



Reference Number: UHB 390	Date of Next Review: <i>January 2022</i>
Version Number: 1.1	Previous Trust/LHB Reference Number:
Guidelines for the Management of Acute In-patient Adult Patients with a Tracheostomy	
Introduction and Aim <p>These guidelines are intended to support and inform all Cardiff and Vale staff involved in the management of patients with both surgical and percutaneous tracheostomies within the acute in-patient setting.</p> <p>These guidelines set out core principles that should be followed by the staff of Cardiff and Vale University Health Board who are involved in the management of patients with a tracheostomy. It will set out how procedures involved in the management of patients with a tracheostomy are carried out, who should be involved and how and where this should be documented.</p>	
Objectives <ul style="list-style-type: none">• Detail emergency management processes for blocked / displaced / bleeding tracheostomies• Provide background information regarding reasons for patients requiring tracheostomy and tube selection• Identify roles of relevant professionals in aiding tracheostomy management• Discuss key procedures and interventions for patients with tracheostomies	
Scope <p>This procedure applies to all of our staff in all locations including those with honorary contracts</p>	
Equality and Health Impact Assessment	An Equality and Health Impact Assessment (EHIA) has been completed and this found there to be no impact
Documents to read alongside this Procedure	Nil
Approved by	Cardiff and Vale UHB Tracheostomy Steering Group



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Summary of reviews/amendments				
Version Number	Date of Review Approved	Date Published	Summary of Amendments	Approved by
1.0	25 th January 2018	10 th April 2018	New document	Cardiff and Vale UHB Tracheostomy Steering Group
1.1	20 th January 2020	11 th February 2020	Updated	Cardiff and Vale UHB Tracheostomy Steering Group



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University Health Board

Guidelines for the Management of Acute In-patient Adult Patients with a Tracheostomy

Date: January 2020

Date for review: January 2022





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1. INTRODUCTION

These guidelines are intended to support and inform all Cardiff and Vale staff involved in the management of patients with both surgical and percutaneous tracheostomies within the acute in-patient setting.

These guidelines set out core principles that should be followed by the staff of Cardiff and Vale University Health Board who are involved in the management of patients with a tracheostomy. It will set out how procedures involved in the management of patients with a tracheostomy are carried out, who should be involved and how and where this should be documented.

Adherence to these guidelines should ensure that there is consistent evidence based management of tracheostomy patients.

Application of these guidelines should be appropriate to meet the needs and capabilities of the individual.

2. OVERARCHING STATEMENT

The UHB is committed to the provision of consistent evidence based care for all patients. It believes that the delivery of evidence-based care supports staff, optimises patient care and contributes to the UHBs clinical governance agenda.

3. AIMS

These guidelines will set out how specific procedures related to the management of tracheostomy patients should be conducted, who should be involved and how and where



such interventions should be documented. This is to minimise any misunderstanding regarding tracheostomy care.

These guidelines are based on the current multidisciplinary evidence base or best practice where this is not available, and informed by local experience.

4. TRACHEOSTOMY EMERGENCIES

There are several scenarios that can lead to a tracheostomy emergency. The most common are: -

- A dislodged or displaced tracheostomy
- A blocked tracheostomy tube
- A bleeding tracheostomy

The procedure for each scenario is presented (dislodged / displaced & blocked use same procedure). It is essential to identify if the tracheostomy tube is temporary, permanent or is an end stoma i.e. a laryngectomy.

For all tracheostomy related emergencies, help must be requested via '2222' stating AIRWAY ARREST

4.1 Dislodged/Displaced Tracheostomy

Tracheostomy tubes may become dislodged or displaced for many reasons. It is important to ensure that the tracheostomy tube holder is adjusted regularly to ensure that a secure, comfortable position of the tube is maintained at all times. Tracheostomy tubes may become dislodged when, for example, a ventilated patient is turned or moved from their bed to a trolley. Restless or agitated patients may pull at lines, catheters, etc. – this can include tracheostomy tubes or ventilator tubes attached to the tracheostomy tube.

A partly dislodged tracheostomy tube is just as dangerous, if not more dangerous, as a completely removed tracheostomy tube as it may not be obvious.

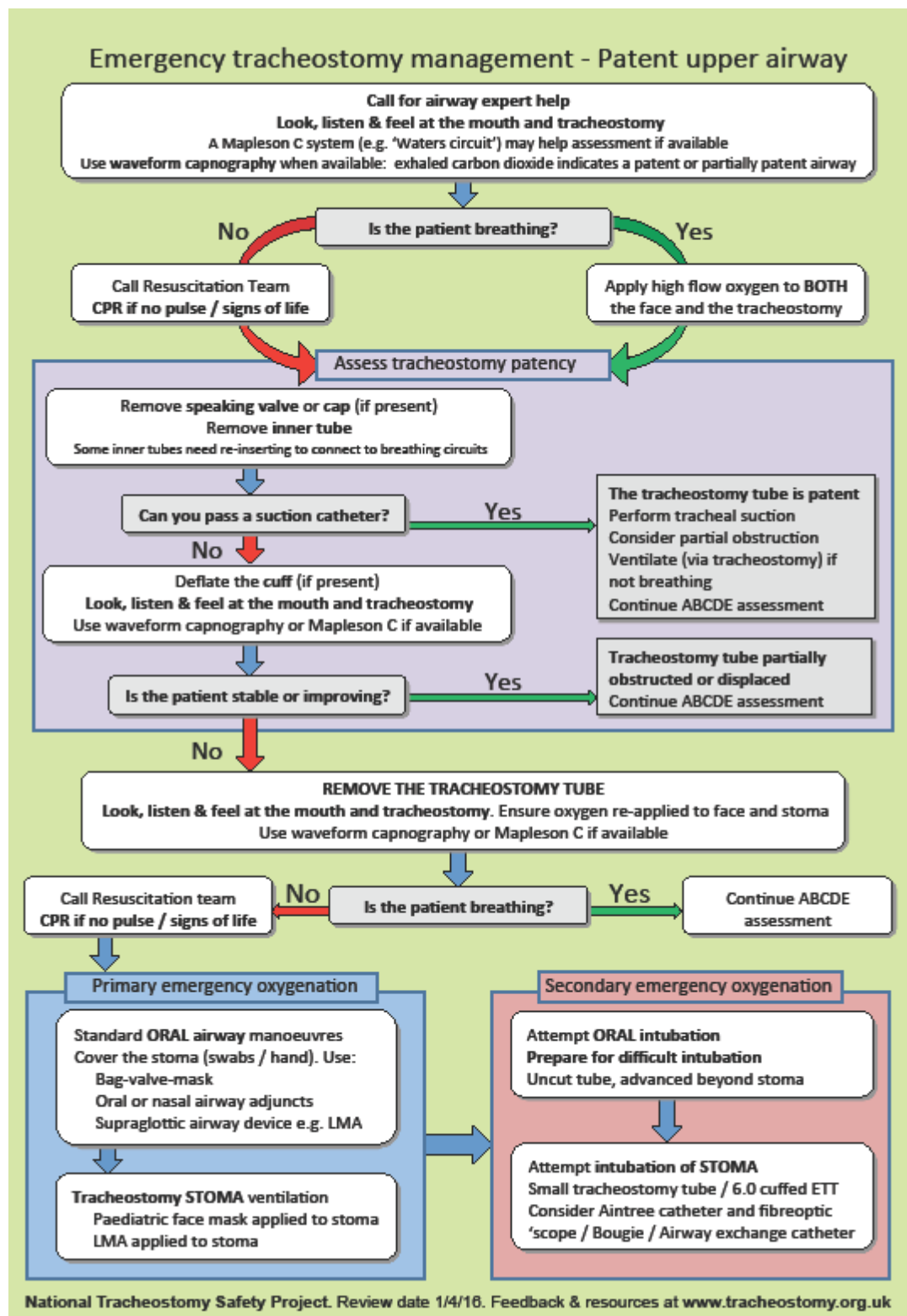
4.2 Blocked Tracheostomy Tube

A tracheostomy tube may become blocked with thick tracheal secretions. Typically, the patient will present with increasing respiratory distress, which may happen over a few hours, but can occur very rapidly. A blocked tracheostomy tube is therefore an emergency in which the patient's life is at risk if not rapidly resolved. Patients with tracheostomies must always receive adequate humidification of their inspired gas to lessen the risk of tube blockage.

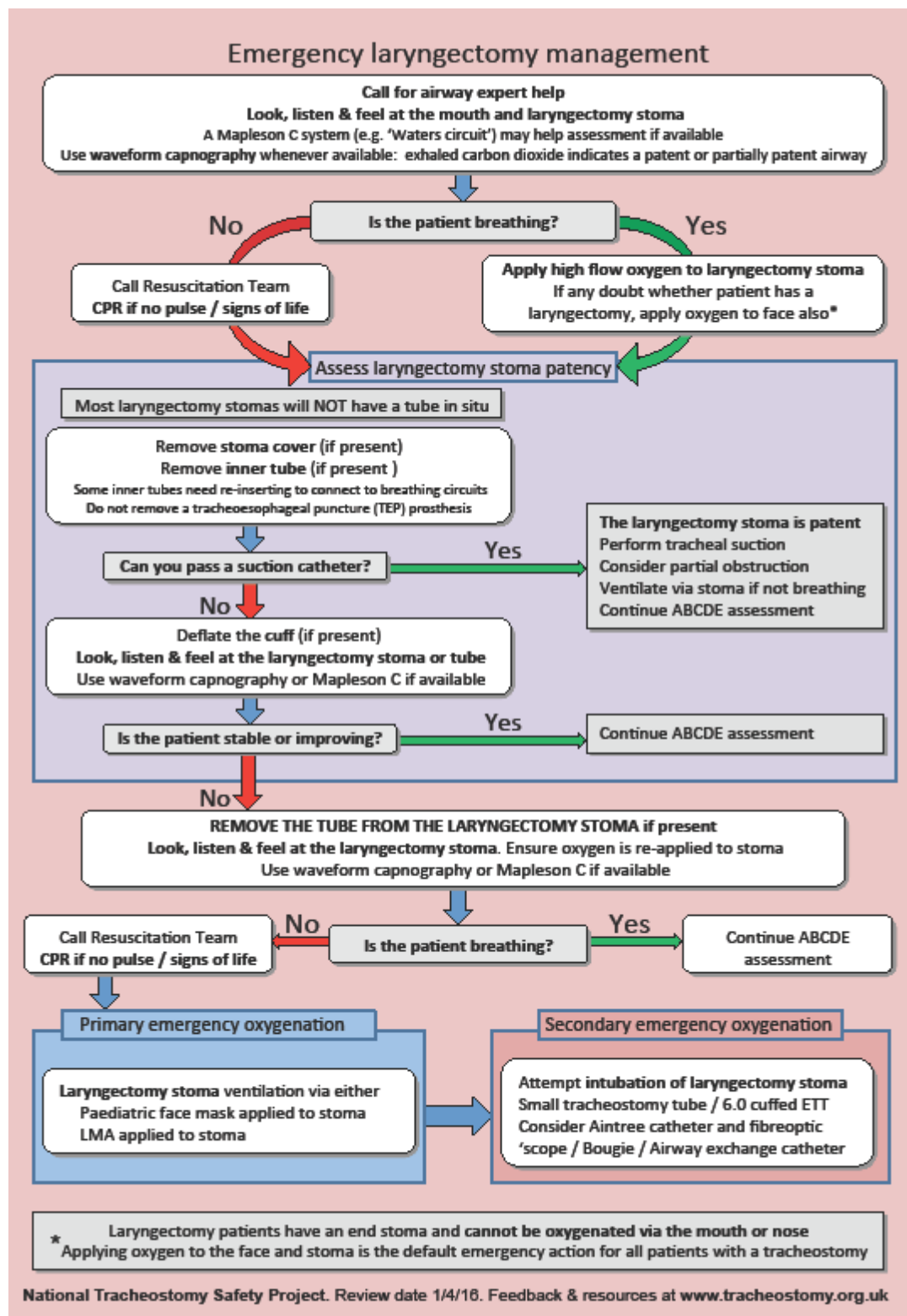


A major safety feature to minimise the risk of tube blockage is the use of a tracheostomy tube with an inner cannula. Such tubes should have their inner cannula cleaned at two-hourly intervals (as per Trust guideline) to prevent the build-up of secretions. It is recommended that, when possible, all patients with a tracheostomy tube should have a tube with an inner cannula. Patients may arrive from other hospitals with a traditional tracheostomy tube without an inner cannula.

4.3 Emergency Tracheostomy Management – For Patent Upper Airway



4.4 Emergency Laryngectomy Management



4.5 Bleeding from a Tracheostomy



Bleeding is the most common complication of tracheostomy, irrespective of the method of insertion. Bleeding may occur early (within 48 hours of formation of the tracheostomy) or late (several days afterwards). Bleeding may be minor (settles with simple conservative management) or major (requiring transfusion of blood and/or blood products) and surgical exploration may be needed to identify and deal with the source of bleeding.

The management of bleeding from a tracheostomy therefore depends upon the context in which the bleeding occurs.

