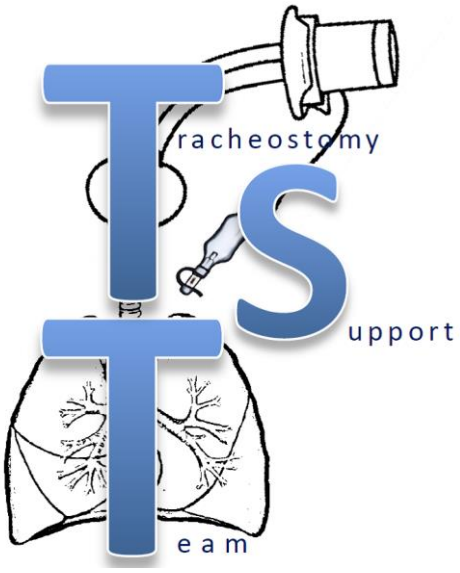
PORTSMOUTH HOSPITALS NHS TRUST

# A guide to tracheostomies

## For the Intensive Care Unit

**TRACHEOSTOMY SUPPORT TEAM**




This guide is to provide background reading on the use, types and management of a tracheostomy on the Intensive Care Unit. It should be read in conjunction with the departmental SOP for tracheostomy care.

Version: 1.0 | Date: 30 Jun 17 | Review Date: 30 Jun 20 | Author: Dr S Blakeley

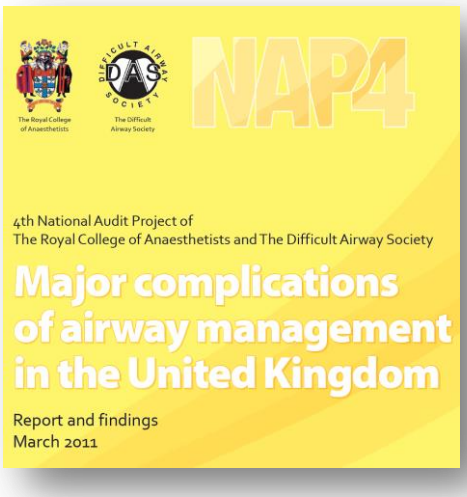
## Introduction

Over 80 tracheostomies a year are performed on our Intensive Care Unit (ICU). Most of these will be inserted percutaneously and most of them will be removed by the time the patient is discharged from the ICU. It is important to have an understanding of the principles and management of a tracheostomy as there is the potential for significant complications to occur. This has been seen in the number of patient safety incidents reported, with over 1,700 incidents reported to the National Patient Safety Agency (NPSA) 2005-2008, including over 30 deaths. It was felt that the actual number of airway incidents was under reported to the NPSA but it was clear that when an incident with a tracheostomy occurs, the chance of some harm occurring to the patient is extremely high.


Following this, the **National Tracheostomy Safety Project** was set up to look at all aspects of tracheostomy care and management. They have been a driving force in standardising the care provided to tracheostomy patients and improving patient safety.

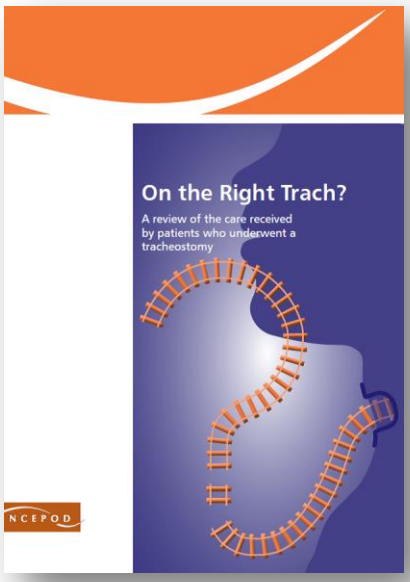
Their website is a portal for educational resources, National and International documents regarding tracheostomies and emergency algorithms.

http://www.tracheostomy.org.uk/




**The 4th National Audit Project from the Royal College of Anaesthetists (NAP 4)** [*http://www.rcoa.ac.uk/document-store/nap4-full-report* 2011] was a prospective study of all major airway complications occuring during anaesthesia (including in the Emergency Department) and on the Intensive Care Unit. It aimed to capture the incidence of airway complications, highlight learning points and make recommendations regarding airway management.

Out of 184 reported airway incidents, 36 occurred on the ICU. Of these 36 incidents on ICU, 21 were tracheostomy related.




The **'National Confidential Enquiry into Patient Outcome and Death (NCEPOD) 2014 report: On the Right Trach? A review of the care received by patients who underwent a tracheostomy'** reviewed all aspects of clinical and organisational care provided to patients who had a tracheostomy, not just on the ICU but on the wards too. A common theme running through all these reports is better education and training of staff in how to deal with tracheostomies on a daily basis as well as in the event of an emergency.

The key recommendations were:

- Tracheostomy insertion should be properly recorded and coded as a separate procedure to enable better data collection
- The diameter and length of the tracheostomy tube should be appropriate for the anatomy of that patient, therefore an adequate range of tubes should be stocked by units which should include duel lumen tubes and adjustable flanged tubes
- All Trusts should have a protocol and mandatory training for tracheostomy care with guidance on humidification, cuff pressure monitoring and cleaning of the inner tube, as well as management of emergencies
- Data regarding the tracheostomy tube should be clearly recorded and made available for review at the bedside. Information regarding the tracheostomy staying with the patient during their patient journey
- In order to facilitate decannulation and discharge planning, multi-disciplinary care needs to be established for ALL tracheostomy patients. This should start while they are still on the ICU
- Bedside staff who care for tracheostomy patients should be competent in recognising and managing common airway complications including tube obstruction or displacement as described by the National Tracheostomy Safety Project
- Unplanned and night time critical care discharge is not recommended, particularly in patient with a newly formed tracheostomy and/or patients recently weaned from respiratory support

*http://www.ncepod.org.uk/2014report1/downloads/On%20the%20Right%20Trach_FullReport.pdf*

This handbook is not designed to replace hands on training but is designed to provide information on tracheostomies in general, their management and the complications that are associated with them.

## Indications for a tracheostomy

Most tracheostomy insertions are done electively. Emergency tracheostomies are rare, and are usually done for upper airway obstruction or the inability to place an oral endotracheal tube.

The indications for a temporary tracheostomy are:

**To provide a patent airway**

- Upper airway obstruction (e.g. tumour, infection)
- Potential upper airway obstruction (e.g. facial oedema associated with burns, post trauma/surgery)
- Intubation difficulties (e.g. unusual/difficult anatomy)

**To protect the airway**

- Reduced level of consciousness with inability to protect airway
- Neurological conditions with inability to protect airway (e.g. stroke, bulbar palsy)

**To clear secretions (bronchial toileting)**

- Reduced level of consciousness with poor cough
- Poor cough due to muscular weakness
- Excessive secretions needing help with clearance

**To help weaning from a ventilator**

- Better patient comfort and less need for sedation
- Reduced work of breathing

The timing of insertion is made on an individual patient assessment. The 2013 Tracman Study (http://jama.jamanetwork.com/article.aspx?articleid=1690674) showed there was no difference in terms of ICU length of stay or mobility between an early versus late insertion. There are however some patients in whom a tracheostomy is 'inevitable' and it may be placed early in their stay. Some patients may undergo a trial of extubation first. The NCEPOD report found that 18% of patients are decannulated within 7 days on the ICU and suggested that a trial of extubation, if appropriate, should be considered for patients prior to tracheostomy insertion.

Except in situations where a tracheostomy is lifesaving (i.e. for upper airway obstruction), a tracheostomy is generally inserted if the risks associated with prolonged endotracheal tube placement outweigh the risks associated with a tracheostomy.

The decision to insert a tracheostomy, its indications and evidence of the consideration of the risks should be clearly documented in the notes. For an awake, competent patient a consent form should be completed, otherwise a Form 4 filled in.

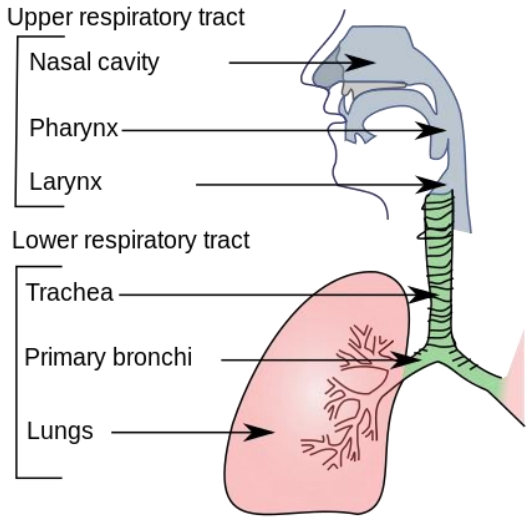
| Oral endotracheal tube | Tracheostomy |
|---|---|
| Unpleasant, often requires some form of sedation – which may then hinder waking and weaning from the ventilator | Better tolerated, needs no or minimal sedation in most patients |
| Difficult to reinstitute mechanical ventilation without re-intubation | Easier to reinstitute ventilation allowing trial periods off the ventilator |
| Risks associated with RSI should re-intubation be needed | Risks associated with insertion – bleeding, airway loss, damage to surrounding structures |
| Mouth irritation from tube and hindrance of mouth care | Easier to provide mouth care |
| | Stoma infection, breakdown and scarring |
| Difficulty with adequate fixation in agitated patients with risk of damage from means of fixation | Easier to secure but still risk of damage to neck from means of fixation |
| Damage to vocal cords and trachea | Damage to trachea - tracheomalacia, stenosis, granulation tissue and bleeding |
| Communication difficult | Easier to communicate – lip read and then application of speaking valve |
| Risk of blockage and displacement | Risk of blockage and displacement |

# Anatomy and physiology

## Tracheostomy definition

A tracheostomy is an opening in the skin of the lower neck (below the cricoid cartilage) which passes directly down to the trachea. A tube can then be then placed through this opening providing a direct route into the patient's trachea, so bypassing the upper airway structures. We generally refer to the opening in the neck as the stoma and the tube plus the opening as the tracheostomy.

