

# Essential principles: tracheostomy care in the adult patient

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## ABSTRACT

**Aim:** This article aims to guide the nurse caring for a tracheostomy patient, following the main principles of nursing care.

**Background:** Tracheostomy is a surgical procedure to create an opening in the anterior wall of the trachea. Owing to improvement in technological support, the number of adult patients receiving a tracheostomy has increased. This requires the critical care nurse to have an understanding of the essential principles of care for a patient with a tracheostomy tube *in situ*.

**Design and method:** Literature search was conducted in Medline and Cinahl using the search terms tracheostomy OR tracheotomy AND procedure/nursing care/experience limited to English language and adult. Owing to the lack of empirical research on the care of patients with tracheostomy, evidence is limited and therefore expert consensus is utilized in much of the article.

**Results:** This article considers the indications for a tracheostomy, identifies the component parts of a tracheostomy tube, discusses 12 essential principles of care for a patient with a tracheostomy tube *in situ*, and finally briefly describes the nurse's role in an emergency and when discharging a patient with a tracheostomy tube to a ward.

**Conclusion:** Performing a tracheostomy has an enormous impact on patients and their care.

**Relevance to clinical practice:** Nurses caring for patients with tracheostomy require an appreciation of the breadth of knowledge needed to provide individual and safe care. It is also important to appreciate the lack of empirical evidence on which to base that care.

**Key words:** Discharge • Emergency care • Essential care • Infection prevention • Tracheostomy

## INTRODUCTION

Tracheostomy is a surgical procedure to create an opening in the anterior wall of the trachea. To maintain the patency of the stoma and thus the airway, a tracheostomy tube is inserted through the opening and into the trachea. Despite this being one of the oldest surgical procedures with reports dating as far back as 2000 BC, it was not until 1909, when a standard technique was described by Chevalier Jackson that it became accepted practice (Rajesh and Meher, 2006). Since the first description of a percutaneous technique (Toy and Weinstein, 1969) and with ever improving supportive technology, the number of patients receiving a tracheostomy has increased (Wright and VanDahm, 2003). This impacts on the hospital in two ways; first more patients are receiving a tracheostomy, demanding informed and competent care during their acute illness. Second, a small number of patients are discharged from hospital with a tracheostomy, but may require an

in-patient admission unrelated to their tracheostomy. After reading this article the reader should be able to:

- understand the indications for tracheostomy,
- recognize the component parts of a tracheostomy tube and various tracheostomy tube types,
- understand 12 essential principles of care for a patient with a tracheostomy tube *in situ*,
- understand the immediate action required by the nurse in an emergency situation,
- understand the role of the nurse in discharging a patient with a tracheostomy tube to the ward.

## LITERATURE SEARCH

Literature was searched in Medline and Cinahl using the search terms tracheostomy OR tracheotomy AND procedure/nursing care/experience limited to English language and adult. In Medline, this resulted in procedure (760) nursing care (7) experience (344) references and in Cinahl procedure (7) nursing care (2) experience (57) references. In addition, local and national guidelines for the care of a tracheostomy were reviewed. Owing to the lack of research on the care of patients with tracheostomy, evidence is limited and therefore expert opinion on best practice is utilized in much of the article.

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## INDICATIONS FOR TRACHEOSTOMY

There are three main indications for a tracheostomy: to provide a conduit for mechanical ventilation, to prevent upper airway obstruction and to provide a safe airway and/or prevent aspiration in patients with neurological trauma or disease.

### Conduit for mechanical ventilation

Despite the lack of evidence of benefit from an early tracheostomy (Gomes-Silva *et al.*, 2012), mechanical ventilation is the most common reason for tracheostomy in the intensive care. Prolonged tracheal intubation by endotracheal tube increases the risk of oral and upper airway damage including tracheal stenosis and vocal cord palsy (Bhatti *et al.*, 2010). It is generally accepted that endotracheal intubation requires a greater reliance on sedation than tracheal intubation; higher levels of sedation; increased time to extubation and mobilization; and active cognitive engagement by the patient (Schweickert *et al.*, 2009). It is also thought that decreasing dead space with the use of a tracheostomy, may reduce the work of breathing and promote liberation from the ventilator (De Leyn *et al.*, 2007). These tracheostomies are usually short term.

### Upper airway obstruction

Acute airway obstruction occurs due to soft tissue oedema from infection, allergic reaction or trauma; neck trauma, i.e. direct damage to the trachea; or in patients presenting with head or neck tumour and may require an emergency procedure. Alternatively, a tracheostomy may be performed to secure the airway during a head and neck procedure. Should the obstruction resolve, then these tracheostomies are usually short term; however, for patients with ongoing head and neck cancer these may be permanent.