4.5.1 Early minor bleeding

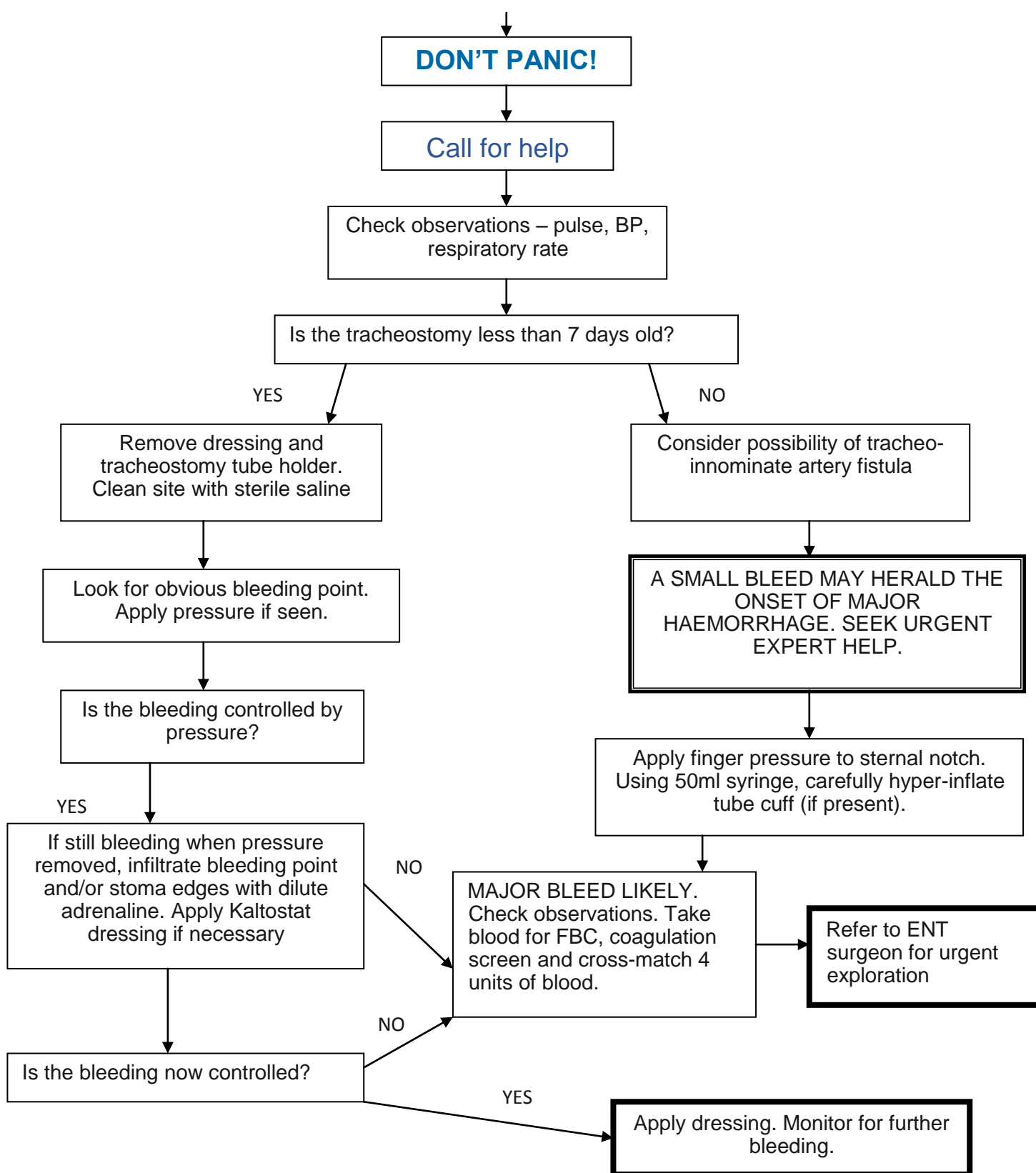
Oozing from the stoma site is the most common type of bleeding seen following formation of a tracheostomy. Most commonly, this is the result of the effects of the vasoconstrictor used to infiltrate the incision site wearing off. Blood staining of the dressings may be noted, or there may be blood staining of tracheal secretions. Large volumes of from blood represent significant bleeding, which may require surgical exploration.

4.5.2 Late bleeding

Late bleeding may occur because of erosion of blood vessels in and around the stoma site. This is more likely if there has been infection of the stoma site. Such bleeding may settle with conservative management. More worryingly, however, is the prospect of such bleeding being the result of erosion of a major artery in the root of the neck where there has been pressure from the tracheostomy tube itself or the cuff tube (another reason why it is important to ensure that the tracheostomy tube cuff pressure is monitored to avoid over-inflation). Tumour erosion may also precipitate a bleed. Most commonly, this erosion occurs into the right brachio-cephalic artery (also known as the innominate artery), resulting in a tracheo-innominate artery fistula. This situation may be heralded in the preceding hours by a small, apparently insignificant, sentinel bleed. Bleeding from such a fistula will be massive. **THIS IS A LIFE-THREATENING EMERGENCY**, and so decisions need to be rapidly made. It is well-recognised that fatalities occur in this situation, and that this may be the mode of death for some patients with head and neck cancers. The appropriate management may, therefore, be palliation. Such a decision should, ideally, have been made in advance and in discussion with the patient, clearly documented in the patient's medical notes and communicated to the nursing staff (who will undoubtedly have to deal with this situation).

4.5.3 Emergency Algorithm for Bleeding

Blood oozing from stoma site, staining dressings and/or blood found on tracheal suctioning
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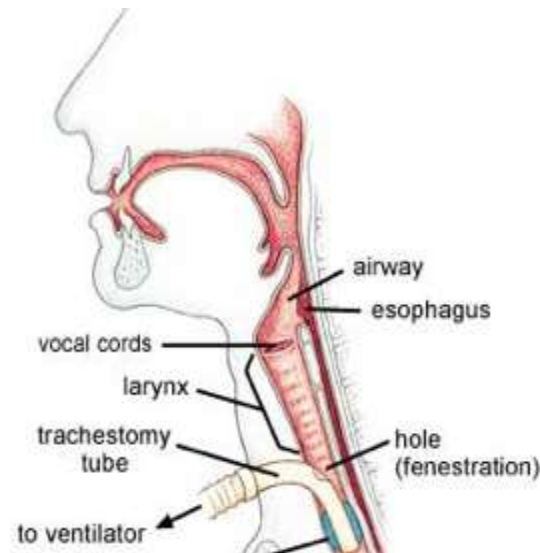




5.0 INTRODUCTION TO TRACHEOSTOMIES

5.1 Definition

A tracheostomy is the surgical creation of an opening into the trachea through the neck which can be permanent or temporary.



5.2 Indications

- - Emergency Airway – Oral or nasal intubation impossible
- Trauma – Facial fractures
- Airway oedema
 - Burns
 - Drug sensitivities
 - Post ENT surgery
- Need for artificial ventilation > 7 days
 - Reduces anatomical dead space
 - Aids weaning from ventilation
- Upper airway obstruction
 - Foreign body
 - Tumour
- Prolonged absence laryngeal reflexes or ability to swallow
- Airway access
- Airway hygiene



5.3 Method of Insertion

5.3.1 Surgical tracheotomy

The surgical tracheotomy (i.e. the cut into the trachea) may be a vertical slit, a fenestration, or may utilise an inferiorly based Bjork flap (rarely performed). The skin edges may then be sutured to the tracheal edge. The operation is usually carried out in the operating theatre but on occasions has to be performed on the ward, or in the intensive care unit under general or local anaesthesia. The term tracheostomy relates to the finished operation, which can be temporary or long term, and can be formed either electively or as an emergency procedure.

5.3.2 Percutaneous Tracheostomy

Most patients within critical care will have tracheostomies performed using a percutaneous, dilatational technique. This procedure may require a general anaesthetic, but is usually performed in the intensive care unit.

Any patient who requires a tracheostomy with a history of,

1. Surgery to the neck.
2. A previous tracheostomy.

should be taken to theatre for a surgical tracheostomy as opposed to a percutaneous tracheostomy.

5.3.3 Mini Tracheostomy

This is for sputum clearance and not for ventilation with only size 10 catheters or smaller should be used for suction or administration of oxygen. A small-bore tube (4mm & uncuffed) is inserted through the cricothyroid membrane or tracheostomy stoma after decannulation.

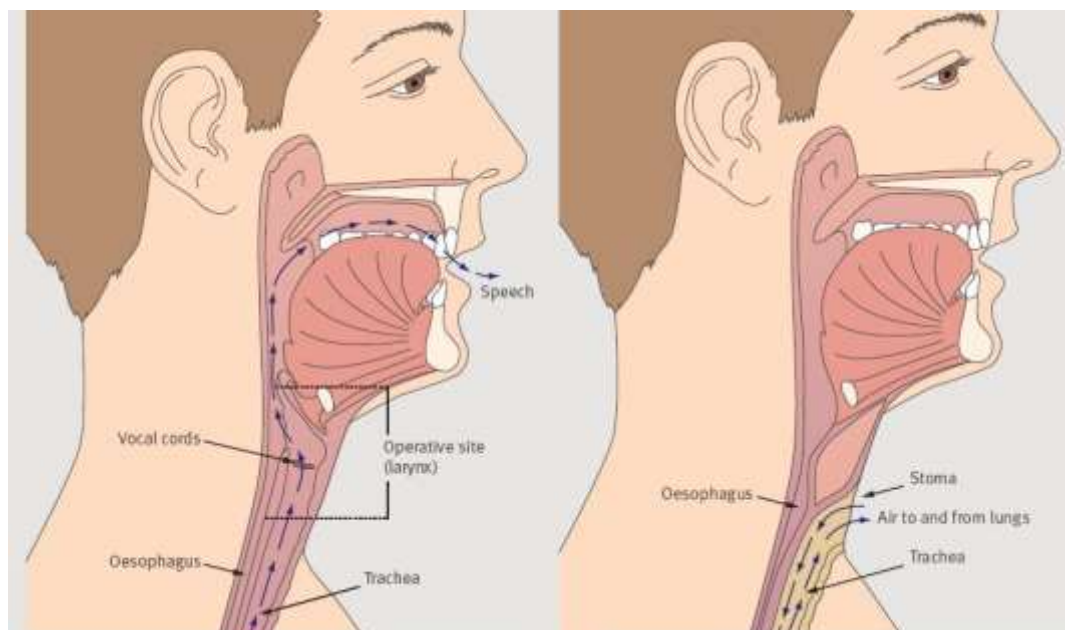


A mini tracheostomy tube



5.3.4 Laryngectomy

A permanent tracheostomy is created following a total laryngectomy. This involves creating a permanent stoma where the top of the trachea is brought to the surface of the skin and sutured to the neck skin. This stoma is kept open by the rigidity of the tracheal cartilage. The patient will breathe through this stoma for the remainder of his/her life. There is no connection between the oral airway (the mouth and nose) and the trachea, and there may be no connection between the pharynx and the trachea unless one has been specially created. Any ventilation or oxygen support must be via this stoma. This procedure is elective and the patients need to be carefully prepared for the consequences of the procedure.



Anatomical changes during a laryngectomy

5.4 Tracheostomy Tubes

There is wide range of tubes available, with differing characteristics and clinicians need to recognize that, even for an individual patient, what is required of a tracheostomy tube may vary with time and changing clinical circumstances. Clinical staff must therefore make an informed choice of which to tubes to stock, and which to use for a particular patient.

Tracheostomy tubes require distinctive features depending on their intended use. The characteristics of the tube to be considered when selecting a tracheostomy tube for temporary use include:



- Construction
- Dimensions:
 - Internal and outer diameter (ID and OD respectively)
 - proximal and distal length (i.e. the length of the tube proximal and distal to its angulation)
 - Shape and angulation
- Compatibility with percutaneous insertion kit
- Presence and nature of tube cuff
- Presence of inner cannula (dual cannula tracheostomy)
- Fixed versus adjustable flange
- Presence of fenestration
- Specialist features, e.g. low contour on deflation tight to shaft cuffs, subglottic secretion control systems, voice enhancement tubes etc.

5.4.1 Construction Material

Tracheostomy tubes can be constructed of either metal or plastic, and thereby vary considerably in rigidity, durability and kink resistance. This may be clinically relevant. Metal tracheostomy tubes are constructed of either silver or stainless steel, but are seldom used in the critical care environment or ENT practice.



Silver negus tube

Temporary tracheostomies are constructed of polyurethane, polyvinyl chloride or silicone. Products made of polyurethane are more rigid than those constructed of silicone, whilst those of polyvinyl chloride construction are of an intermediate stiffness (although some become softer at body temperature).

5.4.2 Dimensions

In most circumstances, a tracheostomy tube is both described and selected based on its size, or more specifically its diameter. This is simple in theory but may easily be confusing in practice.



Diameter: When selecting the size of tube for a patient, there is an unavoidable compromise to be made between a desire to maximise the functional internal diameter (and thereby reduce airway resistance and the work of breathing during weaning) and a need to limit the outer diameter to approximately three-quarters of the internal diameter of the trachea (in order to facilitate airflow through the upper airway when the cuff is deflated). Furthermore, selection of a tube that is too small may result in the need to over-inflate the cuff, thereby increasing the risk of mucosal pressure necrosis, which in turn increases the risk of complications such as tracheal stenosis and tracheoesophageal fistula. Generally, most adult females can accommodate a tube with an OD of 10mm, whilst a tube with an OD of 11mm is suitable for most adult males.

Length and shape: Although a temporary tracheostomy is most commonly selected based on its diameter, there may be situations where the length, angulation or curvature of a tube is of relevance. Thus, whilst many tracheostomy tubes are smoothly curved, others are clearly angulated, thereby allowing a distinction to be made between the proximal (or horizontal) length of a tube (i.e. the distance between the neckplate and the mid-point of the angulation) and the distal length (i.e. the distance from the mid-point of the angulation and the tip). It should be appreciated that these respective lengths are quite short in standard tubes and may be too short even in the patient with apparently normal anatomy. This can result in:

- obstruction of the tube, and consequent difficulties with ventilation and weaning
- injury to the posterior tracheal wall, thereby increasing the risk of tracheoesophageal fistula formation
- suboptimal positioning of the tube cuff, with the associated risk of aspiration, inadequate ventilation and high cuff pressures

Whilst adjustable flange devices are considered suitable for short terms problems, patients who are likely to need airway access for a considerable length of time may be better served with pre-formed nonstandard products such as the Shiley® Tracheosoft XLT range or the Portex® Blue Line® Extra Horizontal and Vertical length products. Some manufacturers offer a bespoke service should none of their stock items be suitable.



Tracheostomy tube dimensions:

TracoeTwist Plus with Suction Aid

ID	Outer Diameter	Inner diameter (with inner)	Tube Length
7.0	10.1	7.0	85.0
8.0	11.1	8.0	88.0
9.0	12.1	9.0	90.0
10.0	13.1	10.0	92.0

TraceoTwist with Suction Aid

ID	Outer Diameter	Inner diameter (with inner)	Tube Length
6.0	9.2	6.0	72.0

Portex Blue Line (with or without SuctionAid)

ID	Outer Diameter	Inner diameter (with inner)	Tube Length
6.0	9.2	5.0	64.5
7.0	10.5	6.0	70.0
8.0	11.9	7.0	75.5
9.0	13.3	8.0	81.0
10.0	14.0	8.5	87.5

Portex UniPerc

ID	Outer Diameter	Inner diameter (with inner)	Main tube Inner Diameter (no inner)	Tube Length
7.0	11.6	7.0	9.3	70.0
8.0	12.6	8.0	10.3	75.5
9.0	13.6	9.0	11.3	81.0

Shiley

Product Code	Outer Diameter	Inner Diameter (with inner)	Tube Length
4	9.4	5.0	65.0
6	10.8	6.4	76.0
8	12.2	7.6	81.0
10	13.8	8.9	81.0

Shiley XLT

Product Code & Inner Diameter	Outer Diameter	Proximal Length	Distal Length
5.0 Distal	9.6	5.0	48.0
5.0 Proximal		20.0	33.0
6.0 Distal	11.0	8.0	49.0
6.0 Proximal		23.0	34.0
7.0 Distal	12.3	12.0	49.0
7.0 Proximal		27.0	34.0
8.0 Distal	13.3	15.0	50.0
8.0 Proximal		30.0	35.0



5.4.3 Percutaneous tracheostomy tubes / kits

Several manufacturers have modified aspects of the construction of their standard tracheostomy tubes such as cuff and distal tube profiles in order that they are more easily introduced as part of a percutaneous dilatational technique (e.g. Portex® Per-Fit and Shiley® PERC). Such changes frequently go unnoticed when the tube comes as a component of a percutaneous tracheostomy kit and may have unpredictable functional consequences. Clinicians are advised to carefully evaluate situations where such product consolidation occurs.