## Anatomy




The airway can be divided into upper and lower. The upper airway refers to all the structures above the larynx and vocal cords; beyond this is the lower airway. A tracheostomy is inserted directly into the trachea so bypassing the upper airway.

Bypassing the upper airway may be beneficial clinically but it leads to certain adverse physiological changes which will be discussed next.

Figure 1 below shows the anatomical landmarks (note a cricothyroidotomy is only done in an emergency) and figure 2 shows the position of the tracheostomy tube in relation to the surrounding structures.

Figure 1

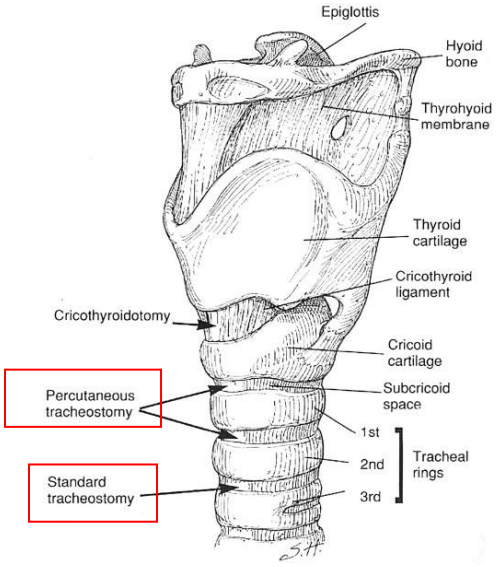
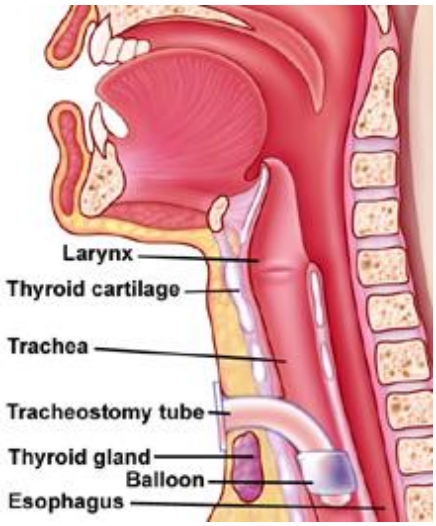
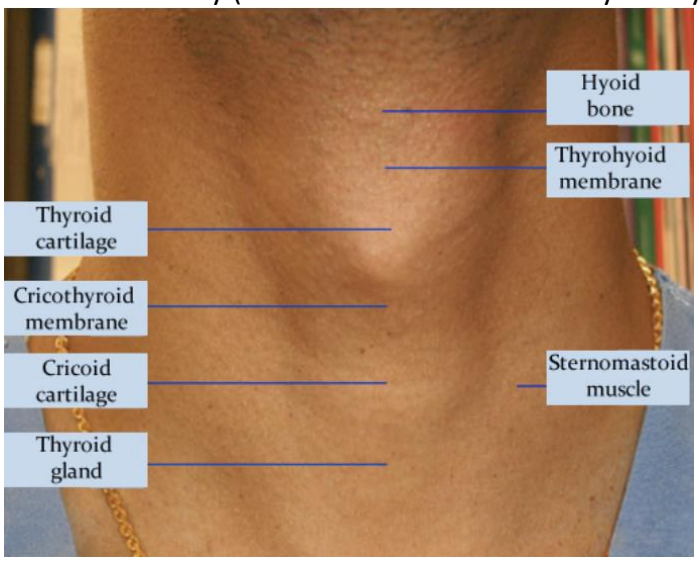



Figure 2




Surface anatomy (from National Tracheostomy Safety Project 2013)



## Physiological changes with a tracheostomy

A tracheostomy changes the normal anatomy and physiology of the upper airway and digestive tract, and this may have implications for the management of the tracheostomy and the patient.

**1. Loss of normal humidification by upper airway**
Normally air is warmed and filtered by the ciliated epithelial cells of the nose and upper airway. The lower airways respond to dry air by producing more mucus and unless air is artificially humidified there is a risk that this mucus can become dry and thick. This makes it harder to clear secretions by suctioning (or coughing) and may lead to blockage of the bronchial tree and blockage of the tracheostomy. Inadequate humidification can also lead to keratinisation and ulceration of the tracheal mucosa leading to further complications.

**2. Reduction in upper airway anatomical dead space and reduction in airway resistance**
This is an advantageous physiological change in some situations. A tracheostomy can reduce the upper airway anatomical dead space by up to 50%, and this may potentially make it easier to wean a patient from mechanical ventilation.

**3. Inability to speak**
An endotracheal tube and a tracheostomy will remove the ability of a patient to speak which may be very distressing for the patient and frustrating for the family and staff. A tracheostomy makes it easier for communication via lip reading and leads to the potential for speech. The power of speech should not be underestimated and can often give patients a real moral boost but also a patient who cannot speak cannot call for help.

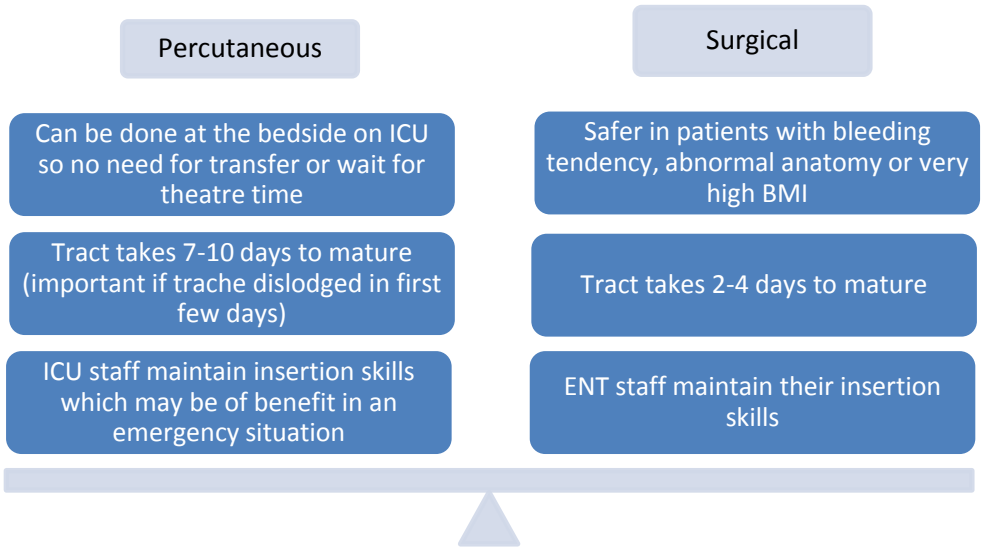
**4. Inability to swallow.**
The cuff, and indeed the tracheostomy itself (if quite large) can hinder swallowing. This is due to mechanical obstruction but also the tracheostomy reduces the normal upward movement of the larynx that occurs with swallowing so potentially making the swallow unsafe. Although most patients on the ICU are tube fed oral intake may be something to consider after proper assessment. All tracheostomy patients should be considered to have an abnormal swallow but not all tracheostomy patients need to be nil by mouth.

# Surgical versus percutaneous insertions

Most tracheostomies inserted on the ICU are percutaneous tracheostomies. They are inserted at the bedside on the ICU by skilled ICU doctors, so avoiding the need to transfer a patient to theatre. If a percutaneous tracheostomy cannot be performed due to anatomy, obesity or bleeding problems, then a surgical tracheostomy is performed in theatre.

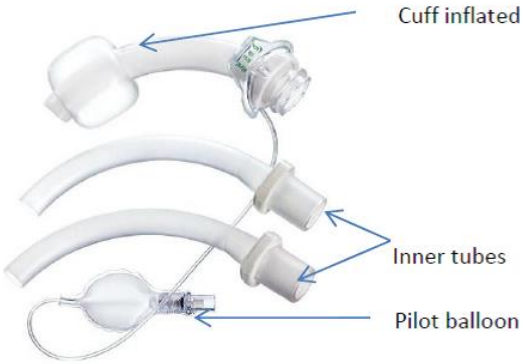
There are 3 main types of surgical tracheostomy; window, vertical slit and Bjork flap (now rarely used). The commonest in PHT involves a small window being made in the trachea. In some cases sutures are placed through the tracheal wall with the 'string' then coming out onto the patients neck. They are usually labelled 'left' and 'right'. These are called stay sutures and can be used to hold the hole in the trachea open if the tracheostomy needed to be reinserted in an emergency.