### Safe airway and/or to prevent aspiration in patients with neurological trauma or disease

Patients with reduced function in cranial nerves V, VII, IX, X or XII, with damage to the brain stem, or with poor conscious levels may be unable to maintain a patent airway or protect their airway from aspiration of food, drink and saliva and may require an elective tracheostomy. These tracheostomies are dependent on resolution of the above symptoms and therefore may be either short or long term.

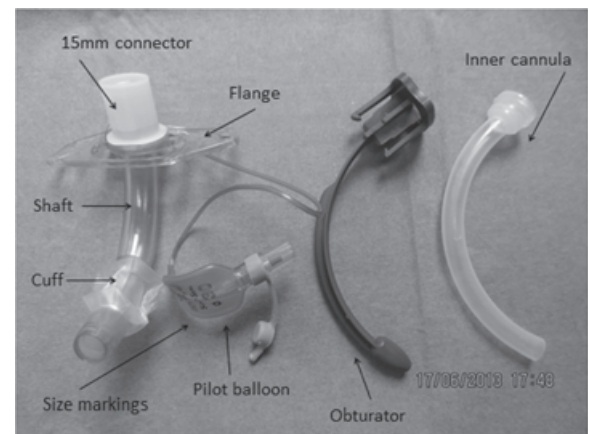
## TUBE TYPES

The choice of tube is dependent on the reason for the tracheostomy, the method of stoma formation (surgical or percutaneous), the duration the tube is

required, and patient anatomy and comfort (ICS, 2008). Tracheostomy tubes are commonly made from polyurethane, polyvinyl chloride (PVC) or silicone. Polyurethane products are quite rigid and more modern tubes tend to be made from PVC which becomes softer with warmth or silicone. Silicone is very soft and excellent for longer term tracheostomy tubes, especially as the surface appears less adherent to sputum. Good care commences with choosing the right tube for the patient's needs (Heffner and Hess, 2001). An understanding of the various structural components of a tracheostomy tube such as the shaft, 15 mm connector, flange, cuff and pilot balloon as described below, will help with selecting the correct tube.

### Shaft

The shaft is the main body of a tracheostomy tube. It sits inside the trachea and maintains the patency of the airway. The shaft may be semi-rigid and preformed into an arc shape (Figure 1) or it may be flexible with circular or spiral reinforcement to protect the tube from kinking. Flexible tubes will adapt to the shape of the trachea on insertion; these are beneficial in patients with fixed flexion abnormalities (ICS, 2008) or where the tube does not sit straight into the trachea. Tracheostomy tubes are available in various lengths. A standard tube varies from 60 to 90 mm, dependent on manufacturer and size of tube; tubes usually increase in length as the outer diameter (OD) of the tube increases. It is thought that up to a third of patients are not suitable for a standard length tube (ICS, 2008). Longer tubes are available up to approximately 130 mm in length. This may be achieved using an adjustable flange tube or by the use of a tube with either a distal or proximal extension. Distal extensions are usually required to ensure that the distal point of the tube lies beyond a defect such as malacia or a stenotic lesion (ICS, 2008).



**Figure 1** Components of an acute tracheostomy tube.

Proximal extensions are required where there is an increase in the dimensions from the skin to the trachea such as in the obese patient (ICS, 2008), goitre, neck mass or those with oedema of the neck tissue.

### Sizing

Adult tubes usually range from 6 to 9 mm although larger and smaller sizes are available. Tubes are conventionally sized by the inner diameter (ID) of the tube; this measurement is dependent on whether the tube was designed to have an inner cannula *in situ*. Therefore the ID of a size 8 tube can vary from 6 to 10.1 mm, but more importantly the OD for the same tubes may vary from 10.8 to 11.9 mm. This represents a serious clinical risk and is not widely appreciated; it could, however, result in the inability of a clinician to insert a tube during a tube change, should an alternative manufacturer's product be used.

### Flange

The flange is to prevent the tube from falling into the trachea and acts as a means of securing the tube to the patient's neck. Most flanges have some flexibility either because of the material used or the design of the connection of the flange to the shaft. In most cases, smaller, softer flanges are more comfortable for the patient and less likely to cause moisture lesions.