5.4.4 Presence and nature of tube cuff

In the critical care setting, most patients will require an air-filled cuffed tracheostomy tube initially, both to facilitate effective mechanical ventilation and to protect the lower respiratory tract against aspiration. The cuff should be of a “high volume / low pressure” design, and should effectively seal the trachea at a pressure of no more than 20 – 25 cmH₂O to minimise the risk of tracheal mucosal ischaemia and subsequent tracheal stenosis. Although many manufacturers offer tracheostomy tubes with suitable cuffs, there is considerable variation between them in the length of the cuff and its precise shape when inflated. Furthermore, there is now considerable evidence to suggest that the current high volume / low pressure design is unable to guarantee isolation of the lower respiratory tract. In all circumstances, the intra-cuff pressure should be monitored regularly.

Causes of excessive cuff pressures include:

- the use of a tube that is too small (an indication for which would be a need to inflate with more than the nominal cuff volume to achieve an effective seal)
- poor tube positioning in the trachea
- tracheal dilatation
- over inflation of the cuff

5.4.5 Presence of inner cannula (dual cannula tracheostomy)

Many tracheostomies are now manufactured with an inner cannula. The design of some makes the use of this optional (e.g. Portex® Blue Line Ultra®), whilst for others it is mandatory, as it is the inner cannulae that has a standard 15mm attachment to connect to the breathing circuit of a mechanical ventilator (e.g. Shiley®, Kapitex Tracoetwist®). Whilst some inner cannulae are disposable and designed for single use, others can be cleaned and re-used.



The principal (and very major) advantage of an inner cannula is that it allows the immediate relief of life-threatening airway obstruction in the event of blockage of a tracheostomy tube with blood clot or encrusted secretions. Whilst traditionally, this has been seen to be particularly advantageous for patients once they have been discharged to a ward environment, it is now recognized that tube obstruction can occur even while the patient is in a critical care facility, and that in such circumstances removal of an obstructed inner cannula may be preferable to removal and repeat tracheal intubation.

The principal disadvantage of dual cannula tubes is that the inner cannula may significantly reduce the effective inner diameter of the tracheostomy tube, and thereby increase the work of breathing and impair weaning. Failure to properly lock the inner tube in place may also result in disconnection of the breathing circuit in circumstances where it is connected to this rather than the outer cannula.



Portex BlueLine Ultra with Inner tubes



Cuffless Shiley CFS with Inner Tube



TracoeTwist with Inner Tube



5.4.6 Fixed versus adjustable flange

Longer tracheostomy tubes are available with a fixed or adjustable flange (fixed or adjustable length).

Fixed longer length tubes may be elongated in either the proximal portion (between the stoma and the trachea) or the distal portion of the tube (within the trachea). Extra proximal length is needed for patients with deep set tracheas i.e. large neck due to obesity, goiter, neck mass. Extra distal length is needed for patients with tracheal problems but normal neck anatomy i.e. tracheomalacia, tracheal stenosis.

A flexible tracheostomy tube with an adjustable flange can be used in any of the above patients (e.g. Portex Uniperc), although the locking mechanism of the neck flange may prove cumbersome for the patient, making it less suitable for long term use. In these cases, a dual cannula fixed longer length tube with the appropriate proximal or distal extension for the patient's anatomy may be more comfortable (e.g. Shiley XLT).



Portex Uniperc



Shiley XLT

5.4.7

Presence of fenestration

Fenestrated tracheostomy tubes are dual lumen tubes which have a fenestration (hole) in the middle of the upper aspect of both tubes. This will allow the passage of air and secretions into the mouth and nose in the normal way rather than directing them out via the tracheostomy tube, if the tracheostomy is occluded. These tubes will always have an optional non-fenestrated inner tube which may be inserted if the patient requires further respiratory support. A non-fenestrated inner tube should always be inserted prior to performing tracheal suction to ensure the suction catheter does not pass through the fenestration and into the larynx instead of into the trachea. These tubes are not routinely used within Cardiff and Vale UHB.



Shiley Uncuffed Fenestrated (CFN) tube



Portex BlueLine Ultra with fenestrations

6. EMERGENCY EQUIPMENT

The following emergency equipment must be kept with an inpatient at all times. Where appropriate, this should be located within the 'tracheostomy blue box'. Boxes are available from critical care, as are spare tracheostomy tubes and inner tubes. Boxes must be returned to critical care 48 hours post decannulation.

Tracheostomy Blue Box Equipment:



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



10ml Syringe



Spare Inner Tube



Stitch Cutter (if sutures present)



Water Soluble Gel



Tracheostomy Tapes

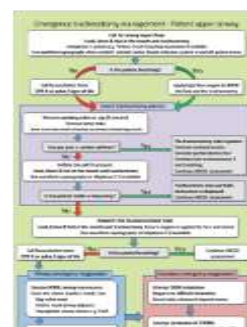
Dressing



Gauze



Cosmopore (or equivalent)



Emergency Algorithm



Bed Area Equipment



Oxygen



Non-rebreathe circuit and/or adult bag-valve-mask with reservoir with tubing



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



Yankeauer Suction Tube



7. CARE OF THE STOMA

7.1 Personal Protection Equipment:

- **Hand washing** is essential both before and after all procedures.
- **Gloves** must be worn and contaminated gloves changed between procedures. For changing the tracheostomy tube or a dressing, these should be sterile.
- **Aprons** should be worn at all times and changed between procedures.
- **Eye protection** should be worn for suctioning, dressing changes and tube changes or where there is any risk a patient may cough secretions.

7.2 Dressings:

Secretions may ooze out of the stoma site and cause wetness around the tracheostomy site, this can cause irritation leading to skin maceration and excoriation. The site should be **assessed at least once in every 24 hours** for trauma, infection or inflammation and the details documented. The neck should also be inspected for signs of redness/skin damage from the tapes.

Should the skin around the stoma be wet with secretions or appear irritated a barrier may be helpful in preventing excoriation and allowing healing. The dressing and tracheostomy holder may need to be changed more frequently if they become soiled.

This is a two person technique to prevent dislodgement of the tracheostomy. Red, excoriated or exuding stomas should be swabbed and the doctor informed. Advice should be sought from the wound care team for complicated wounds.

7.3 Equipment

- Normal saline
- Trachi-Dress (or equivalent)
- Tracheostomy tapes
- Light source such as a pen torch or adjustable procedure light



7.4 Procedure

Action	Rationale
Explain and discuss procedure with patient	Allows for co-operation, patient reassurance and to gain informed consent from patient.
Two-person procedure, one of whom must be qualified (lead) and an assisting member of staff (who may be unqualified).	To maintain safety and limit cross infection.
Screen area and assist patient to comfortable position, with neck extended (if patients condition allows)	Ensures privacy, patient comfort and allows easy access to stoma.
Lead person – assess if suction is required. (Refer to suction guidelines)	To clear secretions and minimise patient coughing and potential tube displacement during procedure. Promote patient comfort.
Assistant – prepare the dressing trolley items with the lead.	For ready use
Both staff wash hands and put on gloves (lead should wear sterile gloves)	Reduces risk of infection Aseptic technique
Assistant – loosen tracheostomy Velcro neck tapes and hold the tracheostomy tube securely in place, preferably by the outer tube.	To stabilise the tracheostomy tube and reduce the risk of displacement.
Lead - remove soiled dressing and clean around the tracheostomy site with normal saline and sterile gauze, using an aseptic technique. Dry thoroughly.	Removes secretions and prevents infection from any crusting which may have formed. Normal saline is non-irritant
Lead - observe tracheostomy site for <ul style="list-style-type: none"> • Infection • Pressure damage 	Early detection and prompt treatment of complications Barrier cream can protect skin from tracheal secretions and encourage wound healing as



<ul style="list-style-type: none"> • Bleeding • Overgranulation <p>Apply skin protection if excessive secretions or if the stoma site is red/inflamed.</p>	appropriate
If the stoma is not intact or the area is becoming excoriated, the senior nurse and medical staff on the ward should be notified	Communication if there is a change in site status is important as a photograph may be necessary to monitor progress
Apply clean tracheostomy dressing, starting from below the tracheostomy tube.	<p>To absorb any discharge from around tracheostomy site and to avoid pressure from the tube, promoting patient comfort.</p> <p>Refer to manufacturers advice for individual dressings</p>
Secure the tracheostomy tube in position with a Velcro tracheostomy tube holder. Ensure that it is possible to allow two fingers to pass between the tracheostomy holder and the neck	To prevent displacement and pressure damage to skin
Clear away equipment as per the clinical waste disposal guidelines, remove gloves and wash hands	Adhering to Health and Safety and Infection Control Policies
Document the procedure	Professional responsibility and to ensure effective multi-disciplinary communication

7.5 Oral Care

Where patients cannot eat and drink they should be encouraged or assisted to maintain their oral hygiene by using a toothbrush and toothpaste and intermittently swilling their mouths with water. It is recommended that patients have regular application of 2% chlorhexidine gel or mouth wash. Patients should have a daily assessment of their buccal mucous membranes to note for bacterial, viral or fungal infections, skin tears or ulceration. A swab should be taken of any suspicious areas, using a viral swab if a virus is suspected i.e. Herpes Simplex.



8. HUMIDIFICATION

A tracheostomy bypasses the normal upper airway mechanisms for humidification, filtration and warming of inspired gases. This results in increased viscosity of mucus secretions, which depresses ciliary function and therefore mucociliary transport. This in turn can lead to an increased risk of infection, impaired secretion removal and microatelectasis. Failure to provide adequate humidification to address these issues can lead to obstruction of the major airways and tracheostomy tube blockage. There are various methods to provide supplementary humidification according to the patient's individual needs, however it is most important to ensure the patient has adequate systemic hydration. This may be via enteral feeding or parenteral fluids; however, if the patient has been assessed as having a competent swallow they may be able to maintain some or all of their own hydration through drinking.

8.1 Methods of humidification for ventilated patients

Action	Rationale
For all patients with loose or no evidence of secretions, place a Heat and Moisture Exchanger (HME) in the inspiratory circuit	To moisten inspired gases by trapping and re-breathing humidity
Replace HME every 24hours or more frequently if contaminated by secretions	To maintain effectiveness and reduce infection risk
For patients with thick secretions, ensure 4-6 hourly prescription of saline nebulisers	To loosen secretions, to prevent atelectasis and sputum thickening
Review need daily	To reduce unnecessary interventions and to assess whether present level of humidification adequate
For patients with difficult to clear secretions or evidence of consolidation, replace HME with a humidifier such as the Fischer Paykel™ water humidifier	Warmed water carries a greater relative humidity
Review need daily <i>In patients with very difficult to clear secretions, a mucolytic may be considered</i>	To reduce unnecessary interventions and to assess whether present level of humidification adequate



8.2 Self ventilating patient requiring oxygen therapy

Action	Rationale
All patients require cold water venturi humidification using an aquapak™ system	To moisten inspired gases
Check water supply 2 hourly and change system every 24 hours	To ensure adequate humidification and reduce infection risk
For patients with thick secretions, ensure 4-6 hourly prescription of saline nebulisers	To loosen and thin secretions, to prevent atelectasis and sputum consolidation
Review need daily	To reduce unnecessary interventions and to assess whether present level of humidification adequate
For patients with difficult to clear secretions or evidence of consolidation, replace cold water venturi humidifier with warm water humidifier such as the Fischer Paykel™	Warmed water carries a greater relative humidity
Review need daily	To reduce unnecessary interventions and to assess whether present level of humidification adequate
In a patient with very difficult to clear secretions, a mucolytic may be considered	



8.3 Self ventilating patient not requiring oxygen therapy

Action	Rationale
For all patients with loose or no evidence of secretions use an HME. The Buchannan™ protector should be used for longer term patients and is preferable in patients with copious secretions where there is a risk of tube occlusion	To moisten inspired gases by trapping and rebreathing humidity, to prevent inhalation of particulate matter
In the acute ward replace HME every 24hours or more frequently if contaminated by secretions (check four hourly)	To maintain effectiveness and reduce infection risk
For patients with thick/dry secretions, ensure 4-6 hourly prescription of saline nebulisers	To loosen and thin secretions, to prevent atelectasis and sputum consolidation
Review systemic hydration – inform medical staff	To highlight problem and introduce an early intervention where required
Review need daily	To reduce unnecessary interventions and to assess whether present level of humidification adequate
In a patient with very difficult to clear secretions a mucolytic may be considered	



9. SECRETION REMOVAL INCLUDING SUBGLOTTIC SUCTION

9.1 Introduction

Suction should not be routinely carried out on a patient with a tracheostomy. Suctioning should only be carried out following an assessment of need (Glass and Grap 1995, Day 2000, HEYH 2001). Where the patient can cough secretions independently into the top of the tracheostomy tube these secretions can be removed with a clean yankauer sucker or a tissue.

