Safer Tracheostomy Care – Resources to support safety improvement

The National Tracheostomy Safety Project (NTSP) is a quality improvement collaborative that aims to improve tracheostomy care and safety. The NTSP website www.tracheostomy.org.uk contains detailed guidance and resources to support healthcare staff and students to provide the best possible care for patients with tracheostomies*.

The site includes a comprehensive tracheostomy manual which can be downloaded at: www.tracheostomy.org.uk/resources/documents

In addition, all training videos are available on the NTSP YouTube channel: www.youtube.com/c/NationalTracheostomySafetyProject

The NTSP site also has a complimentary app available for iOS and Android which includes details of emergency algorithms and links to training videos – the apps can be downloaded from the following sites:

- iOS (App Store) - https://apps.apple.com/gb/app/ntsp/id578430947
- Android (Google Play) - https://play.google.com/store/apps/details?id=com.boxsail.ntsp&hl=en_GB

The information provided in this document brings together some of those resources to focus on 3 key safety interventions:

1. **Standardised tracheostomy daily care bundle**
   - **Note: the frequency of some of the interventions is altered for COVID-19 patients**

2. **Bedhead signs for patients**

3. **Standardised bedside tracheostomy emergency equipment**

All patient care relating to tracheostomy should follow a locally agreed care plan – an example from the Cheshire & Merseyside Critical Care Network is included in **Appendix 1**.

*NTSP resources approved for unlimited teaching with staff providing tracheostomy care. Please cite source, either as the National Tracheostomy Safety Project website www.tracheostomy.org.uk or the original papers (McGrath et al, Anaesthesia 2012;67(9):1025-41 or Doherty et al, Anaesthesia 2018, doi.org/10.1111/ 1anae.14307). Explicit permission only required if using in journal article, textbook or other commercial resource (apply to the journals via Rights Link).

Standard new tracheostomy care

INNOVATION AGENCY
Academic Health Science Network for the North West Coast

1. **Standardised tracheostomy daily care bundle (developed through critical incident analysis and multidisciplinary consensus)**
   - **Click on the links to access written resources and videos to support care delivery**

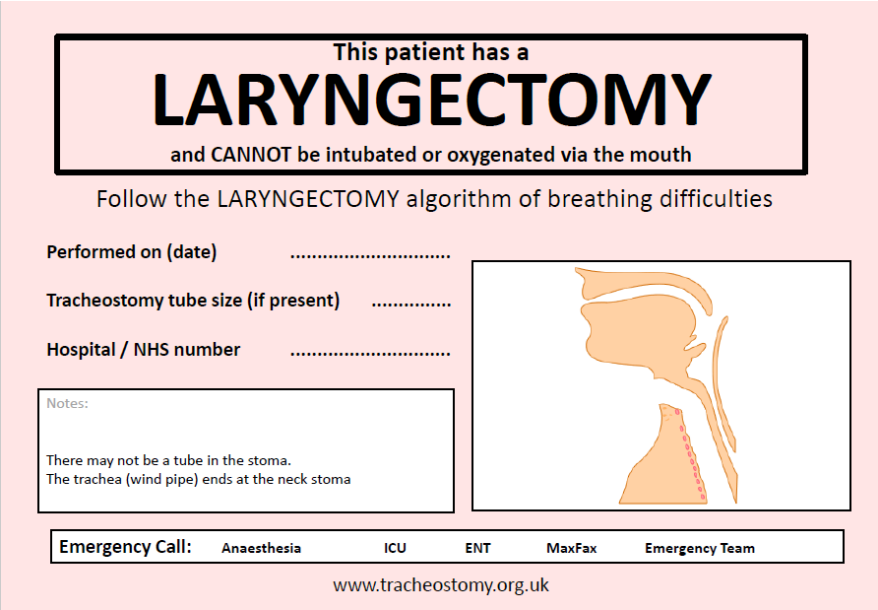
NTSP Safe Tracheostomy Care		Action	Minimum Frequency (hours)	Links to written Resources	Videos
T	**T**ube care	- Secure the tube (tapes / ties) - Inner cannula (check / clean) - Cuff check (pressure) - Sub-glottic secretions (aspirate)	**8** **8** **8** **4-8**	- Secure the tube - Inner cannula - Cuff check	- Tapes video (kids/universal) - Inner cannula video - Cuff pressure video - Cuff deflation & subglottic
R	**R**esus	- Review red flags - Know what to do in an emergency	**8** **Per shift**	- Red flags - Emergency care overview	- Red flags video - Emergency care video
A	**A**irway	- Suction to keep airway clear	**8**	- Suctioning	- Suctioning video
C	**C**are of the stoma	- Keep skin clean, healthy and dry - Change dressings - Skin care	**Daily** **Daily** **Daily**	- Stoma care	- Stoma care video (kids/universal)
H	**H**umidification	- Keep secretions loose - Humidification ladder - Respiratory Physiotherapy	**8** **8** **8**	- Humidification	- Humidification video
E	**E**nvironment	- Bedhead sign - Equipment	**Per shift** **Per shift**	- NTSP bedhead sign - Bedside equipment	
C **O**	**CO**mmunication	- Non-verbal communication aids - Augmentative and alternative communication - Vocalisation plan	**Per shift** **Per shift** **Daily**	- Communication overview	- Speaking valves video - Above cuff vocalisation video - The gift of speech video
M	**M**outh care	- Oral secretion management - Clean the teeth	**8** **8**	- Oral care	
S	**S**wallowing and nutrition	- Swallowing assessment - Refer to SALT - Adequate nutrition	**Daily** **Daily** **Daily**	- Swallowing	- Swallowing assessments video