The benefits of percutaneous versus surgical insertions are as follows.



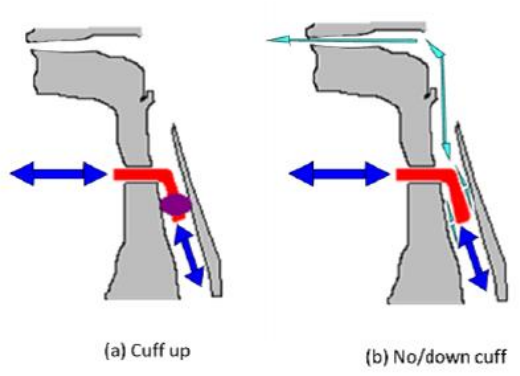

## Types of tracheostomy tube

### Cuffed and uncuffed tubes




All tracheostomy tubes when they are first inserted on the ICU will be cuffed tubes. The balloon (cuff) is inflated to seal the airway and allow mechanical ventilation. The cuffs are high volume but low pressure to prevent excessive pressure on the trachea. The cuff pressure should be no more than **20-25mmHg**. When the cuff is completely inflated, air can only pass through the tracheostomy, it cannot pass through the upper airway. Although we describe this as a 'protected' airway, even when the cuff is fully inflated small degrees of aspiration (micro aspiration) may occur. Once the patient no longer ventilated they may have trial periods of the cuff being let down. If a speaking valve is placed, then the cuff should be deflated first.

The diagram below shows the passage of air through a tracheostomy:




(a) Cuff up: air only passes through the tracheostomy, not through the upper airway.

**If the cuff is inflated and the tracheostomy became blocked, no air would be able to pass around the cuff and through the upper airway so THE PATIENT WOULD NOT VENTILATE**

(b) Cuff down (or no cuff): air passes mostly through the tracheostomy as this is the path of least resistance, but some air is able to pass through the upper airway.

If the patient is discharged to the ward with a cuffed tracheostomy in place, when followed up they will have increasing periods of cuff down as tolerated. There are a number of reasons why someone may not tolerate the cuff being down: for example fatigue and being unable to clear their own secretions properly often needing increasing periods of the cuff down over time. If when the cuff is deflated there is not much room

in the trachea for airflow around the tube, then the tube can be down sized or an uncuffed tube used. It should be remembered that an uncuffed tube will not protect the airway from aspiration and so an uncuffed tube is generally only used if the patient has a good cough and gag reflex.

## Subglottic suction tubes

There is some evidence that the use of subglottic suction for endotracheal tubes as well as tracheostomy tubes may reduce the incidence of ventilator associated pneumonia. For this reason tracheostomy tubes with subglottic suction ports are increasingly used on the ICU and subglottic aspiration is standard for all our endotracheal tubes as well as tracheostomies. The principle is that infected secretions from the oropharynx accumulate above the cuff and micro aspiration of these infected secretions occurs so leading to chest sepsis while on the ventilator. The subglottic port should be aspirated as per the DCCQ SOP.

## Adjustable flange tubes

For patients who have a very large neck a standard length tracheostomy may not sit correctly in the trachea so leading to problems, particularly the risk of displacement. Adjustable flange tubes enable the length of the tracheostomy to be adjusted so that the tip of the tube sits in an adequate position within the trachea. All adjustable flange tubes in PHT have an inner tube. On the ICU we use Uniperc adjustable flange tubes (see right); they all come with an inner tube and this should be used.

For many other patients an adjustable flanged tube is not needed, but they may still benefit from a slightly longer tracheostomy tube giving a better position of the tracheostomy within the trachea. For this reason we now Tracoetwist Plus tubes as standard on the ICU.

## **Fenestrated tubes** (for information only, fenestrated tubes are not used on the ICU)

Fenestrations are holes along the length of the tracheostomy tube. The fenestrations are designed allow airflow around and through the tracheostomy. Some patients find it easier to breathe and talk through a fenestrated tube, but also should the tube become blocked there is still a route for air to pass around. Fenestrated tubes are only used once a patient is off mechanical ventilation.

Fenestrated tubes come with 2 types of inner tube: one with holes matching the holes of the tracheostomy (*fenestrated inner tube*) and one with no holes (*non fenestrated inner tube*). It is important to make sure that the non fenestrated inner tube is in place prior to suctioning or the suction catheter may pass through the holes and lead not only to ineffective suctioning but also mucosal damage. Longer term there can be mucosal over growth through the fenestrations so causing trauma and difficulty in removal of the tracheostomy.

**IN AN EMERGENCY THE NON FENESTRATED INNER TUBE SHOULD BE PLACED TO ENABLE THE PATIENT TO BE VENTILATED**

## Size of tube

The size of tracheostomy tube initially placed depends on the patient's size, body habitus and ventilatory needs. It needs to be big enough for adequate mechanical ventilation and to allow a large suction catheter/bronchoscope to pass through if the secretions are very thick. The stated size of the tube (e.g. 7, 8, 9) usually refers to the inner diameter of the tracheostomy. The outer diameter of the tube will vary depending on the make of tracheostomy due to variation in the thickness of the plastic of the tube wall.

For example taking a **size 8** tracheostomy:

| Make of trache | Inner diameter (mm) With inner tube | Outer diameter (mm) | Length (mm) |
|---|---|---|---|
| **Tracoetwist standard** | 8 | 11.4 | 76 |
| **Tracoetwist plus** | 8 | 10.8 | 88 |
| **Portex blue line ultra** | 6.5 | 11.9 | 75.5 |
| **Portex Uniperc adj flange** | 8 | 12.6 | Variable |

## Tracheostomy tubes used on the ICU

1. Tracoetwist plus **with** subglottic aspiration: This is our default tube for most ICU patients. This is a cuffed trache with an inner tube. The 'plus' part refers to the fact that this tube is slightly longer than the standard Tracoetwist tube.

2. Uniperc adjustable flange: This is used for patients with a large neck or other anatomical reasons meaning that a standard tube is not long enough. It is a cuffed trache with an inner tube.

3. Tracoetwist plus **without** subglottic aspiration: This is the default tube for patients being discharged to the ward. It is a cuffed trache with an inner tube but does not have a subglottic aspiration port for safety reasons. NO PATIENT SHOULD GO TO THE WARD WITH A SUBGLOTTIC ASPIRATION TUBE

## Tube changes

Duel lumen tubes can stay in place for up to 30 days. Surgical tracheostomies should **not** be routinely changed within the first 4 days of insertion and percutaneous tubes within the first 7-10 days. This is due to the time taken to form a track. Any early change of the tracheostomy tube should either be done in theatres (if surgical) or with all the equipment available to re-dilate the track if needed. If it is likely that a patient is going to the ward with a tracheostomy, then the first tube change should be performed on the ICU.

# Tracheostomy complications

Related to insertion:

- Loss of airway
- Damage to trachea and surrounding structures e.g. formation of trachea-oesophageal fistula
- Bleeding from the skin, trachea or related structures
- Pneumothorax; this is not common but more likely to occur with a low insertion of a tracheostomy

Following insertion (may occur early or late):

- Inadequate placement e.g. too short, leading to problems with suctioning and increasing the chance of the tracheostomy becoming displaced
- Blockage e.g. due to secretions or blood occluding the tube lumen
- Displacement or dislodgement
- Infection around the stoma or lower respiratory tract
- Bleeding (see following)
- Tracheal stenosis and tracheomalacia. This is generally seen following removal of the tracheostomy but may be a cause of failure to decannulate initially. It is more likely with high placement of a tube but infection and pressure necrosis also play a part. Tracheal stenosis is estimated to occur in 3.7-18% of tracheostomies.
- Tracheo-oesophageal fistula. This is less common with current insertion techniques, but is related to trauma to the posterior wall at time of insertion and also having a too high cuff pressure with the cuff pressing on the posterior tracheal wall. The presence of a large bore NGT is also a risk factor hence fine bore tubes are preferred.

## Bleeding post tracheostomy insertion

Bleeding from a tracheostomy (not related to insertion) may vary from mild to severe. Small amounts of blood just seen on suctioning are most likely going to represent trauma or related to granulation tissue. In very rare cases significant blood loss enough to cause haemorrhagic shock may occur, as with a trachea-innominate fistula. It should also be remembered that blood seen on suctioning or coughing may indicate underlying pathology or coagulopathy and may not always be directly attributable to the tracheostomy.