Clearing secretions with suction will: -

- Maintain a patent airway
- Prevent lung collapse due to small airways blocked by secretions

The frequency of suction varies widely between patients. Each must be individually assessed. Factors which should be considered are:

- Patients ability to cough and clear own secretions
- Amount and consistency of secretions
- Oxygen saturation/arterial blood gases

As with all techniques, you should only carry out suctioning if it is within your own scope of practice and should follow local policies / guidelines

9.2 Equipment

- Gloves, apron and goggles
- Functional suction unit (wall or portable)
- Appropriately sized suction catheters (size of tube x 3 / 2), this formulation was devised for endotracheal tubes greater than size 6mm assuming the patient was receiving oxygen. Therefore it may be appropriate to adjust the size in patients who have size 6mm or smaller tubes and those without an inflated cuff
- Water to clean suction tubing



9.3 Technique

9.3.1 Open Suction

Action	Rationale
Explain procedure to patient	To reassure patient
Wash hands, put on gloves, apron and visor and change inner cannula if necessary	To prevent cross-infection and protect against contact with body substances.
If patient is receiving oxygen therapy pre-oxygenation may be required by increasing oxygen to 100% for 1 minute prior to suctioning	Suctioning may frequently lead to hypoxaemia. In order to prevent this, pre-oxygenation is recommended prior to suctioning. Pre-oxygenation will also reduce the likelihood of any cardiac arrhythmias (Adam and Osbourne 1997, Day 2000, Brooks <i>et al</i> 2000, HEHY 2001, NHNN 2003).
Check suction pressure is within previously stated parameters and that you have the correct size of suction catheter	To ensure appropriate pressure is applied for the procedure and that the catheter is of an appropriate size for the patient.
Open outer package of sterile catheter and peel back the adapter end of the catheter package. With catheter in package, attach adapter to suction tubing. Do not touch the body of catheter.	To keep the catheter as clean as possible allowing for a clean technique
Put clean glove on dominant hand without touching its outer surface.	Gloves minimise the risk of infection transfer to the catheter.



<p>Take package off the catheter. With the dominant hand hold the catheter, ensuring the glove only touches the catheter and nothing else. Insert the catheter gently into the tracheostomy tube without applying suction.</p>	<p>Gentleness is essential: damage to the tracheal mucosa can lead to trauma and respiratory infection. Saline bolus prior to suctioning is not recommended – it has been shown to increase rate of nosocomial infection (McKelvie 1998, NHNN 2003)</p>
<p>Insert catheter gently until resistance is felt, withdraw catheter 1 cm, then apply <u>continuous</u> suction withdrawing the catheter smoothly at all times.</p> <p>OR Insert catheter until cough is stimulated; stop and apply <u>continuous</u> suction withdrawing the catheter smoothly at all times. There is no need to rotate catheter.</p>	<p>To prevent the catheter from adhering to the tracheal mucosa, negative pressure should only be applied during withdrawal (McKelvie 1998).</p>
<p>If resistance is present continue procedure and check inner tube patency.</p>	<p>Check that you are using the correct catheter size. Resistance may indicate that the inner cannula is blocked with secretions and needs to be changed and cleaned. If problems persist after cleaning, inform nurse in charge and Physio during the day, overnight contact the Hospital at Night Team.</p>
<p>Suction should not exceed 10 seconds at a time</p>	<p>Prolonged suction will result in hypoxaemia and trauma (HEHY 2001, NHNN 2003)</p>



Replace tracheostomy mask (if present) and return oxygen supply to prescribed percentage. If further suctioning is indicated pre-oxygenate as per 3.	In order to minimise the risk of hypoxaemia (Adam and Osbourne 1997, Day 2000)
Dispose of catheter and glove as per Trust infection control policy	Infection control
Repeat suction process as necessary (but no more than 3 suction passes should be made during any one suction episode) using a new catheter and sterile / clean gloves each time.	Catheters are used only once to reduce the risk of introducing infection. The number of suction passes may contribute to the occurrence of complications (NHNN 2003)
Assess the patients respiratory status following suctioning. This should include assessing the rate, depth and pattern of respiration and by using a pulse oximeter.	To reassess efficacy of suction (Glass and Grap 1995, NHNN 2003)
After the final suction, flush through suction tubing with sterile water.	To loosen secretions that have adhered to the inside of the tube.
Note colour, quantity and tenacity of secretions. Record in patient's tracheostomy record.	For effective communication of information.
Clean suction equipment should be replaced every 24 hours or as necessary.	Infection control



9.3.2 Closed Suction

This technique is only suitable for ventilated patients. The inner cannula should not be fenestrated for ventilation and therefore will not need to be changed for suctioning purposes. It will still require a 2 hourly check as per guidelines on tracheostomy tube care.

Indications for a closed suction system include

- PEEP dependence
- Oxygen dependence
- Immunosuppressed patients
- Patients that are a potential infection risk to staff
- Blood on suction
- High Frequency Oscillator Ventilation (HFOV)



Example of closed suction catheter system

Action	Rationale
Explain procedure to patient	To reassure patient
Wash hands, put on gloves and apron	To prevent cross-infection and protect against contact with body substances (Glass and Grap 1995, Wood 1998)
If patient is receiving oxygen therapy ensure pre-oxygenation by increasing % of oxygen to 100% for 1 minute prior to suctioning	Suctioning may frequently lead to hypoxaemia. In order to prevent this, preoxygenation is recommended prior to suctioning (Adam and Osbourne 1997, Day 2000)
Check suction pressure is within previously stated parameters and that you have the correct size of catheter attached to tracheostomy tube	To ensure appropriate pressure is applied for the procedure and that the catheter is of an appropriate size for the patient.



<p>Insert catheter gently until resistance is felt, withdraw catheter 2 cm, then apply <u>continuous</u> suction withdrawing the catheter smoothly at all times.</p> <p>OR Insert catheter until cough is stimulated; stop and apply <u>continuous</u> suction withdrawing the catheter smoothly at all times There is no need to rotate catheter</p>	<p>To prevent the catheter from adhering to the tracheal mucosa, negative pressure should only be applied during withdrawal (McKelvie 1998, NHNN 2003)</p>
<p>If resistance is present continue procedure and check inner tube patency.</p>	<p>Check that you are using the correct catheter size. Resistance may indicate that the inner cannula is blocked with secretions and needs to be changed and cleaned. If problems persist after cleaning, inform nurse in charge and liaise with medical colleagues</p>
<p>Suction should not exceed 10 seconds at a time</p>	<p>Prolonged suction will result in hypoxaemia and trauma (HEHY 2001, NHNN 2003)</p>
<p>Return oxygen supply to prescribed percentage. If further suctioning is indicated pre-oxygenate as per step 3.</p>	<p>In order to minimise the risk of hypoxaemia (Adam and Osbourne 1997, Day 2000 Brooks <i>et al</i> 2000, HEHY 2001)</p>
<p>Repeat suction process as necessary (but no more than 3 suction passes should be made during any one suction episode) using a new catheter and sterile/clean gloves each time.</p>	<p>Catheters are used only once to reduce the risk of introducing infection. The number of suction passes may contribute to the occurrence of complications (NHNN 2003)</p>



Assess the patients respiratory status following suctioning. This should include using a pulse oximeter.	To reassess efficacy of suction (Glass and Grap 1995, NHNN 2003)
Note colour, quantity and tenacity of secretions. Record in patient's tracheostomy record.	For effective communication of information.
Clean suction equipment should be replaced every 24 hours or as necessary.	Infection control

9.4 Subglottic Suction

The Kapitex Tracoe Twist Plus, Kapitex Trachoe Twist and Portex Blue Line Ultra Suctionaid Tracheostomy Tube provides an integral suction lumen to aid removal of secretions from the subglottic space above the cuff.

It is well recognised that the presence of a tracheostomy tube can contribute to the development of VAP (Ventilator Associated Pneumonia) and aspiration pneumonia as it impairs the cough reflex and secretions can pool above the cuff, promoting the growth of nosocomial infections.

Regular drainage of secretions from the subglottic space can significantly reduce the risk of infection, aspiration and VAP. However, subglottic suction does not eliminate the need for routine tracheal suctioning or oral hygiene procedures.

9.4.1 Procedure for use of Suctionaid tracheostomy tube.

1. With the cuff inflated attach a 20ml syringe to the suction line and pull back on the plunger to aspirate any secretions that are sitting above the cuff (there is no indication to complete subglottic suction when a cuff has been deflated).
2. This procedure should be repeated until no further secretions are aspirated. The secretions that have been aspirated should be measured and disposed of in accordance with UHB Infection Control Policies and Procedures. This volume should also be recorded on the tracheostomy daily chart.



3. If resistance is met on aspiration you can attempt to flush the suction line. Prior to flushing check that the cuff pressure is set appropriately with the cuff manometer. Flush the suction line with 5mls of sterile saline and aspirate again. If resistance to instillation of saline is still met and the instilled fluid cannot be withdrawn, the suction line may still be blocked. Finally try flushing the suction line with 5mls of air; if resistance to instillation is still met an alternative means of suction using a yankauer or soft tipped suction catheter should be instituted.
4. The syringe used for removal of secretions from the suction line should be discarded following completion of the procedure.
5. The frequency with which the procedure is carried out is dependent upon the volume of secretions obtained via the suction line. Initially the procedure should be carried out hourly. If no secretions are obtained then this should be repeated 2 hourly and then a minimum of 4 hourly. This should be accurately documented and evaluated in the care plan



TracoeTwist Tracheostomy Tube
with Suctionaid
(SuctionAid line indicated by
arrow)



10. CUFF PRESSURE MANAGEMENT

The tracheostomy cuff (when present) provides a seal to enable positive pressure ventilation and also provides some protection against aspiration of secretions. Over-inflation of the cuff may cause ischaemia of the tracheal mucosa and thereby lead to tracheal stenosis, tracheomalacia and arterial erosion. Conversely, too little pressure places the patient at risk of aspiration and difficulties with mechanical ventilation due to persistent air leak.

The pressure within the cuff should be checked regularly with a hand held pressure manometer (see picture) and should ideally be maintained ideally below 20 – 25cmH₂O. It is good practice to document the cuff pressure on a daily basis and following any tracheostomy-related intervention.

Hand held pressure
manometer



Cuff pressure should not exceed 25cmH₂O

If an air leak occurs with cuff pressure at the maximum recommended, the tracheostomy may have been displaced or may require changing: medical or other professionals who are competent in advanced tracheostomy management should review the patient

The cuff should be deflated to remove the tube, to allow the patient to eat or drink and when a speaking valve or decannulation cap is secured to the tube. This should be completed in conjunction with the tracheostomy weaning plan (see section 14).

Failure to deflate the cuff when the speaking valve or decannulation cap is secured to the tube will result in a total occlusion of the patient's airway



11. INNER TUBE CARE

The inner tube should be checked every **two hours** and cleaned as required, minimally once per nursing shift ie.3 times in 24 hours. Within critical care, ventilated patients may have a longer period between inner tube checks as recurrent disconnection from ventilation may be detrimental to overall management of the patient.

An inner tube narrows the lumen of the tracheostomy tube. The lumen may therefore become easily blocked by secretions within the internal diameter of the inner cannula

The inner tube must be present at all times. It may not be possible to provide resuscitation to the patient if the inner tube is absent

11.1 Equipment Required to Clean Inner Tube

- Bowl / disposable kidney dish
- Protective clothing
- A clean inner tube
- Sterile water –. The bottle should be dated, labelled and renewed every 24 hours
- Tracheostomy cleaning swabs
- Gauze squares



11.2 Procedure for Cleaning Inner Tube

Action	Rationale
Explain the procedure to the patient and sit patient up to 45-70 degrees, depending on their condition.	To gain informed consent and allow easy access to tracheostomy.
Wash hands, put on non-sterile gloves.	Reduces risk of infection
Hold tracheostomy flange with one hand; hold inner tube with the other.	To secure the outer tracheostomy tube
<p>Shiley tubes – Turn the inner tube anti-clockwise to unlock it and remove it from the outer tracheostomy tube, placing it in a bowl ready for cleaning at end of procedure.</p> <p>Portex Blueline ultra tubes / Uniperc – hold ring pull of inner tube and pull out and down to remove. Place inner cannula in a bowl ready for cleaning at end of procedure.</p>	
<p>Replace immediately with clean inner tube (Docherty and Bench 2002).</p> <p>Shiley tubes – Twist new inner tube clockwise until it clicks into place (when 2 blue dots are in line), continuing to stabilise the tracheostomy flange.</p> <p>Portex Blueline Ultra tubes / Uniperc – slide inner tube into place until a gentle click is felt. The tracheostomy phlange should be stabilised throughout procedure</p>	<p>Reduces risk of outer tube blocking</p> <p>To ensure inner tube secure and prevent displacement</p>
Place soiled inner tube in bowl of sterile water (Choate and Barbetti 2003)	To loosen secretions which may be attached to it. Tap water is an infection risk and has been shown to increase incidence of nosocomial pneumonia (US Centres for Disease Control 1997). Due to infection control risks,



	do not leave inner tubes to soak in water.
Clean soiled inner tube with tracheostomy cleaning swabs – see ordering information	Tracheostomy cleaning swabs will not affect the surface of the inner tube. Due to infection control risks, do not use brushes supplied with tracheostomy tubes.
Shake off all excess water, dry with gauze squares and store in a dry container with a lid at the patient's bedside.	A clean inner tube should always be available to use urgently (Docherty and Bench 2002)
Clear away equipment as per the clinical waste disposal guidelines; remove gloves and wash hands.	For infection control purposes.
Document care	Professional responsibility and to ensure effective multi-disciplinary communication

Never leave a double lumen tracheostomy tube without an inner tube in situ.



12. COMMUNICATION

The ability to communicate is affected by the presence of a tracheostomy tube. The patient will be unable to talk and produce voice in the normal way since no air will pass through the vocal cords (unless the patient is able to benefit from a fenestrated tube, a speaking valve or in some cases leakage of air around the tube). [N.B. This will not be the case where the patient has undergone a laryngectomy.] All other systems required to enable the patient to communicate will be intact unless there is a co-existing neurological impairment with possible muscular weakness, impaired sensory function, language and cognitive deficits. The patient's general medical condition may result in fatigue, reduced alertness, behavioural influences, reduced motivation all of which may impede communication.

12.1 Process for establishing good communication with the patient

Action	Rationale
If possible ascertain whether the patient had communication or literacy difficulties pre-tracheostomy.	To obtain a baseline of the patients ability.
Explain to the patient /relative why they are having communication problems [when appropriate the patient/family should be warned pre-tracheostomy placement regarding the effect on communication.]	To provide reassurance.
Check if the patient can see, hear, understand, use facial expression such as smile/ blink, write.	To review available options
When appropriate provide the patient with a means of attracting attention e.g. buzzer/call button.	To facilitate basic communication.
Establish a method for the patient to indicate YES /NO. Ensure everyone who comes in contact with the patient is aware of what method is being used,	Enables the patient to respond to simple questions.



e.g. thumbs up/down.	
If a coded eye blink is the only means available instruct the patient to blink once for yes and twice for no in response to a question.	Ensures the same system is always used.
If the patient can mouth then to aid lip reading ask the patient to exaggerate their lip movement and to speak in short but complete sentences.	To facilitate oral communication
If a patient is able to have an uncuffed or deflated cuff tube then trial of a speaking valve may be appropriate.	To facilitate oral communication
Where more specific communication exist please refer to the Speech & Language Therapy department who will assess and provide other options for alternative communication e.g. picture/word boards, electronic communication aids etc.	To reduce frustration and to allow the patient to express their needs more freely.