### Cuff

Tubes required as a conduit for mechanical ventilation or to prevent aspiration of fluids are cuffed. These are usually air filled, but may be filled with foam; these tubes are indicated for patients with a tracheal leak or tracheal pouch. Cuffed tubes always come with a pilot balloon to enable manipulation of the air volume in the cuff. Uncuffed tubes are used for patients who can protect their own airway, by coughing and clearing their own secretions.

### The 15-mm connector

These are for the connection of emergency and ventilatory equipments and may be located on the shaft or on the inner cannula. Tubes with the 15 mm connector attached to the inner cannula may pose a risk for mechanical ventilation where the inner cannula may become detached from the main tube and cause ventilator disconnection.

### Inner cannula

These are tubes that fit inside the main shaft to prevent tube blockage and are an essential safety feature in non-ventilated and ward patients. They usually include a device to 'clip' them to the main tube in order to prevent



**Figure 2** A selection of fenestrated tracheostomy tubes and inner cannula with fenestrations.

them from being coughed out. They reduce the ID of the tube and this must be taken into consideration when choosing the size of the tube (see Section on Sizing). Importantly, they require regular maintenance; this may be problematic in ventilated patients, as it requires regular breaking of the ventilator circuit which may affect ventilation and introduce infection. This risk must be weighed against the potential harm caused by a blocked tube.

### Fenestrations

These are small holes (they may be singular or multiple) in the upper surface of the shaft and also on the corresponding inner cannula; they lie at a point where air can be passed upwards into the upper airway (Figure 2). A fenestrated tube should always be checked to ensure the ability for air flow and that the fenestrations are not blocked by tissue or sputum, which would render them useless and create a potential risk for the formation of granulation tissue (Carron *et al.*, 2006). These tubes are usually used only for longer term patients, to help with voicing and should not be used in ventilated patients because of the risk of subcutaneous emphysema (Fickers *et al.*, 2004).

### Sub-glottic suction port

These are used for the aspiration of airway secretions that collect on the top of an inflated cuff. Removal of such secretions is considered to reduce ventilator-associated pneumonia or chest infections caused by aspiration in patients unable to manage their own secretions (DePew and McCarthy, 2007) and is recommended as a part of the ventilator care bundle (DH, 2011). The port can be either aspirated intermittently using a syringe or continuously by attaching the port to a suction device. Small studies

have, however, raised some questions about this practice demonstrating that evacuation of sub-glottic secretions can be ineffective in up to 43% of patients owing to prolapse of tracheal mucosa into the sub-glottic suction port (Dragoumanis *et al.*, 2007) causing concern that this practice may cause damage to the tracheal mucosa (Suys *et al.*, 2012).

## TWELVE ESSENTIAL PRINCIPLES FOR THE CARE OF A PATIENT WITH A TRACHEOSTOMY TUBE IN SITU

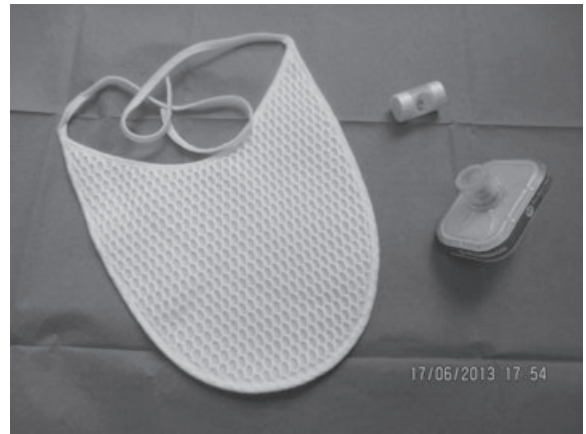
### Infection control

The stoma site, especially in a newly formed stoma is moist and frequently colonized with infection; however, unless there are signs of infection there is no reason to treat. It is important that adequate infection control measures are in place to prevent cross-infection:

- Hand washing and application of alcohol gel should be followed before and after all procedures (DH, 2011)
- Clean gloves and aprons should be used (DH, 2011)
- Eye protection should be worn for suctioning, dressing changes and tube changes or when there is any risk a patient may cough secretions towards the carer (DH, 2011)
- An aseptic non-touch technique should be used for all manipulations of the stoma or tracheostomy tube (ANTT, 2013)

### Humidification

A tracheostomy bypasses the normal upper airway mechanisms for humidification, filtration and warming of inspired gases. Under normal conditions the point where air reaches body temperature and 100% relative humidity is just below the carina, but in the patient with a tracheostomy this occurs in the lower respiratory tract and can be further inhibited by the use of anhydrous gases (Billeau *et al.*, 2004, p.143–144). This results in increased viscosity of mucus secretions, which depresses ciliary function; this may lead to chest infection, impaired gas exchange and atelectasis. Patients often complain of a dry cough which may be associated with tracheitis, an inflammation of the tracheal lining that can become infected leading to ulceration of the tracheal mucosa. Failure to provide adequate humidification to address these issues can ultimately lead to tracheostomy tube blockage. The majority of patients will benefit from intermittent nebulizers with 0.9–5% saline, with the regularity and concentration of saline dependent on tenacity of secretions (St.