<u>Early (< 48 hours)</u>
This is usually (although not always) related to the insertion of the tracheostomy

- Local (skin)
- Trauma to surrounding structures (e.g. thyroid isthmus. anterior and transverse jugular veins)
- Systemic coagulopathy
- Erosions due to tracheal suctioning
- Infection

<u>Late (> 48 hours)</u>

- Granulation tissue
- Pneumonia/infection
- Erosions due to tracheal suctioning
- Erosion of superior or inferior thyroid arteries - rare
- Tracheo-innominate (bracheocephalic) artery fistula (TIF) – rare but can happen

Note: 70% of haemorrhage occurs in first 3 weeks

**Granulation tissue**

This may develop in response to trauma from the tube (particularly if it is not sitting correctly) or due to a low grade infection. Management depends on the location of the granulation tissue, but addressing the tube itself is important – would a different sized tube fit better? If the granulation tissue is bleeding then it can be cauterised. ENT should be involved in all cases of bleeding from a tracheostomy, unless a non ENT cause is known.

## Care of a patient with a tracheostomy

There are a number of elements of care that need to be performed for a patient who has a tracheostomy. In an effort to standardise how everyone approaches tracheostomy care, a series of guidelines have been published through the Tracheostomy Patient Safety Project and more recently the Intensive Care Society (Click on images to access documents).

National Tracheostomy Safety Project

intensive care society
care when it matters

The **Tracheostomy Care policy for DCCQ** brings together National recommendations, which can be divided up into the following sections:

1. Patient assessment including safety checks
2. Oxygen therapy and humidification
3. Clearance of secretions and suctioning
4. Care of the inner cannula
5. Stoma care and securing the tube
6. Cuff management
7. Oral care and assessment of swallowing
8. Use of speaking valves

### Tracheostomy red flags

Reference will be made to **TRACHEOSTOMY RED FLAGS.** Red flags can be divided into problems related to the AIRWAY (tracheostomy), BREATHING, specific TRACHEOSTOMY flags and general clinical deterioration. Red flags are warning signs that all is not right, and may be a sign that a significant tracheostomy related problem is developing. All assessment of a patient should follow an ABC approach and as part of that the tracheostomy should be assessed – however, patients can still develop problems unrelated to having a tracheostomy.

Red flags are early warning signs.

They may indicate problems developing with the tracheostomy such as a blocked inner tube or a dislodged tube. Red flags should trigger a reassessment of the patient and their tracheostomy and a call for more senior help if needed.

BUT Remember 'non tracheostomy' causes of respiratory distress

These are discussed in greater detail in the section on Tracheostomy Emergencies.

## Summary of daily tracheostomy care

*Note: once per shift = once per early, late and night shift*

| | |
|---|---|
| Oxygen therapy & humidification | • Ensure adequate humidification delivered (ventilated **and** non ventilated patients) |
| Inner cannula | • Inner cannula should be removed, inspected & cleaned **every 4 hours** ***(see note in text)***<br>• Spare inner cannula to be kept at bedside<br>• Dirty cannula cleaned with sterile water & left to air dry |
| Secretions and suctioning | • Deep suctioning should be performed as often as clinically indicated but minimum **every 4 hours** if fully ventilated<br>• Secretions can be suctioned from tracheostomy opening using Yankeur sucker if using trache mask |
| Stoma care & securing the tracheostomy | • **Minimum of once per 24 hours**:<br>  • Inspect stoma site for infection<br>  • Clean stoma with sterile gauze & saline/water<br>  • Change dressing and ensure tapes secure |
| Cuff check | • Check cuff pressure a **minimum of once per shift**<br>• Cuff pressure should be below 20-25cm$H_2O$ *(bottom of green on the manometer)*<br>• Check more frequently as indicated |
| Oral care & assessement of swallowing | • Daily oral care (see DCCQ Mouth care SOP)<br>• Regular assessment of swallowing |
| Documentation | • All tracheostomy observations should be documented on CIS |
| Safety | • Ensure continuous capnography in place<br>• Ensure bedhead sign in place<br>• Be familiar with tracheostomy red flags and emergency algorithms |

## 1. Patient assessment including safety checks

When taking over the care of a patient who has a tracheostomy: Think **TRACHE**

| | | |
|---|---|---|
| T | Time/type | When was it inserted?<br>What type of trache? Surgical/perc, adjustable flange |
| R | Reason | Why was it inserted?<br>E.g. airway obstruction, slow wean, neuromuscular condition |
| A | Airway | Are there any concerns regarding intubation?<br>What are the secretions like? |
| C | $CO_2$/cuff | Is continuous capnography in place (value + trace)<br>What is the cuff pressure? Any problems? |
| H | Help | Do I know who to ask for help? |
| E | Emergency | Do I know what to do in an emergency? |

Usual daily bedside safety checks should be performed and much of the tracheostomy emergency equipment will be available on the red airway trolley, however at the bedside there should always be a spare inner cannula. It is not necessary to keep a spare tracheostomy at the bedside as long as there are no clinical concerns (spare trache's are on the red airway trolley) but if transferring a patient with a tracheostomy, a spare tracheostomy should be taken on the transfer….remember to put it back in the equipment cupboard afterwards. If the patient has a specialised tracheostomy (e.g. adjustable flange or very small/large TraceoTwist tube) then ensure that either a spare is in the red trolley otherwise have a spare at the bedside.

## Tracheostomy bedhead signs

These should be in place for every patient and are there to alert everyone that the patient has a tracheostomy (or laryngectomy) but also to readily provide important information regarding the tracheostomy and airway in the event of an emergency. The sign will go with the patient to the ward if the tracheostomy is still in.

*Back – wall side*

This patient has a

# TRACHEOSTOMY

There is a potentially patent upper airway (Intubation may be difficult)

Percutaneous / Surgical *(circle)*

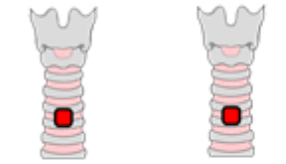
**Performed on (date)** .....

**Tracheostomy tube size** .....

**Cuffed / uncuffed / adjustable flange** *(circle)*

Difficult airway YES / NO
Is there an airway management plan documented YES / NO
Notes regarding tracheostomy (e.g. complications, insertion)

*(circle as appropriate)*



Percutaneous Surgical (window)

Sutures YES / NO

**Emergency Call:** ICU: Bleep 1987 / Ex 5752 | Anaesthetics: 1622 | ENT: Via switchboard | Cardiac arrest 2222

*Back – wall side*

This patient has a

# LARYNGECTOMY

and CANNOT be intubated or oxygenated via the mouth

**Performed on (date)** .....

**Is a tracheostomy tube in place YES / NO**

**Tracheostomy tube size (if present)** .....

**Cuffed / uncuffed / adjustable flange** *(circle)*

Notes:
The trachea (wind pipe) ends at the neck stoma
A tracheostomy tube may or may not be present

**Emergency Call:** ICU: Bleep 1987 / Ex 5752 | Anaesthetics: 1622 | ENT: Via switchboard | Cardiac arrest 2222

**Other contacts:** Critical Care Outreach/Tracheostomy Support Team: Bleep 1676

## 2. Oxygen therapy and humidification

**Thick secretions**:

If the secetions are increasing this may be a sign of new infection and/or inadequate humidification. Thick secretions may lead to blockage of the tracheostomy

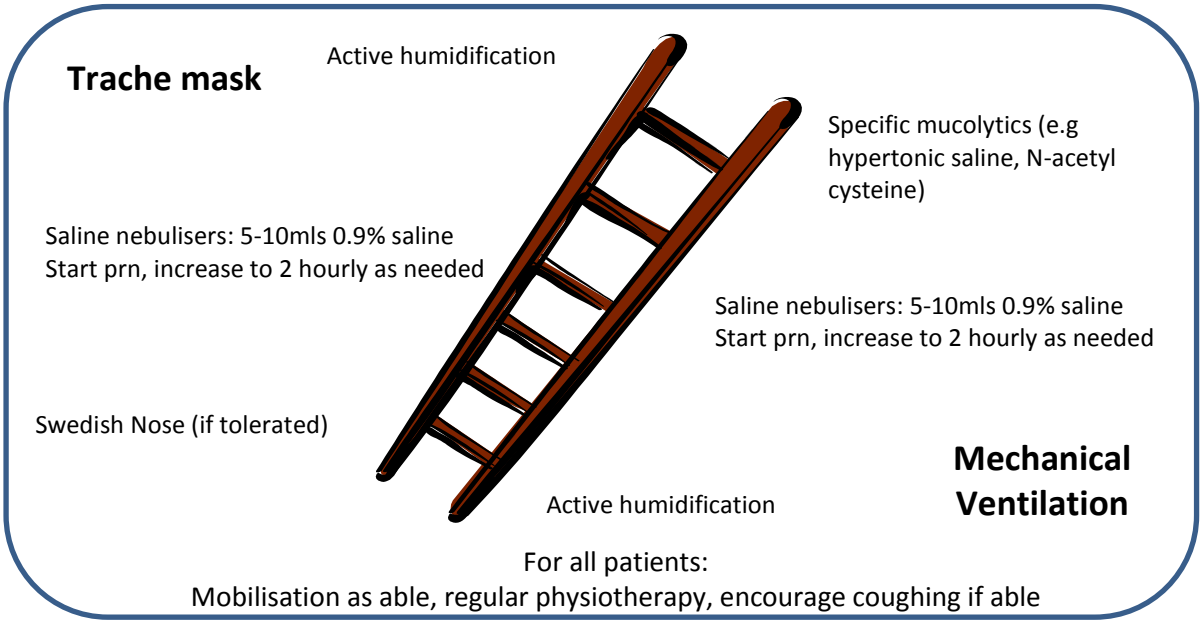
**ACTION: Review humidification and frequency of suctioning, consider new infection**

Some form of humidification should be used in **all** patients who have a tracheostomy; the degree of humidification used should be determined by the quality and quantity of secretions and the mode of ventilation (mechanical or self-ventilating via a trache mask). All tracheostomy patients should have a heated ventilator circuit. If the airway becomes dry, then secretions become dry and are harder to suction so can lead to a blockage either within the tube or within the airway. Inadequate humidification also can lead to keratinisation and ulceration of the tracheal mucosa. If secretions are thick despite humidification, then other therapies such as saline nebulisers or specific mucolytics can be considered.