12.2 Non verbal communication – Other methods to consider

Alphabet Board, Picture Board and Phrase Books:

Laminate A4 sheets displaying the alphabet in large letters, or simple pictures depicting basic activities/needs (e.g. drink, toilet...). These systems can be supplemented by a list or book of useful phrases for the patient (e.g. "Please call my husband"). Communication boards can be individualised for each patient by the Speech & Language Therapist.

Electronic Larynx and Electronic Communication Aids:

It is necessary for the Speech & Language Therapist to assess the patient for use of one of these aids, and then, if appropriate, advise the patient, family, carers and staff on its use. Use of these aids requires the patient to develop an adequate level of skill, therefore may not be suitable for short-term use.



12.3 Verbal communication – Methods to consider

Manipulation of the Tracheostomy Tube for Communication

Voice production may be achieved in patients with a tracheostomy tube by using one or more of the following:

Cuff Deflation:

Deflation of the cuff of the tracheostomy tube will allow air to pass into the upper airway on expiration. Phonation will be achieved as air is directed into the larynx, however the strength of the voice may be weaker as some air will pass out of the open tracheostomy.

Downsizing of Tracheostomy Tube:

Use of a smaller tracheostomy tube will allow increased passage of air between the tube and the tracheal walls on exhalation but it will also increase the work of breathing as the resistance to air flow is increased. This will therefore need to be discussed with the MDT.

Intermittent Finger Occlusion:

Intermittently occluding the tracheostomy tube with a gloved finger will allow for effective voicing in many patients. To use this technique the patient should ideally be able to tolerate cuff deflation, but if not must have a sufficiently small tube to allow passage of air through the glottis or have a fenestrated tracheostomy tube (with fenestrated inner cannula) in place.

One Way Speaking Valve:

One-way speaking valves can be used very effectively with tracheostomised and ventilator dependent patients. Use of a one-way speaking valve is dependent upon the patient's ability to tolerate cuff deflation.

This type of speaking valve has a one-way mechanism where the valve opens on inspiration, allowing air to enter the airway via the tracheostomy, however closes on expiration, forcing air into the upper airway and larynx to allow for phonation.

For the patient who is ventilator dependent and can tolerate cuff deflation, the "Passy-Muir" valve should be considered.





Portex® Orator one-way
speaking valve

“Passy Muir” tracheostomy
and ventilator speaking
valves

The Speech & Language Therapist will be able to provide information and advice on achieving the most appropriate communication system for the individual patient

12.3.1 Procedure for using a One Way Speaking Valve – Self-ventilating patient

Action	Rationale
The patient must have SpO ₂ levels monitored using a pulse oximeter	To obtain the patient’s correct baseline status
Where possible the patient must fully understand the procedure and its mechanism, explanation is therefore essential	To reduce the anxiety of the patient which influence the success of the voice production
Ensure cuff is deflated	If the cuff is inflated air is unable to pass through the vocal cords and a voice cannot be produced. The patient’s respiration will be compromised
If humidified oxygen or air is required, this can be placed over the speaking valve in the normal manner	To maintain consistent environment for the patient throughout the assessment
Once the speaking valve is in place, instruct the patient to breathe in (via the tracheostomy tube) and blow out gently through the mouth	The patient will not be used to normal breathing, especially if the tracheostomy tube has been in place for some time
Being trial attempts at phonation by asking the patient to say “ah” or count from “one” to “five”	Automatic speech such as counting is often easier for the patient than spontaneous speech
If the patient’s voice sounds “wet” or “gurgly” ask them to cough and clear	Any secretions present that may affect voice clarity



secretions	
Monitor carefully and liaise with the other team members regarding the weaning plan (see section 11.0)	Remove the speaking valve if: Respiratory difficulty occurs SpO ₂ levels decrease The patient becomes fatigued The patient requests it
Always refer to the Speech & Language Therapist's advice in the medical and nursing notes and the weaning plan.	
If indicated, remove the speaking valve at the end of the trial period, re-inflate the tracheostomy tube cuff using the MOV technique, checking cuff pressure.	
Clean and dry the speaking valve according to manufacturer's guidelines and store in a named sealed container.	
Document all actions on the weaning plan.	To ensure effective communication amongst the multidisciplinary team.



12.3.2 Procedure for using a Passy Muir Speaking Valve (PMV) in-line with ventilator

Action	Rationale
Obtain medical agreement prior to commencing procedure	Patient needs to be medically stable and weaning from mechanical ventilation, in order to ensure that patient is safe to tolerate cuff deflation and ventilator adjustments.
Where possible the patient must fully understand the procedure and its mechanism, explanation is therefore essential	To reduce the anxiety of the patient which can influence the success of the voice production
Ensure no evidence of reduced airway patency – Patient history, bronchoscopy results, ABGs	
Ideally the patient should be on a pressure support of ≤ 15 cmH ₂ O and no ≥ 8 cmH ₂ O of PEEP, with FiO ₂ < 0.50	To ensure minimum ventilator support is required
Check RR/HR/SpO ₂	To ensure within normal limits for the patient ⁶
Determine potential changes to ventilation modes and O ₂ therapy	To allow for air leak within the ventilator system
Suction orally and via tracheostomy tube prior to cuff deflation	To ensure minimum residual secretions during procedure
Slowly deflate cuff while carrying out synchronous suction. Check for airflow at mouth	Know your ventilator
If signs of intolerance are observed, please remove valve, re-inflate cuff and do not proceed any further without further reassessment	Signs of intolerance: Increased coughing Increased respiratory rate Respiratory effort Need for suction increases SpO ₂ levels decrease



Once the patient is tolerating cuff deflation insert the Passy Muir valve into the ventilator circuit as close to the tracheostomy as possible.	To increase likelihood of success when using valve
Assess patients ability to phonate	<p>To ensure supraglottic airflow. Remove the speaking valve if:</p> <p>Respiratory rate / effort increases</p> <p>Heart rate rises</p> <p>SpO₂ levels decrease</p> <p>Patient experiences distress / discomfort</p> <p>No supraglottic airflow</p> <p>Weak / breathy / hoarse voice</p> <p>Inspiratory / expiratory stridor</p> <p>The patient requests it</p>
If the patient's voice sounds "wet" or "gurgly" ask them to cough and clear secretions	Any secretions present may adversely affect voice clarity
Monitor respiratory rate / oxygen saturations / work of breathing carefully and liaise with the other team members regarding the weaning plan	<p>Remove the speaking valve if:</p> <p>Respiratory difficulty occurs</p> <p>SpO₂ levels decrease</p> <p>The patient becomes fatigued</p> <p>The patient requests it</p>
If indicated, remove the speaking valve at the end of the trial period, re-inflate the tracheostomy tube cuff if indicated using the MOV technique, checking the cuff pressure with a manometer	
Clean and dry the speaking valve according to manufacturer's guidelines and store in the box provided by manufacturer with the patients name on it	
Document all actions on the weaning plan	To ensure effective communication amongst the multidisciplinary team
If the initial trial is successful and it is	



agreed to continue with its use please place the aqua marine sticker provided in the speaking valve pack onto the pilot balloon line which states that when this valve is used the cuff must be deflated first

12.3.3 Contradictions for speaking valve use

- Inability to tolerate full cuff deflation
- Airway obstruction
- Unstable medical/pulmonary status
- Laryngectomy
- Severe anxiety/cognitive dysfunction
- Anarthria
- Severe tracheal/laryngeal stenosis
- End stage pulmonary disease

If communication is particularly difficult or further advice is needed, please contact the Speech & Language Therapy department.

12.4 Above Cuff Vocalisation

Patients unable to tolerate cuff deflation, (e.g. ventilated patient), should be considered for use of a vocalaid tracheostomy tube. Air from an external source is delivered above the cuff to allow airflow through the larynx for phonation. This may allow the patient with a tracheostomy to communicate verbally, however as the airflow is reduced, voice may be

weak.



Portex® VocalAid / Suctionaid Blue Line
Ultra® tracheostomy tube



TracoeTwist (including Twist Plus)



13. SWALLOW

Recent evidence suggests that it is not tracheostomies that cause dysphagia, but the multiple co-morbidities which led to the need for tracheostomy insertion. Age, length of intubation period, number days post tracheotomy, and overall functional reserve, all need to be taken into account when predicting aspiration risk. All patients with a tracheostomy tube in situ must be referred to speech and language therapy.

13.1 The effects of tracheostomy on the swallow

The evidence around the effects of a tracheostomy tube is controversial, but suggests that the following may occur:

- Reduction of anterior movement of the hyoid bone, which can lead to reduced upper oesophageal opening
- Reduced superior movement of the larynx, which can lead to reduced laryngeal closure
- Tracheal irritation at rest and during swallowing¹
- Compression of the oesophagus by the tracheostomy tube cuff⁷
- Reduced subglottic air pressure
- Reduction or elimination of airflow through the glottis
- Blunting of the reflexive cough
- Non co-ordination of the glottic closure response
- Reduced laryngeal sensitivity
- Disuse atrophy of the laryngeal muscles

It is essential that the MDT is skilled in identifying those patients who are at greater risk of dysphagia so that a prompt referral to speech and language therapy (SALT) department can be made.

13.2 The role of the Speech and Language Therapist

Speech and Language Therapists (SALT) specialise in the assessment and management of patients with tracheostomies who present with swallowing or specific communication difficulties.



An assessment of swallowing function by an SALT is required prior to the commencement of oral feeding in patients identified as being at risk of dysphagia. This is to reduce the risk of aspiration, which may lead to aspiration pneumonia/prolonged hospital stay.⁴ A multi-disciplinary approach is recommended to ensure appropriate and effective care for the individual patient.

13.3 Oral Intake for Tracheostomised Patients following Head & Neck Surgery/Chemo radiotherapy treatment

It is recommended that these patients are referred to SALT for a detailed assessment at the pre-operative/treatment stage so that baseline function is understood. Post surgery/treatment, the SALT will support the patient and re-assess communication and swallow function, in the case of surgical patients, working closely with the surgical team in terms of appropriate timing of oral intake post-surgical healing.

13.4 Cuff Deflation

It is preferable for oral intake to be offered when the tracheostomy cuff is deflated, due to improved sensation/mobility of the larynx/improved subglottic pressures, ability to cough to expel aspirated material etc. However, for those patients where cuff deflation is not possible, for example patients who are slow to wean from the ventilator, or where quality of life decisions need to be made, a decision may be made to feed with the cuff partially/fully inflated.

Recent evidence has shown that cuff deflation does not necessarily result in swallowing success or increased swallowing safety. Likewise it could be argued that inflating the cuff is unlikely to *improve* swallow function.

It is therefore recommended that patients be assessed on an individual basis. Cuff deflation must be assessed by a proficient practitioner in order to minimise the effects of over-inflation of the cuff which can result in laryngeal trauma.

Where a FEES service is available (Fiberoptic Endoscopic Evaluation of Swallowing), the SALT team can be called to directly visualise and evaluate swallow safety in the presence of an inflated cuff. Without FEES (offering direct visualisation of the larynx), bedside SALT assessment of swallow efficiency with the cuff inflated poses marked limitations, due to an



inability to auscultate voice and upper respiratory changes due to glottic airflow/patient response to aspiration is inhibited.

13.5 Procedure for bedside evaluation of swallowing by a Speech & Language Therapist (SLT)

The SLT will initially carry out a clinical assessment of the patient's swallowing ability. This will include:-

Action	Rationale
Obtaining information pertaining to medical history and current admission - Reason for the tracheostomy - Type and size of tracheostomy tube	To ensure that all background information and current cognitive, neurological and structural information has been established SALT will check patient is not previously known to SALT service (i.e. investigate any previous history of dysphagia)
Current method of ventilation	Positive pressure ventilation is preferable to assist
Frequency of suctioning	Copious secretions may negate readiness for oral intake
Ability to tolerate cuff deflation (documented medical agreement needed)	See above
If ventilated, aim for cuff deflation once ventilatory inspiratory pressures are sufficiently low (Ideally the patient should be on a pressure support of ≤ 15 cmH ₂ O and no ≥ 8 cmH ₂ O of PEEP)	To allow comfortable expiratory airflow for sensitization of the larynx. This has the benefit of allowing phonation for speech and encourages swallowing of salivary secretions
Full oro-motor assessment	Incomplete lingual range of motion is an independent risk factor for aspiration, regardless of labial closure and facial symmetry



Establishment of basic communication status and cognitive function	Disorientation is associated with higher risk of aspiration
Regular suctioning should be available by an accompanying SALT / nurse/ physiotherapist. They therefore must remain in available to assist at all times	To ensure the airway is clear/to reduce aspiration risk/to ensure patient comfort
If the patient is ventilated, a trained member of the MDT will be required to make the necessary modifications to the ventilator settings	To silence the alarms.
The patient's response to cuff deflation will be monitored closely e.g. change in respiratory rate; fatigue; falling SpO ₂ levels; signs of distress	Adverse reaction to cuff deflation may contraindicate commencing oral trials
Digital occlusion or speaking valve will be used if tolerated	<p>To establish baseline vocal and cough quality and strength prior to introduction of oral intake</p> <p>To normalise subglottic air pressures for swallowing</p> <p>This can improve vocal cord closure and assist in clearing the larynx following swallowing which helps to determine upper airway patency</p>
<p>Assessment of the patient's swallow will include:</p> <ul style="list-style-type: none"> - Saliva swallow - Water swallow - Progression onto other liquids and solids if appropriate 	Start with caution to limit aspiration risk
<p>Judgement of oro-pharyngeal swallow safety will be based on a number of factors:</p> <ol style="list-style-type: none"> 1. Level of alertness 2. Oro motor function 	<p>Orientation and lingual range of motion correlate highly with aspiration risk</p> <p>Impaired voice/laryngeal function may warrant referral to ENT</p>



3. Laryngeal competency 4. Strength of reflexive/spontaneous cough 5. Risk of aspiration	Impaired cough strength may inhibit the patient from expectorating any aspirated material/protecting the airway.
Clinical signs to consider which may indicate aspiration risk include: <ul style="list-style-type: none"> - Effortful/slow initiation of the swallow reflex - Consistent coughing - Consistent drop >4 in SpO2 levels - Multiple swallows needed to clear bolus - Patient distress - Increasingly wet voice quality - Need for suctioning/presence of food/liquid in secretions around trache tube or evident in suction catheter. 	SpO2 monitoring acts as an adjunct to the assessment only. There is limited evidence to support that falling SpO2 levels are a reliable predictor of aspiration.
If bedside swallow assessment is inconclusive, the SALT may arrange an instrumental evaluation of the swallow and laryngeal function e.g. videofluoroscopy (VF) or FEES assessment	FEES is often the most suitable instrumental examination due to its portability. Many tracheostomised patients are too unwell to for transportation to the X-ray department for VF assessment.