**Figure 3** A selection of heat and moisture exchangers suitable for ventilated and non-ventilated patients.

George's Healthcare, 2012); however, nebulization does not replace the need for adequate humidification. To humidify gases, a heat and moisture exchanger (HME) is frequently sufficient for ventilated patients and non-ventilated patients not requiring oxygen (Figure 3). Non-ventilated patients requiring oxygen supplementation will require a cold or hot water humidifier system connected to a tracheostomy mask.

### Cuff management

Cuff monitoring is required at the beginning of each shift, if a cuff leak is heard, after any procedure where the tube may have moved position, e.g. dressing change or patient repositioning and after any change in volume in the cuff (Hess, 2005). An over-inflated cuff may cause ischaemia leading to damage to the trachea and/or oesophagus, whereas an under-inflated cuff may cause aspiration of gastric contents into the lungs and reduce adequacy of mechanical ventilation. Common causes of excessive cuff pressure include undersized tracheostomy tube, poor tube positioning, over-inflated cuff and reduced lung compliance (St. George's Healthcare, 2012). There is a lack of consensus regarding the best method for cuff pressure monitoring. Four methods have been described for monitoring the cuff; subjective estimation of cuff pressure by palpation of the pilot balloon, minimal occlusion volume (MOV), minimum leak technique (MLT) and cuff pressure measurement (Rose and Redl, 2010). Both the MOV and the MLT require a degree of cuff deflation and therefore are of most use when inflating the cuff. The pressure within the cuff can be checked without reducing the volume by using a manometer and should be maintained at a pressure between 20 and 25 cm H<sub>2</sub>O (Heffner and Hess, 2001), but never higher than 34 cm H<sub>2</sub>O (Hess, 2005). It is generally



accepted that the tension of a pilot balloon does not replace appropriate cuff pressure measurement.

### Suctioning

Before suctioning, the patient must always be assessed for signs of sputum in the airways (Mallet *et al.*, 2013, p.134). Suctioning should be reserved for patients unable to clear their own secretions, as the suction catheter and suction pressure may cause tracheal damage and patients find the procedure distressing (Sherlock *et al.*, 2009). Pre-oxygenate for 30–60 s especially in those patients receiving supplemental oxygen (AARC, 2010); in COPD patients this should be no more than 20% above baseline (Day *et al.*, 2002). Ensure that a non-fenestrated inner cannula is present throughout suctioning. The suction catheter should be no more than half the ID of the tube (AARC, 2010). The formula: ID of tracheostomy (mm)  $-2 \times 2$  may be helpful (Odell *et al.*, 1993; Mallet *et al.*, 2013, p.134). Insert sufficient catheter to reach the tip of the tracheostomy tube, approximately 10 to 15 cm, stop when resistance is felt and withdraw 1–2 cm, apply suction of 10.6–16 kPa on withdrawal of the catheter only; this should take no longer than 15 s (Pedersen *et al.*, 2009; Mallet *et al.*, 2013, p.143–145). Reapply oxygen immediately, and reassess the patient. There is currently no evidence for the instillation of saline during suctioning (AARC, 2010). Shallow suctioning is recommended to prevent tracheal trauma (AARC, 2010). Where the patients are able to cough their secretions into the tip of the tube or into their mouth, these secretions can be removed with a tissue or yankauer sucker (St. George's Healthcare, 2012).

### Management of the inner cannula

Dual lumen tubes should be used for all non-ventilated patients. The inner cannula must be inspected on a regular basis, dependent on the tenacity and amount of secretions but usually about four hourly (St. George's Healthcare, 2012). The cannula is easier to remove when the patient is sitting in an upright position with neck slightly extended. If soiled, the inner cannula is either discarded and replaced with a new one or cleaned, dependent on manufacturers' recommendations. Inner cannula should be cleaned with sterile water or saline, assisted by a foam-tipped stick to remove the secretions that stick to the inner surface. Once clean, the inner cannula should be dried and returned to the patient. Non-disposable tubes with interchangeable fenestrated and non-fenestrated inner cannula should be stored in a clean, closed, dry environment. The cleaning fluid should be discarded in a sluice or dirty utility to prevent infection of local hand-wash basins.