Even when the patient is no longer on the ventilator and is receiving oxygen via a trache mask, then some form of humidification is generally needed as the patient's own nasopharynx, which provides natural humidification to keep the airways moist, is bypassed.

The need for humidification should be assessed regularly as the patient's condition changes – this may be a stepwise increase or a decrease in the level of support needed. This can be expressed in the form of a humidification ladder; you can step up as well as step down.

Humidification Ladder modified from: National Tracheostomy Safety Project 2012



## 3. Clearance of secretions and suctioning

**Difficulty passing a suction catheter** :

This should pass easily through the tracheostomy. If it does not, this may indicate the inner cannula is blocked or the tracheostomy is displaced.

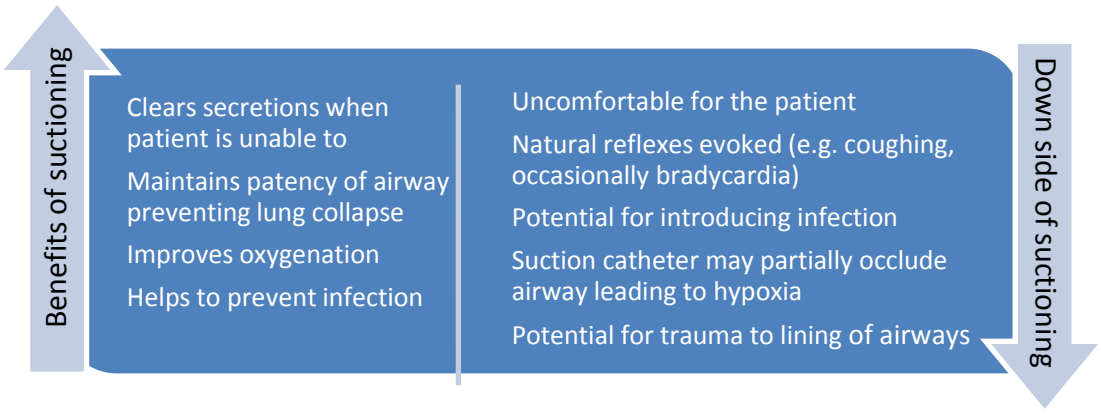
**ACTION: Place patients head in neutral position, check capnography tracing and check patency of inner tube**

**Consider whether tracheostomy has become displaced**

Sputum production is a normal phenomenon which healthy airways deal with easily. However if the patient is mechanically ventilated, particularly if they have an infection or a predisposition to produce excessive respiratory secretions, then assistance is required to help clear secretions and patients will need regular suctioning. As previously mentioned, lack of humidification can lead to increased secretions and also the actual presence of a foreign body (the tracheostomy) is a stimulus to sputum production.

An in-line suction catheter should be used in order to minimise breaks in the circuit with loss of PEEP and interruption of ventilation. The inline suction catheter should be of an appropriate size for the tracheostomy and should be tracheostomy specific one (shorter length of suction catheter). If the circuit needs to be broken and 'open suctioning' performed, then there should be a supply of appropriately sized suction catheters at the bedside.

When patients are self-ventilating on a tracheostomy mask, they may be able to cough and help clear their own secretions. Deep suctioning may still be needed but if the patient is able to cough secretions to the opening of the tracheostomy then a Yankeur sucker can be used to retrieve them. It should however be remembered that patients may be unable to adequately close their vocal cords (due to the tracheostomy) in order to generate enough of a translaryngeal pressure to cough properly.



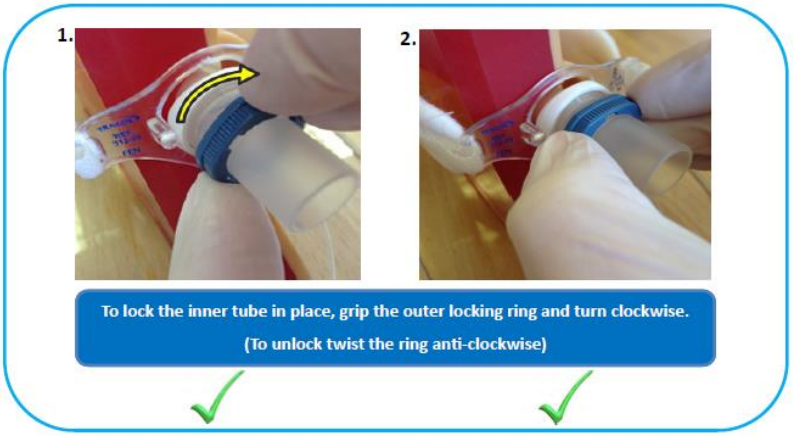

## 4. Care of the inner cannula (maintaining airway patency)

All tracheostomies used on the ICU have an inner cannula. The ventilator circuit will not attach to the tracheostomy without the inner tube being present for TRACOE tracheostomies (our standard on ICU). HOWEVER the ventilator **will** attach to a standard PORTEX tube even if the inner cannula is not there, therefore the presence of an inner cannula should always be checked if a patient has a non standard tracheostomy. The inner cannula is there for safety; if it gets blocked it can be removed, cleaned and a new one replaced. Secretions may not suddenly completely block the lumen of the inner tube, but over time secretions may build up and narrow the lumen so increasing the work of breathing.

Ideally the inner tube should be inspected a minimum of every 4 hours, and if there is no evidence of secretion build up it can be replaced straight away. If the cannula is dirty, a spare tube should be inserted and the dirty one cleaned. The inner cannula should be cleaned with ***sterile saline using a brush or gauze*** and then left to dry. They should not be left sitting in water.

For patients requiring mechanical ventilation, particularly those requiring high PEEP and/or $FiO_2$, these breaks in the circuit to check the inner tube *may* have adverse effects. In these situations it would be acceptable not to check the inner cannula regularly but perhaps time a change with any other periods of ventilator disconnection (e.g. physiotherapy). It should however be remembered that if there is any concern with the tracheostomy the inner tube should be inspected immediately as a potential source of the problem.

**Removing the inner cannula (Traceo Twist Plus tubes)**




## 5. Stoma care and securing the tube

The stoma site should be inspected at least once per shift. The stoma should be considered a wound that goes from skin to the trachea. Secretions may leak out around the stoma providing an ideal culture medium for bacteria, and despite adequate fixation the trache tube may move so leading to further skin irritation. A wet dressing doesn't always imply infection, however if the secretions are smelly or the site looks inflamed a swab should be sent and antibiotics started ONLY if there is a strong clinical indication to do so. The dressing should be changed a minimum of daily, more often if clinically indicated.

The ties holding the tracheostomy in place should be tight enough so that the tube does not become dislodged, but not so tight that they bite into the patient's neck causing pressure sores. The neck should be regularly inspected for signs of redness. Changing ties is a two person job.

## 6. Care of the cuff

**Problems with the cuff** :

a) New or worsening cuff leak

b) Regular cuff inflation to maintain the same cuff pressure

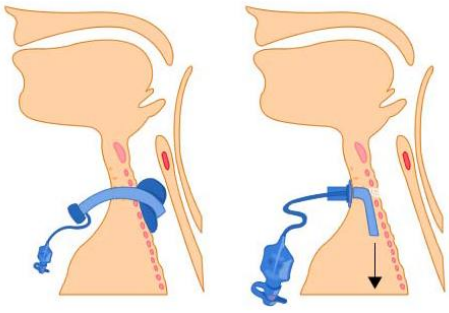
This may indicate that the tracheostomy is not of the correct size, is not sitting in the trachea correctly or the cuff is herniating upwards which could lead to tracheostomy displacement. Occasionally It may indicate a techinical problem with the tracheostomy

**ACTION: Review positon of tracheostomy (fully deflate, repositin then reinflate the cuff of the tracheostomy)**

**Cuff pressure should be below 20-25 cm$H_20$ (below the green zone on the manometer). Maximum 25cm$H_20$.**

The cuff needs to be inflated enough to occlude the airway so preventing secretions from entering the lower airway. The capillary pressure in the tracheal mucosa is around 20 cm$H_2O$ and so a constant cuff pressure above this can lead to ischaemic damage. This could lead to granuloma formation or even erosion down to the oesophagus (tracheo-oesophageal fistula), through to a major blood vessel (tracheo-innominate fistula) or lead to tracheal stenosis. This is aggravated by hypotension, local infection and trauma (from suctioning and excessive tube movement).