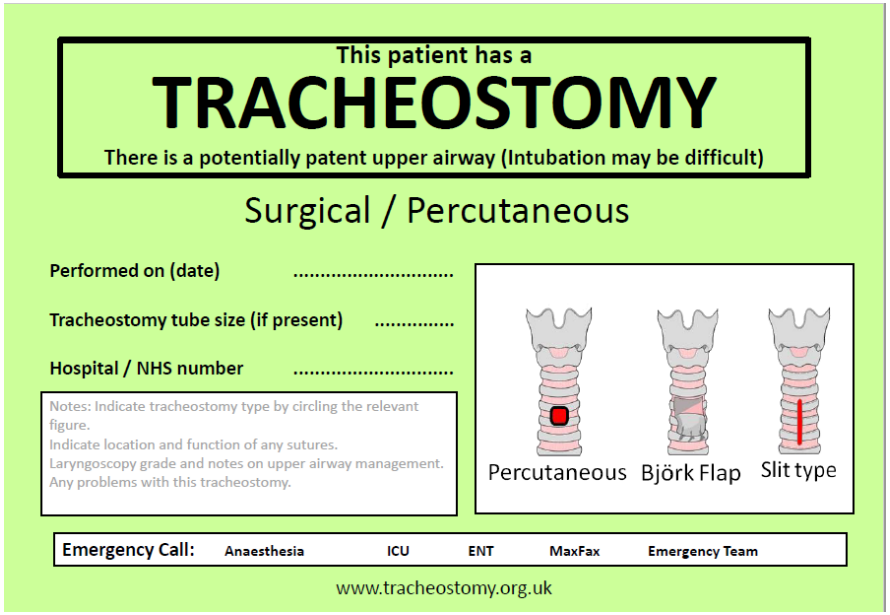
2. Bedhead signs for patients (communicate essential information about the patient to staff who are caring for them)

