remove the old tapes and split dressing. Inspect stoma site and neck creases. Clean stoma site and neck with 0.9% sodium chloride and gauze, then dry.	To maintain hygiene and comfort and remove any debris. To observe the areas for infection or skin breakdown. Swab site for MC&S if concerned. Dressing aids comfort and absorbs exudate.
Hold new tracheostomy tube in dominant hand by flanges and position tip near patient's neck.	Allow swift change of tubes.
Gently remove existing tracheostomy tube following curve of tube and patient's neck.	Maintain comfort and minimise coughing.
Firmly and gently slide in the new tracheostomy tube following the curve of the tube and the patient's neck. Immediately remove the introducer if one has been used.	To prevent damage to the trachea  To allow the patient to breathe.
Hold the new tracheostomy tube securely if the patient is coughing. Assess air flow through the tracheostomy tube, the patient's breathing pattern and colour. Suction if necessary.	To prevent dislodgement and subsequent second tube change.
Apply split dressing and tie the tapes	To secure the tracheostomy tube.
Reapply oxygen (if required)	To prevent hypoxia
Ensure patient is comfortable and breathing without difficulty	To reduce patient distress
Clear away equipment. Dispose of PPE in clinical waste bin, decontaminate hands with appropriate solution.	To minimise risk of infection.
Record the tracheostomy tube change on CICU flow chart and in the medical records with time, date, size and type of tube. Documentation should include any areas of concern and action(s) undertaken including noting any complications arising during the procedure.	Allows for accurate assessment and preparation for future tube changes

<b><i>If the tube is CUFFED:</i></b>	
Lubricate the outer curve of the tracheostomy tube with water-soluble lubricant	Facilitate insertion
If the new tracheostomy to be inserted is cuffed, check the cuff integrity by inflating and deflating it using the 10 mL syringe	To check for air leaks within the cuff
<p>Second practitioner should suction in this order:</p> <ul style="list-style-type: none"> <li>i) tracheostomy tube</li> <li>ii) orally</li> <li>iii) tracheostomy tube <b>(with new catheter)</b></li> </ul> <p>If Suctionaid® tracheostomy tube is in place, 2<sup>nd</sup> suction can be via the adaptor, which is fashioned to suction above the inflated balloon (&gt;6Fg)</p> <p>When the patient stops coughing, release the tracheostomy tapes</p> <p>Remove the tracheostomy tube.</p>	<ul style="list-style-type: none"> <li>i) to clear tracheostomy tube</li> <li>ii) to remove the secretions above the inflated cuff and</li> <li>iii) to remove any secretions not removed by the oral suction</li> </ul> <p>Removal of secretions facilitates patency of the airway and reduces the risk of aspiration once the cuff is deflated. The tracheostomy tube may be more difficult to remove when the patient is coughing as this may tense the neck muscles.</p>
<p>The first practitioner should insert the new tracheostomy tube with the introducer using an up and over action. The first practitioner should immediately remove the introducer.</p> <p>Ease new split dressing into place around the tube over the stoma site</p>	To facilitate inspiration / expiration via the tracheostomy.

## Fenestrated tubes

- Fenestrated tracheostomy tube has a window (*fenestration*) cut into its posterior wall.
- May be cuffed or uncuffed
- Used to encourage weaning from tracheostomy and for vocalising by allowing air to pass over the vocal cords producing voice sounds.
- Used in older patient as they do not normally come in paediatric sizes.
- Supplied with two inner cannulae; one is fenestrated and one is not.
- All patients with a fenestrated tracheostomy tube **must have the fenestrated inner cannula removed prior to tracheal suction and replaced with an unfenestrated inner cannula** as it is possible to insert the suction catheter through the fenestration causing damage to the tracheal wall.
- All patients with a fenestrated tube require an unfenestrated tube to be readily accessible for use in an emergency. This permits ventilation with emergency equipment as air will exit via the fenestration.



### Care of the inner cannula

Some larger tracheostomy tubes *ie sizes 6-0 & above* allow the use of an inner cannula. Main benefit of ability to remove and clean the inner tube, ensures a patent airway - blocked single lumen tracheostomy tube necessitates an emergency tracheostomy tube change.

- Appropriate inner cannula tube changes and care facilitates the tracheostomy tube to be changed monthly to 3 monthly
- Care of the inner cannula involves removing and cleaning with warm running water every 4 hours - sterile water is not required.

It is advisable to have two inner cannulae for each patient to ensure one can be in situ at all times; the spare should be stored clean and dry in a container.