### Dressings

The stoma should be assessed at least once daily for trauma, infection or inflammation and the findings documented on the wound chart (St. George's Healthcare, 2012). Exuding or inflamed stomas should be swabbed. The stoma should be cleaned using 0.9% saline and a thin pre-cut dressing applied to dress the stoma. Where the skin around the stoma is excoriated, a film forming acrylate barrier such as Cavilon™ can be applied locally to prevent further deterioration. This is a two-person technique as the tracheostomy holder must be removed to adequately assess and clean the stoma. The tracheostomy tube should be secured effectively with a commercial tracheostomy holder; this protects the patient from pressure on the back of the neck and is easily adjusted (St. George's Healthcare, 2012), ensuring that one to two fingers can be placed between the holder and the patients neck (Mallet *et al.*, 2013, p.119).

### Oral hygiene

As for a ventilated patient, the patient with a tracheostomy should undergo a daily assessment of the mouth including the condition of the teeth, gums, tongue, mucous membranes and lips (Berry *et al.*, 2011). Twice-daily oral care should be done for all patients unable to complete for themselves and encouraged in patients who can, using a soft toothbrush for 3–4 min to brush both surfaces of all teeth (Berry *et al.*, 2011). The mouth should be adequately rinsed with sterile water (Berry *et al.*, 2011) and a 2% chlorhexidine gel should be applied (Labeau *et al.*, 2011).

### Communication

The loss of the ability to communicate verbally is one of the greatest frustrations for patients with a tracheostomy (Foster, 2010; Sherlock *et al.*, 2009; Donnelly and Wiechula, 2006). The patient, where possible, or the relatives should be informed prior to the tracheostomy procedure that the patient might be unable to phonate while the tracheostomy tube is in place, as air is no longer passing through the vocal cords. They should be reassured that the voice will most likely return once the tube is removed and as soon as a cuff deflation is tolerated, a one-way speaking valve or intermittent finger occlusion can be used to create a voice. In the conscious patient, alternative/augmentative means of communication should be found using lip reading, alphabet, picture or writing boards and electronic communication tools such as an iPad. This process is often supported by a speech and language therapist.

## Swallowing

The other main frustration for patients with a tracheostomy is the inability to swallow effectively (Foster, 2010; Sherlock *et al.*, 2009). Some patients manage oral intake without aspirating with the cuff inflated. Ideally, the cuff should be fully deflated and a swallow test initiated before oral intake is commenced. The risk of aspiration is greatest in those patients with associated or pre-existing neurological or mechanical causes of dysphagia, following head and neck surgery or in those with significant on-going respiratory difficulties (e.g. COPD exacerbations). Sips of sterile water should be offered to the patient and if tolerated without coughing, desaturation or signs of aspiration on tracheal suctioning, the patient may eat and drink. Patients within the critical care environment are likely to have reduced appetites; a combined regime of oral and enteral feeding may help encourage swallowing and appetite while maintaining nutritional needs. If the patient fails to swallow effectively, he or she should be referred to a speech and language professional for further assessment (St. George's Healthcare, 2012).

## Weaning

There are several stages to the weaning process that may be achieved over a varying amount of time from hours to weeks. All the following stages may be achieved using the tube *in situ*. However, when airflow is not sufficient with cuff deflation, then downsizing a tube may prove beneficial (O'Connor and White, 2010). There is no evidence that if airflow through the nose and mouth be sufficient, then routinely downsizing or changing to a fenestrated tube helps with weaning.

- Cuff deflation: The cuff should be deflated using synchronous suction and deflation to avoid the transfer of secretions at the top of the inflated cuff into the lungs. The cuff can remain permanently deflated once the patient is able to manage his or her own secretions without coughing continuously and does not fatigue from the additional work of breathing.
- Gloved finger occlusion: Once the patient can tolerate persistent or intermittent periods of cuff deflation, a gloved finger should be applied to the end of the tracheostomy tube to check for air flow around the tube and through the vocal cords to the nose and mouth. With the finger in place the patient should be asked to count to three or provide a forced expiration through the nose and mouth; airflow should be felt or heard through the mouth. During occlusion the patient should be monitored for signs of distress; if this occurs then the procedure should be terminated.