13.6 Fiberoptic Endoscopic Evaluation of Swallowing (FEES)

Fiberoptic endoscopic evaluation of swallowing allows direct visualisation of pharyngeal and laryngeal anatomy and physiology before, partially during, and after the swallow at the bedside with critically ill or immobile patients, or in a clinic environment. FEES provides a useful biofeedback tool for patients to monitor and modify their swallow technique in an attempt to improve swallow efficiency/safety. Appropriate training in the FEES procedure is essential for all SLT's prior to use of this tool clinically.

13.7 Videofluoroscopy (VFS)

Videofluoroscopy enables radiographic visualisation of all stages of the swallow. These images are recorded onto the PACS system and may be reviewed by any member of the



MDT. This clinic runs weekly at both University Hospital of Wales and University Hospital of Llandough sites. A competent practitioner must conduct all assessment procedures.

13.8 Modified Evans Blue Dye Test

This test is no longer recommended by SALT. Studies show that the test has a 50% false negative rate, i.e. poor sensitivity in identifying aspiration. The test has been found to be more reliable in detecting *gross* aspiration (>10% of the bolus) only.

Careful observations (as outlined above) on introducing oral intake far offer greater information about swallow efficiency than a solitary blue dye or 'Ribena test' (as commonly adapted by ward staff).

13.9 Other Assessment Techniques

Cervical Auscultation may be an adjunct to assessment, although its use is controversial. Cervical auscultation is a technique used to detect sounds of a swallow via a stethoscope placed on the larynx.

It may:

- Determine upper airway sounds prior to the swallow trial
- Determine the point in the respiratory cycle in which the swallow occurs
- Determine a change in upper airway sounds post swallow
- Be used to detect a swallow when laryngeal palpation is difficult

NB: There is no merit in cervical auscultation use in the presence of an inflated cuff.

13.10 Management of dysphagia

After the Speech and Language Therapist has assessed the patient's swallowing function, recommendations regarding swallowing management will be made. This should take the swallow assessment results and the MDT assessment of the patient into consideration.

Speech and Language Therapy intervention may recommend a range of interventions depending on the patient and the type of dysphagia. Russell and Matta, list the following types of intervention:

13.10.1 Indirect therapy

This does not involve the introduction of a food/ fluids, but focus on the aspects of the swallow that have been identified as "abnormal." These generally include a range of



motion exercises and swallowing manoeuvres e.g. Falsetto – to increase laryngeal range of motion, Masako –to increase tongue base retraction

13.10.2 Tracheostomy tube manipulation

Tube manipulation may be used to attempt to “normalise” a patient’s swallow, in order to improve swallow safety. e.g. The SLT might recommend downsizing a tracheostomy tube.

13.10.3 Diet Changes

The SLT may recommend modified food/fluid consistencies to optimise swallow safety. This may require liaison with the dietician.

13.10.4 Positioning

The optimum safe position for swallowing is sitting upright with the chin slightly flexed. This may not be possible for some patients, so the SLT may make recommendations as to the safest position for swallowing.

Postural techniques and manoeuvres that can be used to increase swallow safety may also be recommended e.g. Head tilt or the Mendelsohn manoeuvre. Some dysphagia postural manoeuvres are contraindicated with a tracheostomy tube in situ due to risk of dislodging the tube (e.g. chin tuck/head turn).

13.10.5 Non-oral feeding

If the SLT recommends that a patient should be nil-by-mouth or that they commence oral trials only (whilst swallow safety is being established), the patient may require alternative forms of feeding to maintain nutrition and hydration. Dietetic involvement will be required. The SLT will also be involved in the multidisciplinary decision making process for long-term non-oral feeding options.



14. WEANING FROM TRACHEOSTOMY

It is important that each individual case is carefully discussed and a clear plan made prior to the weaning process commencing. This must be continuously evaluated. These guidelines are intended to assist in the decision making and timing of each stage of the weaning process. There is evidence from the literature, which highlights that although tracheostomy weaning needs to be individualised, a standard procedure is essential to decrease anxiety and facilitate success (Doerkson, 1994, Heffner, 1995, Ladyschewsky and Gousseau, 1996).

14.1 Preparation for Weaning

The decision to wean a patient should be taken by the multidisciplinary team. The patient must be involved in this discussion if possible (Ladyschewsky and Gousseau, 1996, Harkin and Russell, 2001, Choate and Barbetti, 2003). The process usually consists of the following stages:

- Tracheostomy
- Cuff deflation
- Swallow assessment
- Speaking valve
- Downsizing of tube
- Capping off
- Decannulation

Patients may not be appropriate to proceed to full decannulation and the process may take a number of weeks or longer and vary at different stages. It should also be noted that this is not a linear process and that patients may go backwards as well as forwards. In some instances some steps in the process may be omitted. Any decisions should always be dictated by patient needs.

14.2 Pre-Weaning Criteria

- Original indication for tracheostomy has resolved
- Spontaneously breathing with a regular respiratory pattern and rate less than 30 breaths per minute
- On oxygen dependency less than 35% with adequate saturations
- Strong cough – able to clear to the top of the tracheostomy tube



- Clear chest
- Adequate nutrition
- Patient needs to be seen to be coping with their own saliva and, where appropriate, assessed by a Speech and Language Therapist or a competent Healthcare Practitioner
- Multidisciplinary team in agreement

14.3 Contraindications to weaning

- Tumour effecting airway patency
- Upper airway oedema
- Absent or inadequate cough or gag reflex
- Persistent dysphagia and compromised airway protection
- Reduced ability to clear secretions



14.4 Potential Stages of Weaning

14.4.1 Cuff Deflation Assessment

To maximise success, cuff deflation should be considered only if the pre-weaning criteria are met

Action	Rationale
Explain procedure to the patient	To gain patient consent and minimise anxiety
Sit patient upright (unless contra-indicated e.g. spinal cord injury)	To optimise lung expansion
Assess patients' respiratory status i.e. rate, depth and pattern	Ensures that the patient remains stable
Suction on deflation of cuff or encourage active cough	To clear any loose secretions that may have pooled above the cuff and may be colonised by bacteria (Dikeman and Kazandjian, 1995)
Deflate cuff slowly and note reaction to cuff deflation	Allows the patient to adjust to changes in airflow (Dikeman and Kazandjian, 1995)
Monitor Respiratory rate and effort Any spontaneous swallow attempts Additional wheezes/stridor Any voicing Monitor oxygen saturation Observe for signs of fatigue Ability to deal with oral secretions	To assess patients ability to tolerate cuff deflation and detect any difficulties



Indications that a patient is coping safely with cuff deflation are:

- If spontaneous swallows are noted
- If manages to swallow oral secretions
- If maintains O₂ saturations
- If able to cough at least into tracheostomy tube
- If respiratory/cardiovascular systems are stable

Do not continue with cuff deflation if any of the following occur:

- Constant oral drooling
- No swallows observed
- Respiratory or cardiovascular distress
- Fatigues quickly
- Fails to protect airway e.g. audible pooled “wet” pharyngeal secretions
- Desaturation
- **REINFLATE the cuff and reassess when appropriate**

The multidisciplinary team should agree and determine the length of time the patient is able to tolerate cuff deflation. This may vary from a few minutes to permanent cuff deflation and depends on the individual patients' abilities. Careful respiratory monitoring during the process of weaning and decannulation is essential. Many patients will require the cuff deflated in incremental periods

14.4.2 Cuffless Tubes

If a patient tolerates cuff deflation well but is likely to require a tracheostomy for a further period a cuffless tube should be considered at the earliest opportunity. Even a deflated cuff in the airway has been shown to increase work of breathing (Hussey and Bishop, 1996)

14.4.4 Assessment of Phonation and Use of a Speaking Valve

The speaking valve can be used as an aid to communication. It may also improve the biomechanics of swallow (Elpern, 2000, Suiter, 2000).

See also section 12 Communication



**THE CUFF MUST BE FULLY DEFLATED IN ORDER TO USE A SPEAKING VALVE!
(OTHERWISE THE PATIENT WILL BE UNABLE TO EXHALE)**

Contraindications to the use of a speaking valve:

- Severe tracheal/laryngeal stenosis
- Airway obstruction
- Inability to tolerate cuff deflation
- End stage pulmonary disease
- Unstable medical/pulmonary status
- Anarthria
- Laryngectomy

14.4.5 Downsizing of Tubes

It may be necessary to downsize the tracheostomy tube in order to tolerate a speaking valve and continue the weaning process. In some patients a large tracheostomy tube will not allow enough airflow around the tube to elicit phonation (Dikeman and Kazandjian 1995). Larger tubes have also been shown to increase work of breathing (Hussey and Bishop 1996).

14.4.6 Gloved finger occlusion

If the patient is tolerating cuff deflation, adequate airflow around the tracheostomy tube and up into the mouth/nose needs to be established before weaning can progress any further. This is carried out by occluding the tracheostomy tube with a gloved finger and feeling for air flow from the nose/mouth. During occlusion, the patient must be monitored closely for any signs of respiratory distress, if this occurs the procedure must be stopped. Good airflow can be confirmed by auscultating over the neck above the level of the tracheostomy tube

The presence of stridor, minimal or absent breath sounds above the level of the tracheostomy tube indicates reduced airflow around the tube. Therefore, changing the tube to a smaller size and/or fenestrated tube should be considered to optimise and proceed with weaning.



14.4.6 Capping off Tracheostomy Tube

THE CUFF MUST BE FULLY DEFLATED WHEN CAPPING OFF (OTHERWISE THE PATIENT WILL BE UNABLE TO BREATHE)

Procedure for Capping Off:

Action	Rationale
Discuss aims and explain procedure to the patient	Gain consent and reduce anxiety
Ensure cuff is fully deflated	To ensure that the patient is able to exhale
The patient must be able to swallow his or her own secretions safely	To ensure that the patient is able to protect their airway
Place cap over end of tracheostomy tube	To stop air entering the tracheostomy and thus making the patient breathe via upper airway
Apply facial oxygen if required via a face mask and encourage the patient to take deep breaths	Provide supplementary oxygen and to help them begin to feel the change in breathing
Ensure that the patient is able to obtain adequate breath via upper airway	Tracheostomy tube may be too large to allow the patient to breathe around it. (Remove cap and discuss need for smaller tube with tracheostomy team)
Stay with the patient until they are settled and feel comfortable	The patient may become anxious or is genuinely unable to breathe requiring immediate assistance
Agree with the multi-disciplinary team or the tracheostomy team the period for capping off	This should be an individualised regime that is reviewed daily



Do not continue with the procedure if any of the following occur:

- Increased work of breathing
- Oxygen desaturation
- Respiratory or cardiovascular distress
- Fatigues quickly
- Change of facial colour
- Stridor

Indications that the patient is coping safely with use of the cap are:

- If respiratory/cardiovascular systems are stable
- If voice remains clear
- If maintains O₂ saturations
- If patient is comfortable

Within current literature, time for capping off varies from 6 – 48 hours. There is the greatest consensus that a patient should be able to tolerate at least 24 hours capped off prior to decannulation. However, this should be based on individual assessment (Heffner, 1995, Ladyschewsky and Gousseau, 1996, Harkin, 1998).



14.5 Troubleshooting

Problem	Cause	Solution
On cuff deflation, no or poor airflow past tracheostomy into mouth/ nose when using the gloved finger occlusion technique	Reduced space around the tracheostomy as tube too large or airway obstruction (e.g. stenosis, granulation tissue)	Consider changing the tube to a smaller tracheostomy tube +/- fenestrated tube Consider referral to ENT to investigate airway obstruction prior to proceeding with weaning
An increase in work of breathing when one-way valve or decannulation cap in place	<ul style="list-style-type: none"> • Cuff remains inflated • Reduced space around tracheostomy tube as too large or airway obstruction present • Poor ventilatory reserve • Excessive secretions and/or difficulty swallowing • Anxiety 	<p>Remove one-way valve/ decannulation cap and deflate cuff. Continue weaning with a one way valve, once the patient symptoms have resolved.</p> <p>Consider changing the tube to a smaller tracheostomy tube +/- fenestrated tube or referral to ENT to investigate airway obstruction prior to proceeding with weaning</p> <p>Build up time gradually, monitoring work of breathing</p> <p>Encourage patient to cough and clear into mouth or swallow. Remove speaking valve and suction if necessary. If swallow is impaired, refer to Speech and Language Therapy</p> <p>Reassure and explain procedure fully to patient</p>



15. DECANNULATION

15.1 Overview

Prior to the removal of a temporary tracheostomy tube, there must be multidisciplinary team agreement that the indication for the tracheostomy has now been resolved sufficiently. This same team should remain the main point of contact for at least 48 hours post-decannulation. If patient location prevents this being a viable option, care should be formally handed over to someone able to provide adequate advice and interventions.

A tracheostomy should be removed as soon as it is no longer required.

It must be clear which person or team is responsible for management of the tracheostomy, especially if it is not the specialty with primary responsibility for the patient's care.

Reviewing the 'need' for a tracheostomy and planning weaning should be part of the daily assessment. Some patients may tolerate rapid decannulation, especially if their ventilation period has been short or if they do not suffer significant lung or airway pathology or neuromuscular problems. Others, particularly those with underlying cardiopulmonary disease, muscle weakness, neurological deficits, upper airway oedema or problems managing airway secretions, will take much longer to wean and it is important that the process is both planned and sequential.

The team must have a thorough knowledge of the individual patient's condition including indication for tracheostomy, established indicators for decannulation and plan of further any future assessments or interventions. Practitioners caring for the patient through the decannulation process must have a sound understanding of the signs of deterioration during or post-decannulation and must be able to take necessary actions in the event of an emergency.

The procedure is usually straightforward, but adequate assessment and preparation as outlined above is required to maximise success. There should be a person present who is able to cannulate should decannulation quickly prove unsuccessful. The optimal time for decannulation is usually the early morning when the patient has rested overnight and their condition can be observed during the daytime. It is also advisable to ensure a sufficient interval after food or fluid intake.