The cuff pressure should be **checked 8 hourly** (i.e. once per shift) or more often if there are clinical concerns. There will be a small loss of air from the cuff over time, but if the cuff is losing pressure regularly then this should be investigated. If the tracheostomy tube has become displaced then increasing amounts of air will be needed to maintain a seal. If more air is inserted then the tube may start to move as the cuff herniates upwards. This may lead to failure to ventilate adequately or even complete tube displacement. It should be addressed early on and if necessary the cuff deflated and the tube repositioned under direct vision, or even changed for a more appropriate sized one.



Far left: Tracheostomy migrating out of stoma due to cuff distortion
Left: Tracheostomy in pre-tracheal tissues

Occasionally the need to continually inflate the balloon may be due to a mechanical problem with the tracheostomy e.g. a hole in the cuff or an incompetent valve. If the problem is seen early after insertion it may be that the tracheostomy is not positioned correctly within the trachea and should be addressed.

## 7. Oral care and assessment of swallowing

Oral care is important and can help to help to reduce the volume of bacteria developing on the tracheostomy tube. Normal oral care should be provided as per the DCCQ guidelines. The presence of a tracheostomy is not a contraindication to oral intake but it needs to be assessed carefully. Downsizing of the tracheostomy *may* help swallowing when they get to the ward.

A patient with a tracheostomy may have difficulty with swallowing for a number of reasons:

**Related to the reason for tracheostomy insertion**

- Neurological condition (e.g. stroke)
- Neuromuscular conditions (e.g. Guillain Barre syndrome)
- Muscular weakness due to prolonged ICU stay (includes weakness of the bulbar muscles due to disuse

**Related to the actual presence of the tracheostomy tube**

- The tracheostomy cuff may impinge on the oesophagus causing mechanical blockage
- The tracheostomy prevents the normal upward movement of the larynx and upper airway that is needed for safe swallowing

## 8. Speaking valves

A speaking valve is a one way valve attached to the tracheostomy which allows air in through the valve on inspiration. The valve then closes on expiration and exhaled air is diverted through the vocal cords and out through the upper airway so allowing speech. This should only be used with the cuff deflated. The patient should be able to tolerate the cuff being down before a speaking valve trial is undertaken. The first time the valve is put on they may find it uncomfortable but if they immediately develop respiratory distress then remove the valve and ensure that the cuff is FULLY DEFLATED. If tolerated then the time spent with the valve can be gradually increased.

*Reasons for not tolerating speaking valve:*

- Check that the cuff is fully down
- The tracheostomy may be too big within the trachea, not allowing them enough room to 'breathe around' it – a smaller tracheostomy may help
- Muscular weakness of upper airway (secondary to critical illness or due to a separate neuromuscular disorder) – this may just need more time with improvement of nutritional status and improved muscular strength however specialist input may well be needed
- Return of the resistance from the upper airways leading to increased work of breathing

# Tracheostomy decannulation

Some patients are able to be decannulated fairly quickly after they no longer need ventilatory support. They will generally have been off support for over 24 hours, can tolerate cuff deflation and are able to cough and clear their own secretions.

For some patients decannulation is a slower, stepwise process which continues when they go to the ward. When the cuff is inflated it provides some protection from aspiration of secretions and therefore the patient becomes unaccustomed to managing their own oral secretions and swallowing them. Therefore the first few times that the cuff is deflated the patient may feel 'uncomfortable' and cough more. This should improve with time and once the patient's upper airway is 'retrained' they will be able to tolerate increasing periods of 'cuff down', aiming for continuous cuff deflation. To start with while the cuff is down the patient should be monitored for any signs of respiratory distress and if they are not tolerating the cuff down it should be re inflated and the patient reassessed.

**Reasons for not tolerating cuff deflation**

Air flow through the tracheostomy has less resistance than air flow through the upper airways, deflating the cuff may cause the following problems:

1. Increased work of breathing
    - It is easier to breathe through a tracheostomy tube. Deflating the cuff and so allowing air to pass through the 'normal' route may, in someone who has limited respiratory reserve, lead to extra breathing effort and cause respiratory distress
    - The presence of the tracheostomy tube in the airway, even with the cuff down, causes a partial obstruction which may make it harder for the patient to breathe
    - Failure to tolerate cuff down may be related to muscular weakness of the upper airway or respiratory muscles which may be secondary to critical illness or due to a separate neuromuscular disorder

2. The patient may become hypoxic when the cuff is deflated
    - Oxygen passing through the upper airways is diluted with dead space air, whereas oxygen being inhaled through the tracheostomy bypasses this dead space area so is 'pure oxygen'. For some patients who have borderline gas exchange, this dilution of oxygen with dead space gas may be lower the $FiO_2$ enough to cause them distress.

3. Specific neurological problems affecting muscles of upper airway
    - The glossopharyngeal nerve (cranial nerve IX) innervates the roof of the pharynx and the tonsils, and the vagus nerve (cranial nerve X) gives off the superior laryngeal nerve and the recurrent laryngeal nerve which provide the motor supply to all the muscles of the larynx. In neurological conditions where these are affected this may lead to problems trying to decannulate
    - Long term muscular weakness

## The patient with a laryngectomy

A laryngectomy involves removal of the larynx and involved surrounding structures. The opening to the airway is brought out to the neck as a stoma (tracheotomy). There is no communication between the mouth/nose and the lungs so all air passes in and out of the tracheotomy but the mouth still communicates with the oesophagus. Some patients will have had a speaking valve inserted which involves the creating a small communication between the trachea and oesophagus and the placement of a TEP valve (**T**racheo o**E**sophageal **P**uncture valve). Most patients who have had a laryngectomy for some time will not have anything in the stoma; it will just be seen as a hole at the base of the neck. If a patient with a laryngectomy is admitted to hospital they do not necessarily need a tracheostomy tube to be inserted. A tracheostomy tube may be inserted if the surgery is recent or ventilation is needed.

The important thing to note in an emergency for these patients is:

- They cannot be intubated via the mouth, a tracheostomy tube can be inserted into the stoma
- They cannot be bagged via a facemask. If in an emergency they need bagging then place a small face mask over the stoma and attempt to ventilate. Even if a tracheostomy tube is not present, an ETT can be inserted into the stoma to assist ventilation.

NTSP
www.tracheostomy.org.uk

THE NATIONAL ASSOCIATION OF LARYNGECTOMEE CLUBS

# Laryngectomy information sheet
## (for healthcare providers)

This information sheet has been produced to help healthcare professionals who may not be familiar with laryngectomees. More information can be found on the NALC (www.laryngectomy.org.uk) or NTSP websites (www.tracheostomy.org.uk).

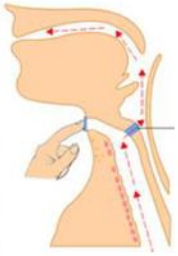
### What is a laryngectomy?

A laryngectomy involves surgical removal of the larynx (voice box), usually as treatment for cancer of the larynx. The remaining trachea (wind pipe) is brought to the front of the neck as an end stoma. The mouth, nose and upper airways are no longer connected to the lungs. All breathing, ventilation and oxygen delivery can only occur via the stoma in the neck. Bed-head signs are available to display this information.

### Humidification & suction

The humidification normally provided by the upper airways is lost. Laryngectomees need continuous artificial humidification of air or oxygen inspired via the neck stoma. This can be achieved using various stoma covers or protectors. Any oxygen administered *must* be humidified. Cough effort can also be reduced or less effective. Regular suction may be required and should *always* be available.



### Communication

Laryngectomees have lost their 'voice box'. Artificial speech is possible via an 'electolarynx' which vibrates the neck externally, oesophageal speech ('burping' swallowed air) or via a Tracheo-oEsophageal Puncture (TEP) valve. The TEP valve allows expired gas to be forced into the oesophagus, facilitating speech.

### Anaesthesia

There are no contra-indications to anaesthesia with a laryngectomy. For general anaesthesia, the laryngectomy stoma can be intubated with a tracheostomy tube, specialist laryngectomy tube (eg. Montadon tube shown here) or an endotracheal tube. Supplemental humidified oxygen via an open stoma can be delivered via a 'trachy-mask.' The TEP valve should be left in situ. Emergency management algorithms and further resources are available from NALC and NTSP.

## Check list before patient discharge to the ward with a tracheostomy

For patients that are going to be discharged to the ward with a tracheostomy in situ, it is important to make sure the following have occurred:

1. Change of tracheostomy if needed
    - **No patient should go to the ward with a subglottic aspiration tracheostomy in place**
    - When changing the tracheostomy always think, do they need the same size tracheostomy or can they be 'downsized'?

2. Ensure bedhead sign is completed
    - The appropriate details should be filled in if not done already (the bedhead sign is in the tracheostomy discharge pack)

3. Inform outreach regarding discharge
    - They will see the patient and provide a ward tracheostomy discharge pack to go with the patient.
    - The patient and their tracheostomy will then be reviewed regularly by the tracheostomy support team who will lead the process of decannulation and advise and support the ward with the care of a patient who has a tracheostomy in place.