- One way (speaking) valve: Should the patient tolerate tube occlusion, then a one way speaking valve can be applied to allow the patient to breath in through the tracheostomy but out through the vocal cords, nose and mouth; this may help the patient speak audibly. The length of time a patient is able to tolerate a speaking valve will vary from patient to patient and can only be gauged from observing the patient's work of breathing. For some patients tolerance will not pose a problem, others may have to build up the time they use the valve starting with just a few minutes. The aim is to build tolerance to enable the patient to use the speaking valve continuously. To prevent the valve occluding the airway, it should be regularly observed, removed during nebulizers and when sleeping.
- Decannulation cap: For patients who have required a longer wean or have suffered upper airway obstruction, the use of a decannulation cap may provide the clinician and the patient with greater confidence prior to decannulation. This cap occludes the tube completely, requiring patients to inspire and expire through their nose and mouth. It is unusual to use a cap for more than 4h, as it increases the work of breathing and may cause the patient to tire unnecessarily; however, this time needs to be assessed using individual patient factors by the multidisciplinary team caring for the patient.

## Decannulation

Decannulation should be undertaken as soon as it is feasible to minimize the risks associated with a long-term tube; however, decannulation also presents hazards such as airway obstruction, aspiration, ventilatory failure, sputum retention and difficulty in oral re-intubation (ICS, 2008). Therefore the decision to decannulate needs to be based on objective criteria including:

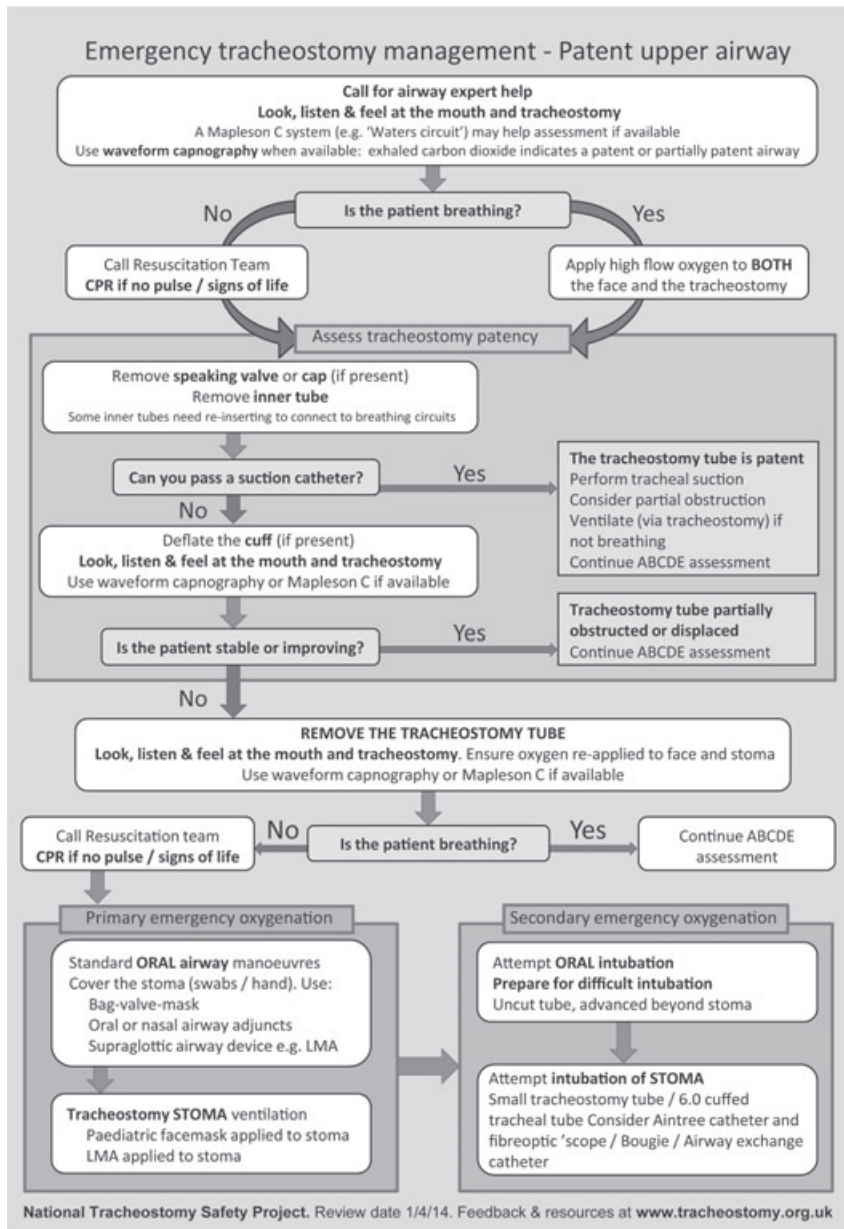
- The initial reasons for the insertion of the tracheostomy have been resolved (Heffner, 1995) and there are no signs of deteriorating bronchopulmonary infection (ICS, 2008)
- The patient can maintain adequate gas exchange self-ventilating on oxygen therapy of less than 40%
- The patient can consistently cough any secretions either into his or her mouth or to the end of the tracheostomy tube (O'Connor and White, 2010; Stelfox *et al.*, 2008; ICS, 2008; Heffner, 1995)
- The patient is alert and interactive (O'Connor and White, 2010; Stelfox *et al.*, 2008)