There are many variations on decannulation protocols described in the literature. It is not clear which of these is 'the best' or whether some work better in certain situations. However, the stages of weaning described previously must have been undertaken and documented as having been completed successfully.

Prior to Decannulation the multidisciplinary team will confirm:

- The patient can maintain and protect their airway spontaneously
- They are free from ventilatory support with adequate respiratory function
- They are haemodynamically stable
- They are absent of fever or active infection
- The patient is consistently alert
- They have a strong consistent cough (able to cough into mouth)
- They have control of saliva + / - a competent swallow
- They are not planned for procedures requiring anaesthesia within next 7-10 days
- They are considered clinically stable

Extra caution is essential if the patient is known to have a complex airway (e.g. requiring an adjustable flange tracheostomy) or has a previously documented difficult intubation

For all decannulation procedures the following equipment must be available:

- Oxygen available
- Continuous oxygen saturation monitoring
- Microbiological swab for stoma
- New tracheostomy tubes (for possible re-insertion)
- Sterile dressing pack
- 0.9% Saline
- Semi-permeable occlusive dressing
- Suction equipment
- Relevant documentation
- Resuscitation equipment must be locally available
- Access to advanced airway expert, with appropriate equipment



Additional equipment may include:

- Stitch cutter
- 10ml syringe
- Gum elastic bougie
- Bag valve mask circuit
- Rebreathe circuit
- Facial nebuliser circuit / adrenaline available for nebulisation

15.2 Procedure

Decannulation is a 2-person procedure:

Action	Rationale
Discuss the procedure with the patient. Have communication aids available e.g. interpreters.	To ensure consent, understanding and reduce anxiety.
Initiate continuous oxygen saturation monitoring for procedure	To identify and alert staff to desaturation following procedure.
Check that all emergency equipment is at the bedside.	To ensure appropriate equipment is available if the patient has difficulties post-decannulation.
Ensure that the patient is sitting in an upright position.	To optimise lung expansion and reduce risk of aspiration.
Universal precautions (PPE) should be adhered to	To reduce the risk of infection.
Stop any naso-gastric feed or oral intake for 4 hours pre-procedure. Aspirate NG tube if present	To minimise the risk of aspiration.
Ensure the cuff (if present) is deflated. While holding onto the tracheostomy tube, remove the tracheostomy tapes and dressing. Remove the tracheostomy tube using a gentle outward and downward movement. Remove the tracheostomy on maximal	To prepare tube for removal. The tracheostomy tube will follow the anatomical formation of the tract. Rapid jerking or pulling of the tube upwards will cause trauma to the trachea and acute discomfort to the patient. To minimise the risk of alveolar



inspiration.	collapse.
Following decannulation, the stoma should be cleaned, dried, dressed and covered with a semi-permeable occlusive dressing.	This will absorb any secretions whilst occluding the stoma opening to aid healing and communication.
Ensure close observation of patients' respiratory status post-procedure	To reduce patient risk.
Update MDT post-procedure and clarify further monitoring requirements, dressing needs and alert to possible complications	To optimise team communication and safe patient rehabilitation
Encourage the patient to apply pressure to the stoma dressing whenever speaking or coughing.	To minimise any leak from the stoma site, produce a more effective cough and encourage stoma closure.
Document appropriately including review date by clinician completing decannulation, contact details, observation frequency and any other essential information	To ensure clear plan in case of patient deterioration post-decannulation

15.3 Post –decannulation

Following the removal of the tracheostomy tube, the patient is left with an opening into their trachea. This needs protection from entry of water or foreign bodies and needs assistance to close. An airtight dressing is required to prevent the ongoing passage of air through the tract (tracheo-cutaneous fistula) which will delay wound healing. Where possible, the patient should be encouraged to apply gentle pressure to the dressing whilst coughing or speaking. This will reduce the air pressure through the fistula to the underside of the dressing, which will loosen the dressing's contact with the skin, necessitating frequent dressing changes. The wound should be airtight within two weeks and if not, then a referral to ENT should be considered. Tissue forming along the fistula may require specialist assessment and treatment.

The use of a standardised weaning procedure should reduce the risk of patients 'failing' a decannulation attempt. However, a patient's condition can alter which may necessitate consideration for re-insertion of the tracheostomy. The emergency tracheostomy equipment should be left at the patient's bedside for 48 hours following decannulation to enable access to tracheostomy equipment for this period post decannulation. This is particularly important



to maintain for those patients transferred to other clinical settings within 48 hours post decannulation.

Following decannulation, the following signs may indicate an urgent need for help from ENT, Anaesthesia or Critical Care:

Problems	Actions in all circumstances
Stridor	Sit the patient up if possible.
Desaturation (hypoxia)	Check tracheostomy dressing for leakage.
Increased respiratory rate	Encourage deep breathing.
Increased heart rate	Clear secretions by active cough +/- suction as required.
Sweating	Give oxygen via facemask
Agitation	Bring emergency trolley to bedside
Cyanosis	Use continuous pulse oximetry to measure saturations
Loss of consciousness	



16. TRANSFERRING TRACHEOSTOMY PATIENTS

To ensure the safety of patients with tracheostomies being transferred between clinical areas and hospitals, the All-Wales NHS Tracheostomy document recommends the use of a transfer information document.

ALL WALES TRANSFER INFORMATION FOR PATIENTS WITH TRACHEOSTOMIES

1. Primary Reason for Tracheostomy:

- ☐ To assist weaning from the ventilator
- ☐ Maintain an airway
- ☐ Post Maxillofacial/ENT surgery
- ☐ Secretion clearance
- ☐ Risk of aspiration
- ☐ Other _____

Name:
Hospital Number:
DOB:
Address

2. Type of Tracheostomy: ☐ Percutaneous ☐ Surgical

3. Date of Tracheostomy procedure:

4. Advised tube change date (max 29 days):

5. Sutures present? Yes / No Date for removal:

Brand of Tracheostomy	Size	Type of Tube
		Cuff present? Y / N Inner tube present? Y / N Fenestrated? Y / N Adjustable flange? Y / N



6. Current Requirements:

Humidification	Oxygen	Suction Catheter Size	Secretion
<input type="checkbox"/> Cold Water <input type="checkbox"/> Swedish Nose <input type="checkbox"/> Buchanan Bib <input type="checkbox"/> Regular Saline Nebulisers	% _____		Quantity Type

Microbiology:	Swallow/Nutritional status	Weaning to date
Date of Culture: Sputum culture results:	Assessed by SLT: Yes / No Assessed by Dietetics: Yes / No NBM: Yes / No If not NBM, please describe current oral intake:	Cuff deflated: Yes / No Speaking Valve: Yes / No Tolerating Finger occlusion/capping: Yes / No

Date of transfer:

Tracheostomy Blue Box Available / Transferred with Patient: Yes / No

Professional completing form:

Name: Designation: Sign:

Professional receiving form

Name: Designation: Sign:



17. CHANGING A TRACHEOSTOMY TUBE

Changing a tracheostomy tube is potentially hazardous, but so is failure not to do so. Unfortunately, recommendations for the frequency of changing tracheostomy tubes are inconsistent and unsupported by evidence.

Basic principles guiding replacement of a tracheostomy tube are listed in the box below. Basic principles for changing a tracheostomy tube Tracheostomy tubes without an inner cannula generally should be changed around every 7-14 days. This is to prevent obstruction of the lumen with secretions. Subsequent frequency may decrease once the patient is free of pulmonary secretions and has a well formed clean stoma. Timing is a matter of clinical judgement but general recommendations are that tracheostomies should be changed every 30 days to prevent infection, maintain a healthy stoma, and prevent degradation of the composition material. Individual manufacturers have recommendations for maximum use of their devices.

A European Economic Community Directive (1993) states that tracheostomy tubes with an inner cannula can remain in place for a maximum of thirty days. This assumes the inner cannula is changed or cleaned according the manufacturer's instructions at least daily. In patients with very productive chests the inner cannula may need reviewing every couple of hours.

The first routine tracheostomy tube change:

- Should not be performed within 4 days following a surgical tracheostomy and 7-10 days after a percutaneous tracheostomy to allow the stoma to become established.
- The decision to change the tube is usually a multi-disciplinary one, considering weaning, swallowing, ventilation, speaking and the ongoing need for a cuff.
- Must be carried out by a person competent to do so and with advanced airway expertise and equipment immediately available.
- Techniques involving exchange over a gum elastic bougie or airway exchange catheter may be safer for the first change.
- Technique used and ease should be recorded, along with recommendations for future exchanges.

Subsequent changes can be made by relevant staff, which are competent to do so, e.g. specialist tracheostomy nurses or therapists. In practice, the frequency with which the tube needs to be changed will be affected by the individual patient's condition and the type of tube used. Elective changes are inherently safer than those done in an emergency.



Tracheostomy tubes should only be changed by staff, which are competent to do so. Most will be doctors, but there are specialist non-medical practitioners who have the necessary skills.

Although problems can occur in any patient, they are particularly likely in the obese, those with a deep trachea, and other anatomical difficulties. In all circumstances, the patient should be pre-oxygenated and monitored appropriately, which should include pulse oximetry and the availability of capnography or bronchoscopy to confirm placement. Whilst the same principles apply to subsequent changes, the first change is usually the most difficult and technically challenging. Significant numbers of patients in NCEPOD report experienced unplanned early tube changes at less than 7 days.

Prior to tube exchange, consideration should be given to equipment, personnel, procedure and the environment required should problems arise when inserting the new tube.

It is essential that if the new tube cannot be inserted or is misplaced, there is an agreed procedure for responding to the situation.

17.1 Considerations for Changing a Tube

When planning a tracheostomy tube change always consider:

- Is this the best time to be doing this?
- Am I the best person to do this?
- Is the patient adequately/appropriately prepared?
- Have I got all the essential/appropriate equipment?
- Is there adequate support?

The type of tracheostomy tube used should be tailored to the patients' condition and will depend on numerous factors such as length of weaning time, original reason for tracheotomy and type of secretions.

This is a two-person technique, with one person supporting the tube and the patient and the other performing the change. In patients who are at risk of aspiration it is recommended that any enteral feed be stopped 3-4 hours prior to the procedure and the enteral tube aspirated immediately prior to the procedure. The procedure used for changing any tracheostomy tube will depend on the circumstances of that change.

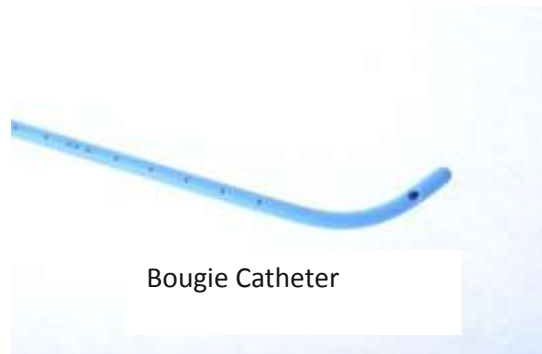


There are two commonly used methods:

1. Guided exchange using a tube exchange device - usually required for early changes and for patients with a high risk of airway loss
2. Blind exchange using an obturator – for patients with formed stomas and a low risk of airway loss

17.2 Equipment Required for Changing a Tube

- Dressing pack
- Suture cutter
- Appropriately sized tracheostomy tube and one a size smaller
- Tracheostomy tube holder
- 10ml syringe for cuffed tubes
- Water-soluble lubricant
- Sterile normal saline
- Pre-cut slim line key hole dressing such as Metalline™ or if large secretions use a more absorbent dressing such as Allevyn™ or Lyofoam™
- Gloves, apron and protective eye wear
- (Tracheal dilators)
- Functioning suction unit and appropriate sized suction catheters
- Stethoscope
- (Airway exchange catheter / bougie)
- Resuscitation equipment
- Microbiological swab



Bougie Catheter



17.3 Procedure for Changing a Tube

17.3.1 Exchange using an airway exchange catheter / bougie

Intervention	Rationale
Check emergency equipment	Ensure availability of equipment if needed
Explain procedure to patient and gain patient consent	Patient should feel comfortable and relaxed.
Position patient in semi-recumbent position	Neck extension allows easier removal and reinsertion of the tracheostomy tube
Where required pre-oxygenate	Minimise risk of hypoxia (Adam and Osbourne 1997, Day 2000, Brooks et al 2000, HEHY 2001)
Ensure assistant is clear regarding what is expected of them	Clear understanding of roles, alternative plans and potential adverse events
Check and lubricate tube	To ensure equipment functioning appropriately including cuff on new tracheostomy tube. Lubricate to facilitate insertion
Ask assistant to suction if required, remove old dressing, inner cannula and tapes and support the tube	To facilitate insertion
Insert exchange device to length of tube	To ensure exchange device into trachea without causing unnecessary discomfort
Ask assistant to deflate the cuff	To facilitate smooth tube removal and minimise the risk of aspirating secretions which have collected above the cuff
Remove old tube over exchange device	Removal of old tube whilst ensuring route for new tube into trachea
Insert new tube over exchange device	Restore artificial airway with new tracheostomy tube
Check for airflow through tube. Inflate cuff.	To ensure the tracheostomy tube is positioned correctly
Remove exchange device. Identify presence of CO ₂ using a CO ₂ detector	To ensure the tracheostomy tube is positioned correctly, is patent and the patient can maintain adequate respiration



Observe site, swab if required and clean while assistant support the tube	To clean the skin of debris and superficial organisms (Royal Free Hampstead NHS Trust 1997)
Dress and apply holder	Secure airway and protect stoma site
Replace inner cannula	Reduce risk of tube obstruction
Check patient is stable (and cuff pressure)	To maintain patent airway Maintain adequate seal of cuff while minimising the risk of mucosal ischaemia
Document procedure in the case notes using printed label where available and check patient again. If using a fenestrated tube, place spare inner cannula in emergency pack and clearly label tube	Ensure compliance with professional standards and legal responsibilities Ensure bedside / emergency equipment present prior to leaving patient

17.3.2 Blind exchange using an obturator

Intervention	Rationale
Check emergency equipment	Ensure availability of equipment if needed
Explain procedure to patient and gain patient consent	Patient should feel comfortable and relaxed.
Position patient in semi-recumbent position	Neck extension allows easier removal and reinsertion of the tracheostomy tube
Where required pre-oxygenate	Minimise risk of hypoxia (Adam and Osbourne 1997, Day 2000, Brooks et al 2000, HEHY 2001)
Ensure assistant is clear regarding what is expected of them	Clear understanding of roles, alternative plans and potential adverse events
Check and lubricate tube	To ensure equipment functioning appropriately including cuff on new tracheostomy tube. Lubricate to facilitate insertion
Insert obturator	To facilitate insertion
Ask assistant to suction if required, remove old dressing, inner cannula and tapes and support tube	To facilitate smooth tube removal and minimise the risk of aspirating secretions which have collected above the cuff



(Deflate cuff with suction applied)	To facilitate smooth tube removal and minimise the risk of aspirating secretions which have collected above the cuff
Remove tube on expiration	Reduce risk of bronchospasm / laryngospasm
If patient not oxygen dependent and stoma well formed, observe site, swab if site looks infected and clean stoma	To clean the skin of debris and superficial organisms (Royal Free Hampstead NHS Trust 1997)
Insert tube on expiration, remove obturator (inflate cuff)	To facilitate smooth insertion and return of tracheostomy airway
Check for airflow through tube. Identify presence of CO ₂ using a CO ₂ detector	To ensure the tracheostomy tube is positioned correctly, is patent and the patient can maintain adequate respiration
Ask assistant to support the new tube	To promote airway protection and security of tracheostomy tube
Dress and apply holder	Secure airway and protect stoma site
Replace inner cannula	Reduce risk of tube obstruction
Check patient is stable (and cuff pressure)	To maintain patent airway Maintain adequate seal of cuff while minimising the risk of mucosal ischaemia
Document procedure in the case notes using printed label where available and check patient again. If using a fenestrated tube, place spare inner cannula in emergency pack and clearly label tube	Ensure compliance with professional standards and legal responsibilities Ensure bedside / emergency equipment present prior to leaving patient

17.3.3 Emergency management

If unable to re-insert tube successfully or the patient become compromised:

- Call the on-call anaesthetist/ENT/Resus team immediately and as appropriate to the situation, to assist and/or orally intubate where appropriate
- Maintain oxygenation via stoma and nose and mouth with a facemask
- Use tracheal dilator and attempt to re-insert tube
- Reposition patients neck and attempt to re-insert tube
- Consider using a smaller size tube



18. RESPONSIBILITIES

All staff have a responsibility to ensure the guidelines are followed and applied consistently throughout Cardiff and Vale UHB.