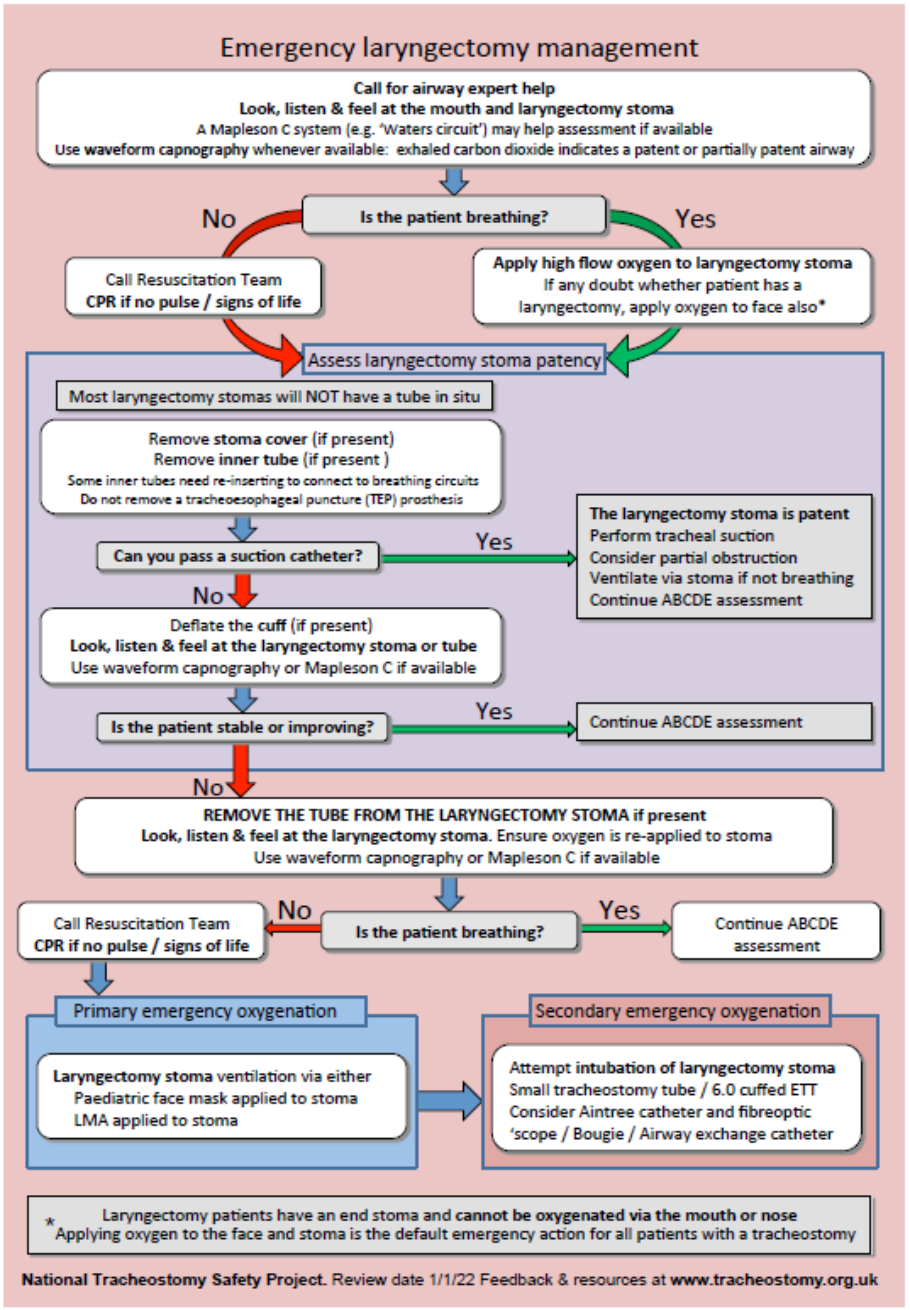
Bedhead signs:

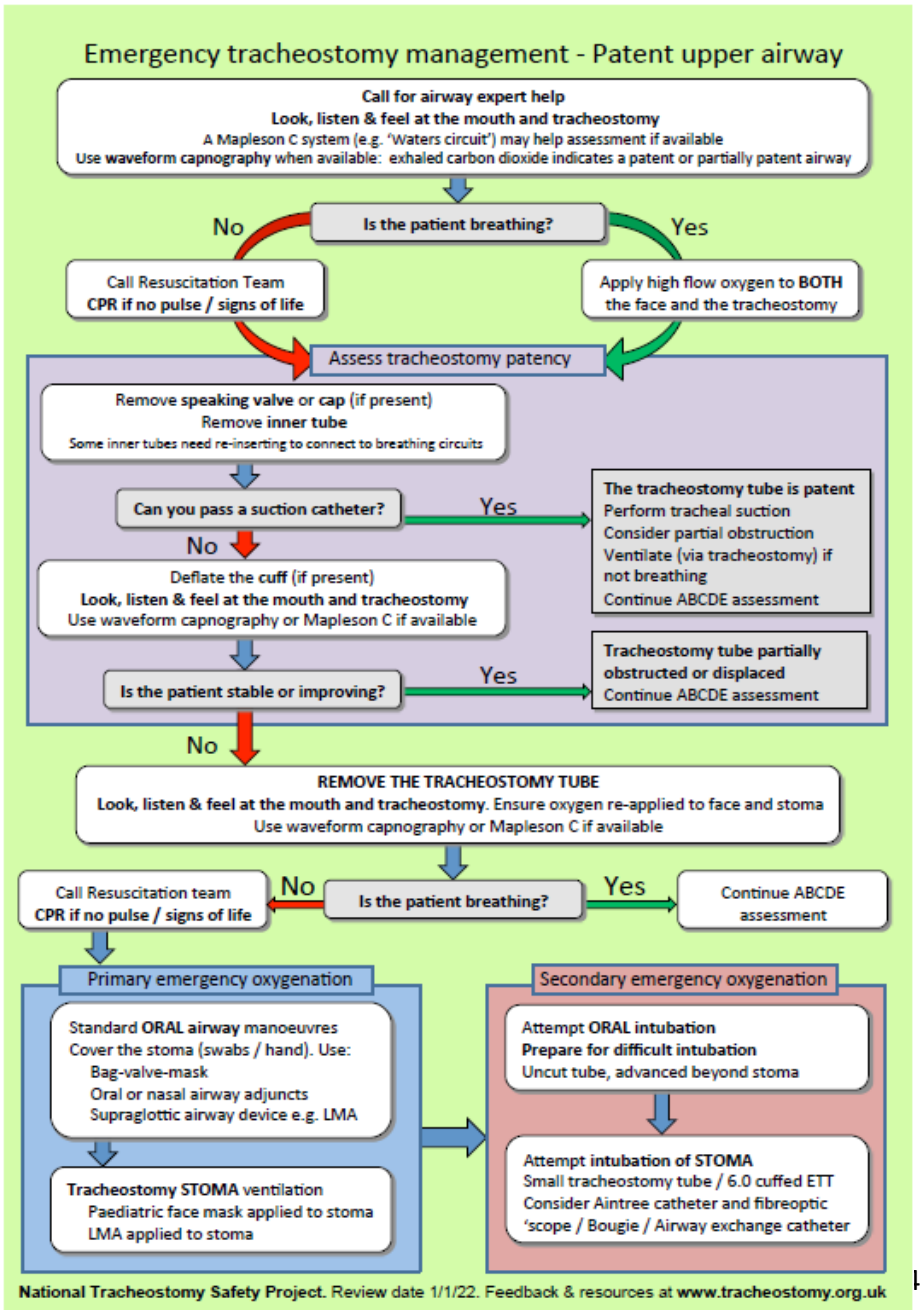
- Detail key information about the indication, type and date of a tracheostomy
- Identify how to manage the upper airway in an emergency and who / how to call for help
- Should be in place for every patient with a tracheostomy or laryngectomy
- Should initially be completed by the doctor performing the tracheostomy
- Front side (facing out) indicates that the patient has a tracheostomy or laryngectomy
- Reverse side provides relevant airway information – vital to be aware of in an emergency

Bedhead signs and algorithms are available as PowerPoint slides for local systems to adapt. Examples of the front and reverse of these signs can be seen below and are also available to download here: www.tracheostomy.org.uk/NTSP-algorithms-and-bedheads






Emergency laryngectomy management
Call for airway expert help
Look, listen & feel at the mouth and laryngectomy stoma
A Mapleson C system (e.g. 'Waters circuit') may help assessment if available
Use waveform capnography whenever available: exhaled carbon dioxide indicates a patent or partially patent airway
Is the patient breathing?
No
Yes
Call Resuscitation Team
CPR if no pulse / signs of life
Apply high flow oxygen to laryngectomy stoma
If any doubt whether patient has a laryngectomy, apply oxygen to face also*
Assess laryngectomy stoma patency
Most laryngectomy stomas will NOT have a tube in situ
Remove stoma cover (if present)
Remove inner tube (if present)
Some inner tubes need re-inserting to connect to breathing circuits
Do not remove a tracheoesophageal puncture (TEP) prosthesis
Can you pass a suction catheter?
Yes
The laryngectomy stoma is patent
Perform tracheal suction
Consider partial obstruction
Ventilate via stoma if not breathing
Continue ABCDE assessment
No
Deflate the cuff (if present)
Look, listen & feel at the laryngectomy stoma or tube
Use waveform capnography or Mapleson C if available
Is the patient stable or improving?
Yes
Continue ABCDE assessment
No
REMOVE THE TUBE FROM THE LARYNGECTOMY STOMA if present
Look, listen & feel at the laryngectomy stoma. Ensure oxygen is re-applied to stoma
Use waveform capnography or Mapleson C if available
Call Resuscitation Team
CPR if no pulse / signs of life
No
Is the patient breathing?
Yes
Continue ABCDE assessment
Primary emergency oxygenation
Laryngectomy stoma ventilation via either
Paediatric face mask applied to stoma
LMA applied to stoma
Secondary emergency oxygenation
Attempt intubation of laryngectomy stoma
Small tracheostomy tube / 6.0 cuffed ETT
Consider Aintree catheter and fibreoptic
'scope / Bougie / Airway exchange catheter
* Laryngectomy patients have an end stoma and cannot be oxygenated via the mouth or nose
Applying oxygen to the face and stoma is the default emergency action for all patients with a tracheostomy
National Tracheostomy Safety Project. Review date 1/1/22 Feedback & resources at www.tracheostomy.org.uk