### TRACOE® mini Extension Piece

- Use in individual patient circumstances may be considered after collaborative discussion between Tracheostomy Long-term Ventilation CNC, ENT and CICU teams.
- Product **should not be used** for infants < 1 year of age or with body weight of less than approx. 10kg.
- Increases dead space by approx. 3.5 to 4mL – roughly corresponding to normal dead space of 2-3 year old child
- If patient's breathing decompensates after placement of the TRACOE mini extension piece, the extension piece must be removed immediately.
- Clean daily using mild detergent and thoroughly rinse in sterile water for irrigation
- Completely replace every 28 days unless damage to integrity of product is noted earlier
- Clean and dry spare TRACOE mini extension piece should be available at bedside whenever product is in use.

### Complications

Tracheostomy care is a complex activity which has many potential complications which may include:

- **Haemorrhage** – primary, reactionary, secondary. A large haemorrhage could be fatal. Expect blood stained secretions in the first few hours but if this continues or becomes heavy, advise medical staff who will contact the ENT surgeon.
- **Infection** – chest or stoma site. Effective suctioning and humidity should remove secretions that if left may become infected. Observe and record the secretion colour, smell and consistency. Stoma site should be cleaned daily or when soiled, using sterile gauze and saline.
- **Accidental decannulation / tube displacement** – tracheostomy tube may visibly come out of the stoma or it can be dislodged out of the trachea and sit in the pre-tracheal tissues. This may be caused by a fat/full neck, pulling at the tube or loosely tied tapes.



Close visualisation and inspection of stoma site, observation of respiratory rate, effort, chest movement and air entry will detect tube dislodgement.

- **Surgical emphysema** – air may leak around the tube into the surrounding tissues. This is particularly problematic if the patient has had neck sutures inserted. Observe for face and neck swelling or if the patient complains of discomfort, pain or difficulty with breathing. Regularly check the tape tension as they will need to be tightened as swelling reduces.
- **Stoma breakdown** Bleeding may be caused by peristomal granulation tissue and inflammation. Treatment is with topical antibiotics and silver nitrate application – this will be decided in collaboration with Tracheostomy Long-term Ventilation CNC, ENT team and CICU team.

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## Appendix 1 - Individual Record Tracheostomy Emergency Box form

### INDIVIDUAL RECORD TRACHEOSTOMY EMERGENCY BOX

Name:

MRN:

Individualised Equipment	Size	
Tracheostomy tubes x 3 Cuffed / Uncuffed Shiley / Portex / Bivona		1 x same size opened in EBM container
		1 x same size in unopened box
		1 x 1 size smaller in unopened box
Tracheostomy ties	Velcro <input type="checkbox"/>	
	Cotton Tapes <input type="checkbox"/>	
Suction catheter size (see overleaf)		
Depth of suctioning (see overleaf)		

Ventilation information		
Does this child have an upper airway option	YES	NO
Respiratory machine type		

General equipment
Emergency drug chart
Bag and mask with liquorice stick
Spare inner cannula's (if required)
Tracheostomy oxygen mask
Nebulizer pack (oxygen tubing and nebulizer parts required)
Humidified moisture exchange (HME) device
Split dressing
Scissors
Tweezers
Gauze
0.9% normal saline ampoules
500ml bottle of sterile water to clean suction tubing





## Appendix 2 Suction catheter size and depth guide

### SUCTION CATHETER SIZE AND DEPTH GUIDE

Tracheostomy Tube		Suction Catheter	
Type	Size	Size	Depth
Shiley Neo	3.0	6 Fg	5.5cm
	3.5	6 Fg	6.0cm
	4.0	8 Fg	6.0cm
	4.5	8 Fg	6.5cm
Shiley PED	3.0	6 Fg	6.5cm
	3.5	6 Fg	6.5cm
	4.0	8 Fg	7.0cm
	4.5	8 Fg	7.0cm
	5.0	10 Fg	7.0cm
Shiley PDC (cuffed tube)	5.5	10 Fg	7.0cm
	4.0	8 Fg	7.0cm
	4.5	8 Fg	7.0cm
Portex (cuffed/uncuffed)	5.0	10 Fg	7.0cm
	6.0	10/12 Fg	9.5cm
	7.0	10/12 Fg	9.5cm
Portex Ultra Blue Line (uncuffed)	8.0	14 Fg	9.5cm
	6.0	10/12 Fg	9.5cm
	7.0	10/12 Fg	9.5cm
Bivona Fome-Cuf	8.0	14 Fg	9.5cm
	4.5	8 Fg	7.0cm
	5.0	10 Fg	7.0cm
Bivona Neo/Paeds Cuffed/uncuffed	5.5	10 Fg	7.0cm
	3.5	6 Fg	6.5cm
	4.0	8 Fg	7.0cm
	4.5	8 Fg	7.0cm
	5.0	10 Fg	7.0cm
Bivona Cuffless Adult	5.5	10 Fg	7.0cm
	5.0	10 Fg	7.0cm
	6.0	10/12 Fg	7.0cm
Shiley's Adult	7.0	12 Fg	7.0cm

**NB: Please note this is to be used as a guide only.**

**Check with ENT/CNC Tracheostomy if there is additional consideration for the child.**