On occasion reference is made to “an appropriately qualified healthcare professional”. This can apply to doctors, nurses, physiotherapists and speech and language therapists who have the appropriate skills within the management of the acute tracheostomy patient.

All procedures documented within these guidelines are intended to be carried out by qualified staff. Where unqualified staffs are permitted to undertake a procedure, this is clearly highlighted within individual procedures.

Individual practitioners have a duty of care to ensure that their practice is evidence based and that they work within their personal scope of practice. It is envisioned that the clinical incident reporting system will be used to flag up areas of poor practice.

19. RESOURCES

Implementing this evidence-based policy may have resource implications in terms of professional hours as opposed to changes in equipment.

20. TRAINING

Training is provided by the Cardiff and Vale UHB Tracheostomy Team based at University Hospital of Wales. This is provided as a 3.5 hour session once per month.

21. IMPLEMENTATION

Following ratification by the UHB board, these guidelines will be disseminated to service groups and directorates through the cascade system.



22. REFERENCES AND FURTHER READING

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Appendix 1

TRACHESOTOMY WORKING PARTY

Introduction

Within Cardiff and Vale UHB a Tracheostomy working party has been developed to support the quality and safety of care being provided to patients with tracheostomies. Additionally, University Hospital of Wales is a member of the Improving Tracheostomy Care (ITC) collaborative.

Terms of Reference

- To benchmark and identify an evidence based guideline which serves as a minimum standard
- To formulate and produce guidelines on the management of patients with tracheostomies in the acute care in-patient setting
- To ensure appropriate data collection to evaluate the quality of care being provided to patients with tracheostomies

Working Party

Paul Twose	Clinical Specialist Physiotherapist
Dr. Paul Morgan	Consultant Intensivist
Gemma Jones	Clinical Lead Speech and Language Therapist
Jennifer Lowes	Tracheostomy Clinical Nurse Specialist
Sali Curtis	Dysphagia Lead Speech and Language Therapist
Carole Jones	Clinical Lead Physiotherapist (ITC Champion)
Dr. Tom Holmes	Consultant Intensivist
Mr. David Owens	Consultant ENT
Beverley Oughton	Senior Nurse Critical Care
Dr. Catherine Doyle	Consultant Anaesthetist
Lynda Govier-Bond	Head and Neck Specialist Nurse
Harriet Lacy	Head and Neck Specialist Nurse



Appendix 2

This patient has a

TRACHEOSTOMY

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



Surgical / Percutaneous

Performed on (date)

Last change (date)

Tracheostomy tube size

Notes: Indicate tracheostomy type by circling the relevant figure.
 Indicate location and function of any sutures.
 Laryngoscopy grade and notes on upper airway management.

Percutaneous Slit type

INNER TUBE MUST BE IN SITU AT ALL TIMES

Intubation Grade:	I	II	III	IV
Emergency Call:	Anaesthesia	ICU	ENT	MaxFax Emergency Team

www.tracheostomy.org.uk



This patient has a
LARYNGECTOMY

and CANNOT be intubated or oxygenated via the mouth

Follow the LARYNGECTOMY algorithm of breathing difficulties

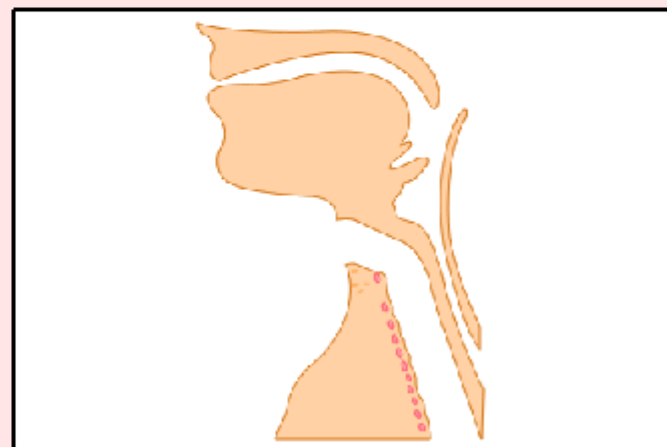
Performed on (date)

Tracheostomy tube size (if present)

Hospital / NHS number

Notes:

There may not be a tube in the stoma.
The trachea (wind pipe) ends at the neck stoma

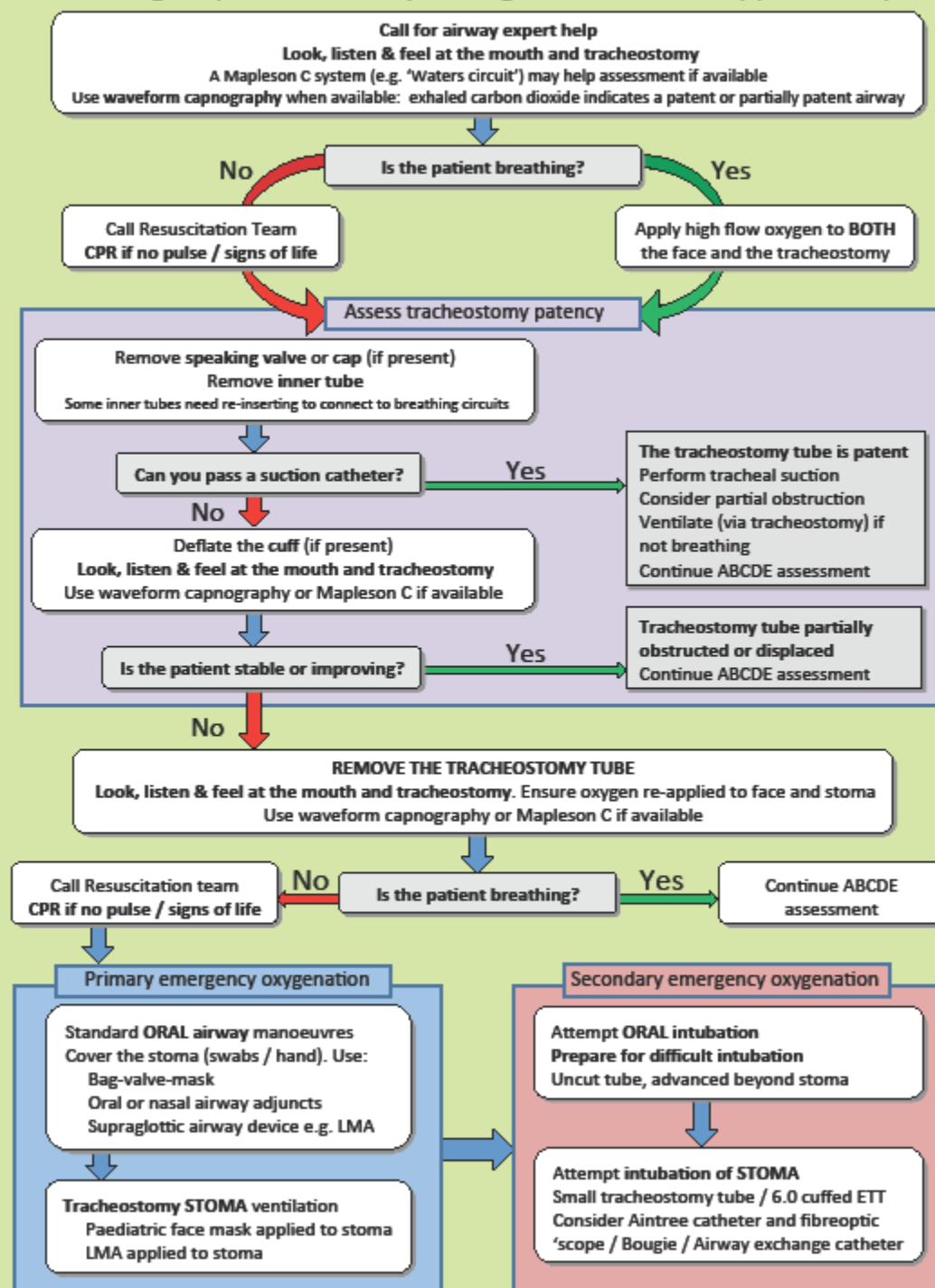


Emergency Call: Anaesthesia ICU ENT MaxFax Emergency Team

www.tracheostomy.org.uk

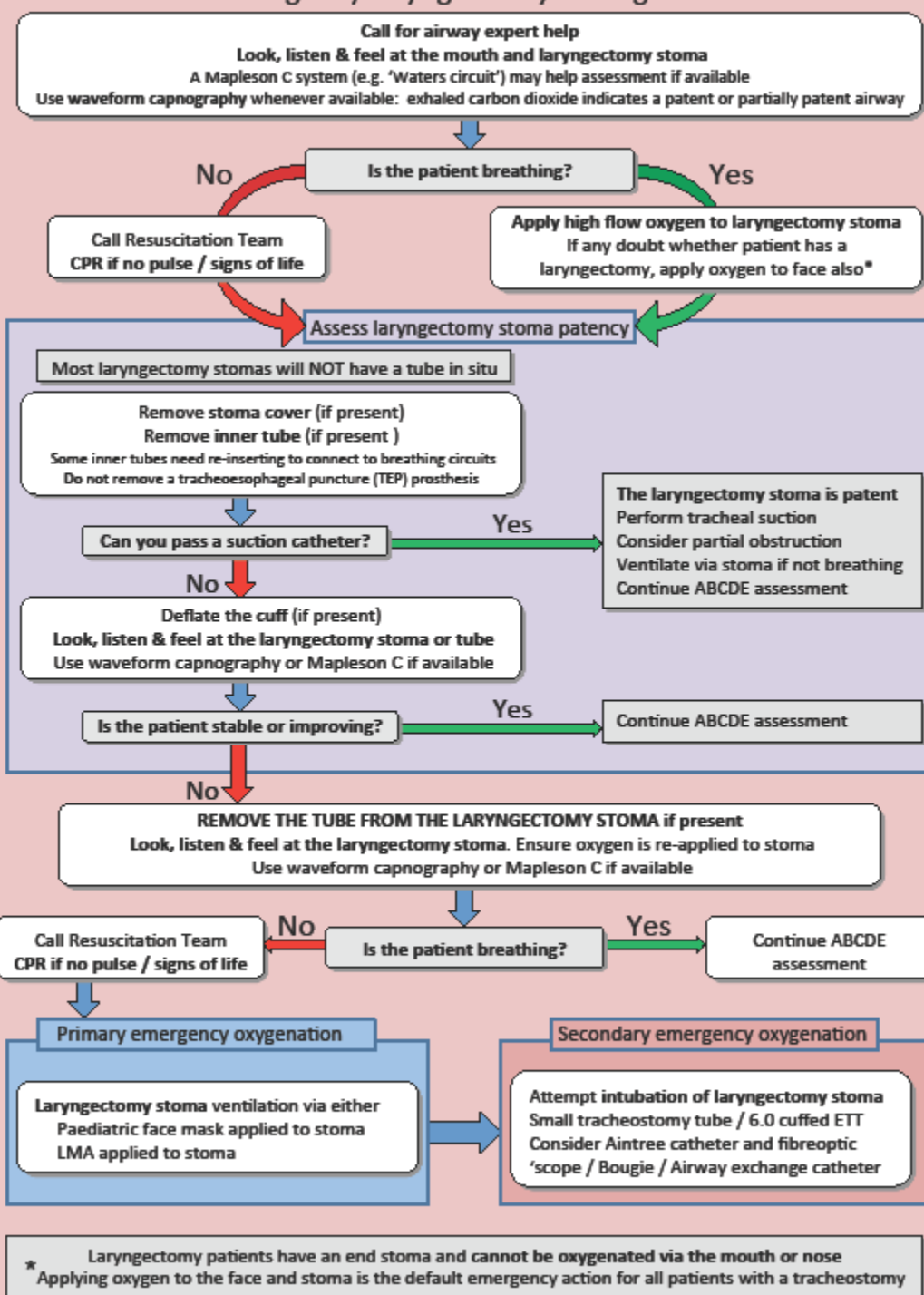


Emergency tracheostomy management - Patent upper airway





Emergency laryngectomy management





APPENDIX 3: TRACHEOSTOMY TUBE SELECTION IN CRITICAL CARE



Bwrdd Iechyd Prifysgol
Caerdydd a'r Fro
Cardiff and Vale
University Health Board

ised approach to the selection of tracheostomy tubes in Critical Care **Scope:** Adult Critical Care patients requiring tracheostomy, either inserted on the ICU (percutaneous) or in theatre by ENT (surgical)