- The patient does not appear to be aspirating oral or gastric secretions (O'Connor and White, 2010; Stelfox *et al.*, 2008; ICS, 2008; Heffner, 1995)

Having identified the patient as ready for decannulation, it is reasonable, especially in a patient with a prolonged wean, to decannulate early in the morning after a night of rest and when sufficient personnel with the skills to re-insert a tracheostomy or intubate are available, should decannulation fail. The tube should be removed, the stoma cleaned with sterile saline and the stoma covered with either a small piece

of gauze and a clear semi-permeable dressing or a proprietary dressing applied over the site using an aseptic non-touch technique. Proprietary post-decannulation dressings are relatively new to the market and to date there are no trials of effectiveness available. The patient should be instructed to place his or her hand over the stoma site when speaking or coughing to prevent the dressing being 'blown off'. Daily dressings should take place until skin closure occurs, then the site should be left open to heal completely.

The patient should be observed and advice sought from a member of medical staff if there is



**Figure 4** Tracheostomy emergency algorithm (reprinted with kind permission from Anaesthesia 2012 67, 1025–1041, John Wiley and Sons).

**BOX 1**

- Functioning suction facilities
- Appropriate-sized suction catheters
- Yankauer sucker
- Mapleson C circuit and/or adult bag-valve-mask having reservoir with tubing
- Oxygen
- Spare tracheostomy tubes (one of identical size and one a size smaller) usually the one of same type but must be a type that can easily be inserted in an emergency situation
- Tracheal dilators
- Tracheostomy disconnection wedge
- 10 mL syringe
- Stitch cutter (if sutures present)
- Water-soluble gel
- Immediate access to a fully equipped resuscitation trolley and difficult airways trolley

any concern about the airway patency or work of breathing. Decannulation failure is defined as the need to re-insert an artificial airway within 48–72 h of decannulation (Stelfox *et al.*, 2008). The greatest risk is thought to be within the first 4–24 h (Choate *et al.*, 2009); it is therefore important that the decannulated patient is observed closely during this time period and emergency equipment should be left with the patient for at least 24 h after decannulation.

**Tube changes**

Changing a tracheostomy tube is potentially hazardous and should be carried out whenever possible electively by two persons skilled in tracheostomy tube exchanges (ICS, 2008). For first and early changes, or where there is not a formed stoma, at least one person should possess advanced airway skills. Elective changes occur either as a routine procedure to prevent tube blockage or when the decision is made to convert to an alternative tube type or size. Single lumen tracheostomy tubes, i.e. those without an inner cannula, should be changed every 7–14 days (ICS, 2008). The frequency of change is determined by the tenacity and quantity of secretions and thus the risk of tube blockage. Dual lumen tubes or those with an inner cannula can be left for a maximum of 30 days (EEC, 1993). Initial tube changes should not take place within 72 h of a surgical tracheostomy and ideally 7–10 days of a percutaneous insertion to allow time for the stoma to establish (ICS, 2008). In an emergency situation where the patient's upper airway is patent, oral intubation should be considered early in an attempt to secure the airway, rather than persist with re-insertion of the tracheostomy tube. First or complex tracheostomy changes should be completed using a bougie or an airway exchange catheter that allows for the continued insufflation of oxygen such as the Frova catheter

or Cook™ airway exchange catheter (ICS, 2008). Subsequent or later exchanges may occur using the obturator supplied with the tube. To confirm tracheal placement a CO<sub>2</sub> detector may be helpful.