Emergency tracheostomy management - Patent upper airway
Call for airway expert help
Look, listen & feel at the mouth and tracheostomy
A Mapleson C system (e.g. 'Waters circuit') may help assessment if available
Use waveform capnography when available: exhaled carbon dioxide indicates a patent or partially patent airway
Is the patient breathing?
No
Yes
Call Resuscitation Team
CPR if no pulse / signs of life
Apply high flow oxygen to BOTH the face and the tracheostomy
Assess tracheostomy patency
Remove speaking valve or cap (if present)
Remove inner tube
Some inner tubes need re-inserting to connect to breathing circuits
Can you pass a suction catheter?
Yes
The tracheostomy tube is patent
Perform tracheal suction
Consider partial obstruction
Ventilate (via tracheostomy) if not breathing
Continue ABCDE assessment
No
Deflate the cuff (if present)
Look, listen & feel at the mouth and tracheostomy
Use waveform capnography or Mapleson C if available
Is the patient stable or improving?
Yes
Tracheostomy tube partially obstructed or displaced
Continue ABCDE assessment
No
REMOVE THE TRACHEOSTOMY TUBE
Look, listen & feel at the mouth and tracheostomy. Ensure oxygen re-applied to face and stoma
Use waveform capnography or Mapleson C if available
Call Resuscitation team
CPR if no pulse / signs of life
No
Is the patient breathing?
Yes
Continue ABCDE assessment
Primary emergency oxygenation
Standard ORAL airway manoeuvres
Cover the stoma (swabs / hand). Use:
Bag-valve-mask
Oral or nasal airway adjuncts
Supraglottic airway device e.g. LMA
Tracheostomy STOMA ventilation
Paediatric face mask applied to stoma
LMA applied to stoma
Secondary emergency oxygenation
Attempt ORAL intubation
Prepare for difficult intubation
Uncut tube, advanced beyond stoma
Attempt intubation of STOMA
Small tracheostomy tube / 6.0 cuffed ETT
Consider Aintree catheter and fibreoptic
'scope / Bougie / Airway exchange catheter
National Tracheostomy Safety Project. Review date 1/1/22. Feedback & resources at www.tracheostomy.org.uk

3. Standardised bedside tracheostomy emergency equipment

Any clinical area caring for patients with a tracheostomy must have emergency equipment immediately available at all times. Some routine equipment will be at the patient's bedside as it is required for everyday care, whilst other equipment is provided in a central ward or nursing area.

If a patient is transferred to a different location within a hospital, then the accompanying staff **must** ensure that any equipment that may be required in an emergency is available at the destination and during the journey to it – there have been many incidents recorded in hospital lifts, corridors and remote departments where a blocked or displaced tube could not be managed due to a lack of immediately available equipment.

Equipment may be in the form of a dedicated case or box that accompanies the patient or stocked on a 'difficult airway' trolley in a critical care area. This equipment, including suction, should accompany the patient wherever they go during their hospital stay. An appropriately trained carer who is competent to use the equipment in an emergency must also accompany them.

Emergency equipment needed in a ward or clinical area

• Basic airway equipment:
  ○ Oxygen masks
  ○ Self-inflating bags
  ○ Oral and nasal airways
 	
• Advanced airway equipment:
  ○ Supraglottic Airway Devices (such as Laryngeal Mask Airways)
  ○ Laryngoscopes with appropriate tubes (arrest trolley or similar)
  ○ Videolaryngoscope
  ○ Bougies and /or stiletto (relevant to the laryngoscopes available)
	• An airway endoscope (disposable endoscopes are available with long, sterile shelf lives)
	
	• Waveform capnography (immediately available in critical care areas and available in designated tracheostomy cohort wards. Most defibrillators have provision for a capnography module)
	
	• Tracheal dilators

Waveform capnography and airway endoscopes should be available for all patients with a tracheostomy. In critical care, specialist ward areas (Head & Neck Surgery for example) and areas who look after high volumes of tracheostomy patients these should be immediately available. For other ward areas, availability should be within minutes (eg on a cardiac arrest trolley).