# Tracheostomy emergencies and emergency algorithms

## Red flags

It is important to be aware of the early warning signs indicating there may be a problem with, or related to the tracheostomy (red flags). By acting on these signs promptly a major emergency may be averted, for example a blocked inner tube or a displaced tracheostomy tube.

Red flags can be divided up into airway and breathing flags.

|  | Flag | Action |
|---|---|---|
| Airway | **Sudden onset of cuff leak:** *(An audible bubbling noise, loss of expired tidal volume or patient being able to vocalise despite an inflated cuff)*<br>This may be due to the tracheostomy cuff herniating upwards or the tube not positioned correctly | Immediately assess tracheostomy position<br>Deflate cuff fully and re inflate ensuring tracheostomy is positioned correctly<br>Assess the type/size of tracheostomy and its position in the trachea, consider a change in tube if needed |
| | **Slow cuff leak**: *(Cuff needing regular inflation to maintain cuff pressures or prevent cuff leak)*<br>This may be due to a mechanical failure of the cuff | Tracheostomy tube will need to be changed |
| | **Difficulty in passing a suction catheter:**<br>May be due to a blocked inner tube or the tube incorrectly positioned and the suction catheter hitting the posterior tracheal wall | Check the inner tube is not blocked<br>Assess position of tracheostomy tube |
| | **Sudden loss/change in end tidal $CO_2$ waveform:**<br>May be due to a blocked tracheostomy or tube becoming displaced | Check the inner tube is not blocked<br>Confirm tube is still in the trachea |
| Breathing | **Respiratory distress:**<br>This may be caused by reasons immediately related to the tracheostomy (e.g. blocked tube, secretions) but it is important to then consider non tracheostomy related causes of respiratory distress | Check the inner tube is not blocked<br>Confirm the tube is still in the trachea<br>Suction via the tracheostomy<br>If problem is related to secretions then reassess humidification, frequency of suctioning and consider need for mucolytics or antibiotics |
| | **Feed being suctioned via the tracheostomy:**<br>This may indicate that the cuff is not functioning properly (inadequately inflated or tube incorrectly positioned) | Check the position of the NG tube<br>Check the position of the tracheostomy and cuff pressures |
| Trache | **Visibly displaced tracheostomy:** | Refer to section on 'complications' |
| | **Blood or blood stained secretions:** | Refer to section on 'complications' |

## Summary of red flags

**Immediate assessment of the tracheostomy is needed if there is an unexplained:**

Increase in respiratory rate and/or heart rate

Unexplained worsening of gas exchange

Fall in tidal volumes

Difference between inspired and expired tidal volumes

Change in end tidal $CO_2$ value and/or trace

**Thick secretions**:

If the secetions are increasing this may be a sign of new infection and/or inadequate humidification. Thick secretions may lead to blockage of the tracheostomy

**ACTION: Review humidification and frequency of suctioning, consider new infection, consider use of mucolytics**

**Difficulty passing a suction catheter** :

This should pass easily through the tracheostomy. If it does not, this may indicate the inner cannula is blocked or the tracheostomy is displaced.

**ACTION: Place patients head in neutral position, check patency of inner tube, check position of tracheostomy**

**Problems with the cuff** :

a) New or worsening cuff leak

b) Regular cuff inflation to maintain the same cuff pressure

This may indicate that the tracheostomy is not sitting in the trachea correctly and the cuff is herniating upwards which could lead to tracheostomy displacement

It may indicate a techinical problem with the tracheostomy

**ACTION: Review positon of tracheostomy (fully deflate, re position then reinflate the tracheostomy)**

## Tracheostomy complications

There are many complications that can develop, but the most common are discussed below. Some complications are 'tracheostomy emergencies' that need immediate action; this is shown in the emergency algorithm following. It is important to keep calm and reassure the patient if they are awake.

### Blocked tracheostomy

This is usually due to secretions which become thick and sticky, either as a consequence of new infection, inadequate humidification or on-going heavy secretion load (or a combination of factors). Occasionally the tracheostomy can become blocked with a blood clot. A build-up of secretions may lead to gradual narrowing of the tube over a period of time so making it harder to pass a suction catheter but quite often blockage can occur rapidly as a sputum plug moves.

Regular inspection and change of the inner tube can help to reduce sputum build up within the trache with meticulous attention to humidification and mobilisation of secretions.

If the tracheostomy tube were to become blocked then a change of the inner tube should restore airway patency; if the sputum plug is just at the end of the tracheostomy then suctioning should be performed.

### Displaced tracheostomy

A tracheostomy may be completely or partially displaced. If the tracheotomy is completely out, the stoma should be covered by gauze, pressure applied and the emergency algorithm followed. The sequence of events after the accidental removal of a tracheostomy in a patient who is weaned down to a trache mask will be different to that if that patient is fully mechanically ventilated.

For a patient who is getting close to decannulation, then the decision may be made not to reinsert the trache but to closely observe them. If the patient is fully ventilated then plans should be made to reintubate them orally and THEN replace the tracheostomy. The patient should be ventilated using a bag and mask while someone prepares for RSI. Reinsertion of the tracheostomy may be performed once the airway is secured, or after the patient has had a period of stability post intubation.

If the tracheostomy is PARTIALLY out, then it should **not** be simply pushed back in again unless the tip of the tube can be confirmed as still within the trachea (usually via bronchoscopy). The defect in the trachea stays open for a varying period depending on the age of the tracheostomy, but the soft tissues overlying can move leading to the risk of pushing the trache back into paratracheal tissue.

### Infection around the tracheostomy stoma

Excessive secretions leaking from around the tracheostomy can cause erythema of the stoma and does not necessarily mean a skin infection however the stoma is a surgical wound and infection can still occur.

Regular stoma care and change of dressing together with regular active inspection of the wound should be performed. If there is the suspicion of infection the wound should be cleaned, swabbed and antibiotics started if felt appropriate.

## Bleeding from the tracheostomy

The causes of bleeding from a tracheostomy are discussed elsewhere, but all cases of blood on suctioning should be reviewed and if a cause if not immediately apparent then one should be looked for (e.g. involving ENT).

Action following a haemorrhage will depend on the magnitude of the bleed, however the key points are:

- Ensure tracheostomy patency: change inner tube if blocked with blood clot, suction via tracheostomy. If a significant bleed has occurred then then consider **3H's**
    - **H**yperinflate the cuff (this may tamponade any bleeding)
    - **H**elp: Consultant help will be needed as well as specialist help from ENT
    - **H**aematology: in cases of massive haemorrhage, the massive transfusion policy should be activated
- All attempts should be made to preserve the tracheostomy as once it is removed, oral intubation or recannulation of the stoma may be very difficult due to the presence of blood.

Academic Department of Critical Care
Queen Alexandra Hospital Portsmouth

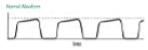
Portsmouth Hospitals NHS
NHS Trust

# Emergency tracheostomy management (ICU non ventilated)

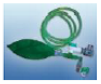
**Red flags including:**
Increased respiratory rate
Falling saturations
Unexplained agitation

**Consider:**
Blocked tracheostomy
Displaced tracheostomy
Non trache related causes

**Call for appropriate help**
Nurse in charge
ICU Registrar (Bleep 1987)
ICU Consultant



Look, listen & feel at the mouth and tracheostomy
**Ensure capnography attached, consider using Mapleson C system**



**Is the patient breathing?**

**No**

**CPR if no pulse/signs of life**
**Refer to cardiac arrest algorithm**

**Yes**

Apply high flow oxygen to **BOTH** face and tracheostomy

Assess tracheostomy **PATENCY**

Position head in neutral position , remove speaking valve
Encourage patient to cough if able
Remove, inspect and replace inner tube

Can you pass a suction catheter easily?

Yes

**The tracheostomy tube appears patent**
Continue ABCDE assessment
Attach to ventilator if needed

No

Deflate the cuff
Look listen & feel at mouth & tracheostomy
**Is the patient stable or improving?**

Yes

**The tracheostomy tube appears partially obstructed or displaced**
Continue ABCDE assessment

No

**REMOVE THE TRACHEOSTOMY TUBE**
Ensure oxygen to face & cover stoma with gauze
Consider re insertion of tracheostomy (established tract), oral intubation or remain decannulated

**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

Draft May 2017 (ICU non vent)

Modified from National Tracheostomy Safety Project www.tracheostomy.org.uk

Academic Department of Critical Care
Queen Alexandra Hospital Portsmouth

Portsmouth Hospitals NHS
NHS Trust

# Emergency tracheostomy management (ICU ventilated)

**Red flags**
Increased respiratory rate
Falling saturations
Unexplained agitation

**Consider**
Blocked tracheostomy
Displaced tracheostomy
Non trache related causes

**Call for appropriate help**
Nurse in charge
ICU Registrar (Bleep 1987)
ICU Consultant

**Disconnect from ventilator**
Remove inspect & replace inner tube
Ensure capnography in place & ventilate gently using Water's circuit

**CPR if no pulse/signs of life**
**Refer to cardiac arrest algorithm**

**No**

Apply high flow oxygen to **BOTH** face and tracheostomy

Assess tracheostomy **PATENCY & POSITION**

Normal $ETCO_2$ waveform

Chest wall moves easily

Yes

**The tracheostomy tube appears PATENT**
Check cuff pressure
Continue ABCDE assessment
Consider return to ventilator if stable
Consider fibre-optic assessment of tube position