**THE NURSES ROLE IN EMERGENCY SITUATIONS**

The most common emergency situations are tube blockage and accidental decannulation; however, occasionally there may be haemorrhage through the stoma. Bleeding may occur as an early or late complication. Early bleeding is usually as a result of the procedure and often minor; late bleeding may be due to infection or erosion of a major vessel, usually the innominate artery: *this is a medical emergency*. Always be aware of whether the patient has an intact/viable upper airway, as tracheal intubation in an emergent situation is preferable to re-inserting a tracheostomy tube. Figure 4 provides an algorithm for emergency tracheostomy management irrespective of the cause. An algorithm similar to this should be adopted hospital-wide and available to all staff caring for patients with tracheostomy.

The nurse should ensure that emergency equipment (Box 1) must be kept with and available to the acute in-patient during any transfer off the ward. In an emergency, the most important role for the nurse is first to call for support and expert help. If the patient is in respiratory distress then it is most appropriate to call the cardiac arrest team, as this will provide an anaesthetist with advanced airway skills and also other experienced teams' help should be taken if the situation deteriorates further. In addition, it may be appropriate to call for an ENT surgeon. If the patient is not compromised then the nurse is required to call a person with appropriate skills to manage the airway; this may be an ENT surgeon and/or an anaesthetist,



and is essential if the patient is bleeding. It is helpful to identify which clinician is most appropriate for the individual patient before an emergency occurs. Having called for help, the nurse should apply high-flow oxygen via a face mask and/or the stoma; in some cases the patient will not have a patent oro/naso-pharyngeal airway and oxygen via the face will not be necessary. If the patient is in distress and while waiting for expert help the nurse should consider means to relieve the airway, e.g. removing the speaking valve and inner cannula, suctioning, asking the patient to cough to relieve any blockage and deflating the cuff to allow airflow around the tube. At the same time, the nurse should reassure the patient and commence monitoring, including oxygen saturations and all vital signs.

The management of bleeding varies slightly from the above in that after calling for expert help and applying oxygen, it is helpful to inspect the stoma to look for a bleeding point; if one can be found careful manual pressure may ease the bleeding. It is also unadvisable to deflate the cuff; if the cuff is already deflated then reinflation may be helpful in applying pressure to a local bleeding point. The nurse should check clotting results or if none have been taken recently, take a sample for clotting and prepare some dilute adrenaline and/or kaltostat for the ENT surgeon on arrival. If at any time the bleeding becomes heavy and/or the patient becomes haemodynamically unstable or respiratory status deteriorates, then an arrest call must be made immediately.

## TRANSFER TO THE WARD WITH A TRACHEOSTOMY

Discharge to the ward from critical care with a tracheostomy *in situ* has been associated with a higher mortality (Martinez *et al.*, 2009). This may be due to

insufficient ward care, but also a group of patients with greater morbidity. Therefore patients should be discharged to a ward only if staff are familiar and experienced in the care of the stoma and tube; this may be supported by an Outreach service. Ideally, hospitals should cohort patients to wards where a multi-professional team with a high standard of skill and competence in tracheostomy care and management is available. On discharge from critical care a dual cannula tube should be left *in situ*, preferably this would be uncuffed or the cuff deflated, as an uncuffed tube is inherently safer in a patient who can tolerate cuff deflation. Initially, the patient should be followed-up by critical care for at least 48 h (London Health Programmes NHS, 2013); there should be a clear multi-disciplinary plan of care, supported by ongoing multi-disciplinary review.

## CONCLUSION

The insertion of a tracheostomy tube has an enormous impact on patients and their care. This article identifies the various reasons for a tracheostomy and describes the component parts of the tracheostomy tube; without this knowledge the nurse will be unable to provide the most appropriate care for their individual patients. It then details essential principles of care relevant to patients with tracheostomy, whether the insertion is new or if the patient has been re-admitted with a tracheostomy inserted during a previous admission. It closes with a brief description of the nurse's role in emergency situations and discharge to the ward. This information should enable the nurse to identify the individual care needed for the patient and to adapt this to local circumstance. The paucity of empirical evidence suggests that there is a need for collaborative research in this important area of care.

*This paper was commissioned by the BACCN.*

### WHAT IS KNOWN ABOUT THIS TOPIC

- There is little evidence on which to base a patient's tracheostomy care.
- Patients' are at risk of harm if nurses do not feel confident and competent to care for this vulnerable group of patients.

### WHAT THIS PAPER ADDS

- This article provides a review of the essential elements of care, based where possible on evidence-based literature and where this is not available draws on expert consensus.

## REFERENCES

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