Airway endoscopes should ideally be portable and able to be used quickly without a light source or separate 'stack' system. All staff caring for patients with a tracheostomy and those who respond to emergencies should know how to access and operate these devices around the clock.

There is conflicting opinion on whether tracheal dilators are useful in an emergency. This should be agreed locally, reflecting patient demographics, types of tracheostomy performed and clinician preference.

Equipment for routine care kept at patient's bedside:

• Humidification equipment
• Suction with selection of appropriate suction catheters
• Spare tracheostomy tubes
  ○ One tube the same size
  ○ One tube which is one size smaller
• Clean pot for spare inner cannula
• Sterile water for cleaning the suction tube
• Scissors
• Stitch cutter if tracheostomy tube is sutured
• Water soluble lubricating jelly
	• Sterile dressing pack
	• Tracheostomy dressings
	• Tracheostomy tapes
	• Personal protective equipment (gloves, aprons, eye protection)
	• Sterile gloves – for performing deep suction
	• Nurse call bell: the patient may be unable to verbally call for help
	• Communication aids: the patient may not be able to verbalise
	• Bedside equipment checklist

Some of this equipment could be kept in the emergency tracheostomy equipment box with contents as listed below.
It is important to check all equipment is available at the beginning of every shift.

Emergency portable tracheostomy equipment box

A suitable emergency tracheostomy equipment box is useful to keep all emergency equipment together. These can then accompany the patient if they need to be transferred to a different location. Portable suction and a portable oxygen supply also need to accompany the patient.

The emergency equipment box must contain:

- Spare tracheostomy tubes
- Suction catheters
- Scissors
- Stitch cutter (if the tracheostomy tube has been stitched)
- Lubricating jelly
- Tapes
- Dilators (if agreed locally).

An example of the emergency equipment checklist can be found below:

Example of and Emergency Equipment Checklist (to be completed <u>every</u> shift)

Date								
Time								
Protective equipment – gloves, aprons, eye protection								
Humidification +/- oxygen								
Functioning suction facilities (where centralised suction is not available, as is often the case in the community, independent portable suction units should be used)								
Appropriate-sized suction catheters (one which is the same size as the tracheostomy and one which is a size smaller)								
Yankauer sucker								
Non-rebreathe circuit and/or adult bag-valve-mask with reservoir with tubing								
Size zero paediatric mask (for patients with a laryngectomy)								
Spare tracheostomy tubes (one of the same size and one a size smaller) usually the same type but must be a type that can easily be inserted in an emergency situation								
Tracheal dilators								
Tracheostomy disconnection wedge								
Stitch cutter (if sutures present)								
Catheter mount								
Water soluble gel								
Tracheostomy tapes								
Initials								
Signature								

Appendix 1 – Example Tracheostomy Care Plan from Cheshire and Merseyside Critical Care Network

NEED	ACTION	RATIONALE
HUMIDIFICATION (TC1)	• Assess humidification needs at least daily. • Provide sufficient humidification to keep secretions loose and easy to suction. • Choose humidification system to match patient requirements (eg water humidification, heat-moisture exchanger). Consider additional humidification using nebulised normal saline via the tracheostomy.	• *A tracheostomy bypasses the normal upper airway mechanisms for humidification, filtration and warming of inspired gases* *Failure to provide adequate humidification can lead to blockage of the tracheostomy tube, with associated risks of hypoxia and cardio-respiratory arrest.*
SUCTION (TC2)	• Frequency of tracheal suction should be performed to individual requirements. • Observe patients for clinical signs that may indicate the need for	• Routine suctioning may result in over-suctioning of the patient and increase risk of suction related trauma to the airway. • Tracheal suction based upon clinical need and regular clinical observation is preferred to routine suction practices.