No

*Neck swelling or surgical emphysema developing?*

No

Yes

*Can you pass a suction catheter easily?*

Yes

If patient stable **CONSIDER** fibre-optic assessment of tracheostomy

No

**REMOVE THE TRACHEOSTOMY TUBE**
Ensure oxygen to face & cover stoma with gauze
Plan for oral re intubation
*(consider re insertion of tracheostomy **IF** established tract **AND** patient stable)*

**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

Draft May 2017 (ICU vent)

Modified from National Tracheostomy Safety Project www.tracheostomy.org.uk

Academic Department of Critical Care
Queen Alexandra Hospital Portsmouth

Portsmouth Hospitals NHS
NHS Trust

# Tracheostomy emergency – CARDIAC ARREST (ICU)

Confirm cardiorespiratory/respiratory arrest | Call for help

## Assess tracheostomy patency
and provide ventilation

Position head in neutral position
Remove speaking valve (if present)
Ensure cuff inflated
**Ensure capnography in place**

Attach Waters circuit to tracheostomy + 15l $O_2$
**Give 2 GENTLE inflations**
**Does the chest move easily with ventilation?**
***Is an appropriate end tidal $CO_2$ trace seen?***

**YES** → Continue **continuous** chest compressions
100-120 per minute

Ventilate at 10-12 breaths/min

Management of cardiac arrest as per ALS guidelines

**No**

Remove, inspect and replace inner tube
**Suction via tracheostomy**
**Does the chest move easily with ventilation?**
***Is an appropriate end tidal $CO_2$ trace seen?***

**YES** → Continue **continuous** chest compressions
100-120 per minute

Ventilate at 10-12 breaths/min

Management of cardiac arrest as per ALS guidelines

**No**

Deflate the cuff
**Can you ventilate via FACE using bag + mask?***

**YES** → Continue CPR rate **30:2** with facemask ventilation

Management of cardiac arrest as per ALS guidelines

*Once airway secured move to asynchronous ventilation/compressions*

**No**

**SPECIALIST RESPONDER**
If tracheostomy **displaced** - remove tube
Cover stoma with gauze and apply pressure
Ventilate via FACE using bag + mask*
Prepare to secure airway *(see over)*

## Start chest compressions
If no/inadequate output

Fetch cardiac arrest trolley

* Remember airway opening manoeuvres: head tilt, chin lift, jaw thrust. Consider use of oral and NP airway adjuncts
# Remove tracheostomy tube if no chest wall movement and no appropriate $ETCO_2$ trace seen

**REMEMBER LARYNGECTOMY PATIENTS CANNOT BE INTUBATED VIA THE MOUTH**
**INSERT ORAL ENDOTRACHEAL TUBE OR TRACHEOSTOMY INTO STOMA TO VENTILATE**

Draft May 2017

## Further reading

E-learning. There is a very good E-learning package available through E-learning for Healthcare at http://www.e-lfh.org.uk/programmes/tracheostomy-safety/.

National Tracheostomy Safety Project. This national project brings together best practice for care and management of tracheostomies as well as providing useful education. It can be accessed via http://www.tracheostomy.org.uk/

NCEPOD 'On the right trach' report 2014. http://www.ncepod.org.uk/2014tc.htm

Please refer to the Tracheostomy Support Team intranet site (right hand site of Critical Care site) for updated background reading.

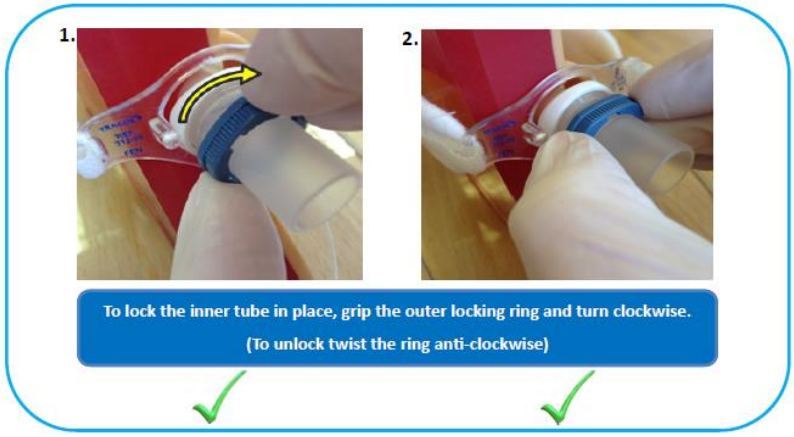
# How to guides

## Care of the inner cannula

The inner cannula must be removed, inspected and cleaned at least 4 hourly to prevent narrowing and blockage. The patient should never be without an inner cannula.

| Action | Rationale |
|---|---|
| Explain procedure to patient | To gain verbal consent, co-operation and reassure the patient |
| Pre oxygenate with 100% (oxygen breath) | To prevent hypoxia |
| Wash and dry hands, don apron, gloves and goggles | To reduce cross infection. |
| With one hand stabilize the actual tracheostomy tube and with the other hand remove the inner cannula then insert clean inner cannula<br>Ensure that the clean inner cannula is locked in position (see image below) | To maintain airway, prevent early build up of secretions and to maintain oxygenation. |
| Clean inner cannula with sterile water/saline, use cleaning brush if needed<br>Dry and store in a dry clean container<br>If very heavily soiled then dispose of an place a new inner cannula at the bedside | To reduce infection risk<br>Cannula should not be left to soak in water as it is an infection risk |
| Document procedure on CIS | To facilitate communication and evaluation. |

**Removing the inner cannula (Traceo Twist Plus tubes)**



## Suctioning

| Action | Rationale |
|---|---|
| Explain the procedure to the patient | To obtain consent, co-operation and reassure the patient |
| Wash hands and don apron and gloves. Goggles should be worn if in-line suctioning is not being used | To reduce the risk of cross infection. |
| Pre oxygenate with 100% (oxygen breath) | To prevent hypoxia |
| Ensure head is in neutral alignment | To provide patient comfort and ease procedure |
| In line suctioning should be used for all mechanically ventilated patients. Ensure the circuit is the correct size and in date<br>Suction pressure on circuit occlusion should not exceed -150mmHg (20 kPa pressure)<br>Suctioning should be performed with the inner cannula in place<br>Repeat as clinically indicated | Too great a suction pressure can cause prevent mucosal trauma, hypoxaemia and atelectasis |
| Observe the patient throughout the period to ensure no adverse effects | Tracheal suction may cause vagal stimulation (leading to bradycardia), hypoxia and stimulate bronchospasm |
| Record the procedure on CIS | To facilitate communication and evaluation |

Sequence of events for non in-line suctioning

1. Pre oxygenate the patient, explain the procedure and apply personal protective equipment
2. Ensure inner cannula is in place
3. Put a sterile glove on dominant hand (double glove)
4. Insert suction catheter without applying suction until approximately 1/3 of the catheter is in situ or until the patient coughs
5. Withdraw the catheter 0.5-1cm and apply suction by occluding the suction port with gloved thumb
6. Continue withdrawing the catheter applying continuous suction until it is removed from the tracheostomy tube
7. The entire process should not exceed 10 seconds
8. Remove glove from dominant hand by inverting over used catheter, dispose of in clinical waste bag
9. Reattach oxygen within 10 seconds
10. If another suction is needed a new sterile catheter and sterile glove must be used
11. No more than 3 suctions in succession
12. Flush through the connection tubing with clean water and wash hands after
13. Record procedure and secretions on CIS

**Note**: For self-ventilating patients on a tracheostomy mask, if the patient is able to cough secretions to the opening of the tracheostomy then a Yankeur sucker can be used to suction the secretions form the opening rather than perform a deep suction.

## Tracheostomy dressings and ties

This is a 2 person procedure which needs to be performed at least once per 24 hour period.

| Action | Rationale |
|---|---|
| Explain procedure to patient where appropriate | To gain verbal consent, co-operation and reassure patient. |
| Wash and dry hands, don apron, clean gloves and goggles. | To reduce the risk of cross infection. |
| One practitioner should hold the tube and ventilator tubing while the other removes tapes and dressing and discards dirty gloves. | To reduce the risk of dislodgement. |
| Assess tracheostomy site for signs of trauma, infection or maceration<br>Take a swab if there are clinical signs of infection (e.g. purulent discharge, odour, cellulitis and discolouration)<br>Observe the back of the neck for signs of redness/soreness from tapes. | To take further action if required. |
| Gently clean around stoma using sterile gauze squares soaked in saline and then pat dry<br>Apply new tracheostomy dressing starting from below the stoma with shiny side to skin. | To remove debris while not causing irritation.<br>To protect area around stoma. |
| Secure in place with tracheostomy tapes/holder.<br>**Not too tightly - 2 fingers should be a comfortable fit between the tapes and patients neck** | For patient comfort and to prevent migration of the tube. |
| Dispose of all soiled dressings as per trust policy. | To reduce infection risk. |
| Document assessment and procedure on tracheostomy care and suction chart | To facilitate communication and evaluation. |