	tracheal suction (eg respiratory distress; reduced oxygen saturations; spontaneous coughing; audible or visible secretions from the tracheostomy, chest auscultation suggesting secretion build-up). • Ensure that fenestrated inner tubes are replaced with non-fenestrated inner tubes for suctioning. • Choose suction methods and circuits that meet patient needs (eg closed or open suction techniques).	• Suction via a fenestrated inner tube can allow the suction catheter tip to come into contact with the trachea, with potential for tracheal trauma and scarring • Consider frequency of suction requirements and infection status when choosing between suction circuits. Risk of cross infection from tracheal aspirate infections will be reduced when using closed circuit suction techniques.
INNER TUBE CARE (TC3)	• Ensure that all patients who are not mechanically ventilated have a double cannula tracheostomy tube (ie a tube with an inner tube), at the earliest opportunity. • Inspect inner tubes as a minimum 4 hourly, to check for patency	• *Inner tubes reduce the risk of total blockage of a tracheostomy tube* • *Regular inspection is required to check fro secretion build up on the inner lumen of the inner tube* • *Tubes should never be left to soak – this increases risks of infection*

	• Rinse inner tubes with sterile water and clean the lumen with a tracheostomy inner tube cleaner – leave to air dry	
DRESSINGS AND TUBE SECURITY (TC4)	Ensure that tracheostomy dressings and tube ties or collars are clean and changed at least daily. Ensure that tube ties or collars are fastened securely but not too tight - allow a finger width space between the tie and the neck. Check stoma site at least daily for skin integrity Tracheostomy dressing and tape change changes require 2 members of staff throughout the procedure.	*To minimise risk of infection.* *To enhance patient comfort and appearance* *To hold tube securely in place without restricting blood flow through the vessels in the neck* *To promote patient comfort* *For early identification of pressure related problems from tracheostomy flange or inflammation / infection at the site* *To minimise risk of tube displacement or accidental decannulation during the procedure.*
CUFF PRESSURE (TC5)	• Multi-disciplinary agreement should be sought on whether the patient is to be nursed with a cuffed / non cuffed tube.	• *Prolonged, unecessary cuff inflation increases the risk of pressure related complications affecting the trachea.* • *Promotes accurate and consistent approach* • *Visible record of cuff pressures / deflations.*

	For cuffed tubes: MDT agreement is required for instructions on when / whether the tracheostomy cuff should be inflated or deflated. Ensure that all aspects of cuff status are recorded on the Tracheostomy Care Record chart.	
COMMUNICATION (TC6)	• Assess the individual patient's communication needs at least daily. • Where patient is able, consider methods to enhance non-verbal communication (eg. Letter boards, pen and paper, nodding/blinking to command) MDT approach to consider technical methods to facilitate voice production (fenestrated tube occlusion; speaking valves).	• *Tracheostomy tubes with inflated cuffs prevent air passing the vocal chords, meaning the patient will be unable to produce an audible voice.* *Alternative methods of communication should be sought for conscious patients to help reduce stress / anxiety / frustration at loss of voice production.*
PATIENT SAFETY / MENTAL AWARENESS (TC7)	• Ensure that conscious and able patients have access to a working call bell at all times.	• *Tracheostomy patients will not be able to summon help verbally. The patient may have an urgent need for staff to attend, eg respiratory distress related to their tracheostomy, or another physical need.* • *To check on patient's well-being and to reassure the patient.*

	• Ensure frequent observation and communication with the tracheostomy patient. • Assess staffing ratios in relation to the individual patient's needs, taking into account anticipated frequency of observation / interventions; patient's mental awareness, tendency to confusion / agitation.	• *Patients who are agitated or confused or lack mental awareness are at increased risk of tracheostomy incidents, (eg.hypoxia, accidental decannulation, tube displacement / tube blockage, removal of humidification)*
HYDRATION (TC8)	• Ensure that individual patients have hydration needs assessed each shift • Observe for clinical signs of under-hydration, (eg.thick or sticky tracheal aspirate, dry mucous membranes, oliguria). • Consider intake / output monitoring to help guide fluid requirements Ensure supplemental fluids via intravenous / enteral / other routes are prescribed as required.	• *Good systemic hydration is essential to keep tracheal secretions loose and easy to remove on suction.* *Dehydrated patients are at increased risk of sputum plugs blocking the tracheostomy tube, leading to acute respiratory distress, hypoxia, atelectasis or respiratory arrest.*

NUTRITION AND SWALLOW (TC9)	• Refer all tracheostomy patients to a Dietitian and a Speech and Language therapist	• *Tracheostomy patients are at risk of swallow impairment and should not be assessed using a standard nurse – led swallow screen* • *Due to potential swallow impairment, dietary and nutritional requirements should be discussed amongst the MDT.*