

Changing tracheostomy tubes

Changing the tracheostomy tube should be a multidisciplinary decision. The first change should always be performed or supervised by a suitably trained member of the medical staff. [Videos of tube changes](#) can be found here.

Knowledge and Understanding

In order to change a tracheostomy tube safely and appropriately, the practitioner must appreciate the specific clinical indications for the original formation of the individual patient's tracheostomy. In addition they will need to know when and how the tracheostomy was formed. It is considered that a newly formed tracheostomy will close more quickly than an established tracheostomy tract, and indeed within the first 48 hours of a surgical tracheostomy or 7-10 days for a percutaneous tracheostomy, extreme caution must be taken as a tube change may be difficult or even impossible.

Patient assessment

Indications to change a tracheostomy tube change include:

- The tube has been in-situ for maximum recommended duration: 30 days for tubes with a removable inner cannula (most manufacturer's recommendations) and 7-10 days for single lumen tubes
- Facilitating weaning by inserting a smaller, un-cuffed or fenestrated tube
- The patient needs ventilatory support or resuscitation and requires a change from an un-cuffed to a cuffed tube
- To improve fit or comfort of tube
- To replace a faulty tube
- To resolve a misplaced or displaced tube

A tube change may be contra-indicated if the patient:

- Is in an unstable clinical condition (balancing risks/benefits)
- Requires high levels of ventilatory support or oxygen
- The risk of losing the airway is high
- The tracheostomy was performed within the last 7 days, especially if percutaneously formed.
- The patient is undergoing radiotherapy to the neck region (or has completed course in last 2 weeks)
- In palliative care patients where quality of life will not be improved by tube change
- Patient refuses

Each tracheostomy tube change and each patient should be assessed individually prior to each and every tube change, balancing the risks and benefits. The procedure will require two competent practitioners and more, especially if the patient becomes agitated during the procedure.

Particular caution needs to be taken in the following circumstances:

- First tube change
- Difficult previous tubes change
- Patient has a known obstructed or difficult upper airway (this is the 'back up' airway in case of difficulties with the stoma)
- Early changes (within 2-4 days of surgical tracheostomy and 7-10 days of percutaneous tracheostomy)
- Patients with a large neck
- Patients requiring high levels of ventilator support
- Patients requiring high concentration of inspired oxygen
- Patients with tumours surrounding the tracheostomy tract
- Patients with significant granulation tissue around the stoma site
- Agitated or combative patients

NB: If a difficult tube change is anticipated then a clinician experienced in upper airway management (including endotracheal intubation) and a clinician or practitioner proficient and experienced in managing tracheostomy tubes should be present. All relevant equipment and emergency anaesthetic drugs should be available. Plan for loss of airway and failure to cannulate the tracheostomy.

Most tube changes are uneventful, but those that don't go smoothly can go badly wrong. Thorough preparation is essential. Following a successful initial change of tube, subsequent tube changes can be performed by a competent and suitably trained person **but medical assistance and emergency equipment should be readily available at all times.** The *availability* depends on your risk assessment of the clinical situation. It is essential to record how you changed the tube and any complications that arose. This record should also document recommendations for subsequent tube changes, such as timing and whether any particular equipment or personnel are required. If the tube change was straightforward, this is useful information to pass on also. Record any important details on the bed-head sign.

The tubes may be changed like-for-like, changed for a different type of tracheostomy (e.g. fenestrated tube or a different brand), changed for a smaller tube (down-sizing) or removed completely (decannulation).

Equipment required for a tracheostomy tube change

- Two tracheostomy tubes of appropriate make
 - 1 same size, 1 size smaller
- Dressing pack
- Normal saline (0.9%) to clean
- 10 ml syringe and cuff pressure manometer if the tube has a cuff
- Suction equipment and suction catheters.
- Sterile gloves and protective eye wear

- Water soluble lubricating gel
- Tracheal dilators (local or individual preference)
- Pen torch
- Tracheostomy tube tapes, ties or dedicated holder
- Stoma dressing
- Stitch cutter if previous tube has been sutured

- New closed suction system (this is a good opportunity to change to clean ancillary equipment)
- Microbacterial swab of the stoma site may be indicated

- An exchange device such as an Aintree catheter or Bougie may be required

- Waveform capnography (essential if the patient is ventilator-dependent or a difficult procedure is expected)
- Resuscitation equipment
- Fibreoptic scope available
- Oxygen supply and appropriate masks to deliver oxygen to face or stoma
- Oxygen saturation monitoring
- Stethoscope

Patient preparation

Gaining the patient's trust and co-operation is essential. This is not always possible in the sedated, neurologically impaired or combative patient, but an explanation should always be attempted. The patient is likely to cough, feel a tugging and a pushing sensation in the neck, have blood stained secretions afterwards, but can be reassured that the procedure usually lasts less than 1 minute.

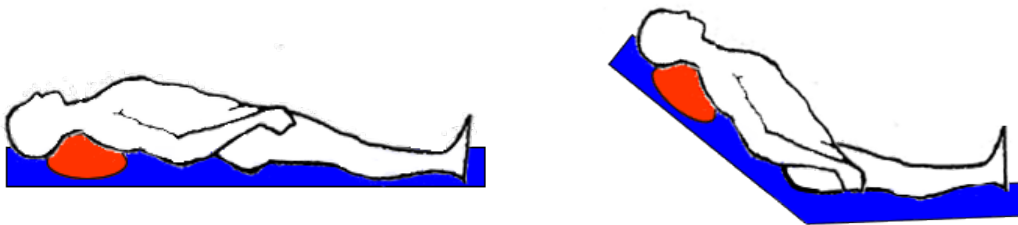
Some patients will benefit from a sedative or analgesic premedication. The risks of this should always be balanced against the benefits and sedation should be prescribed and administered by an appropriate person. Sedating patients who are not breathing fully independently or have a high requirement for oxygen should only be done in an appropriate environment. Full resuscitation equipment should be available. Using sedation may mean that future tube changes become more complex to arrange and facilitate.

Local anaesthetic gel can also be applied to the stoma for a few minutes prior to the procedure. Lubricating the new tube with local anaesthetic gel will improve any immediate post-procedural discomfort.

Pre-oxygenation is essential before a tube change of a patient with oxygen or ventilator dependency, or those in whom the difficulty of the change is unknown.

Due to the risk of vomiting and aspiration associated with tube changes and airway manoeuvres, patients should ideally be 'nil by mouth' for 6 hours for solids, and 2 hours for clear liquids before an elective tube change. If a patient has had many tube changes before without incident, then these guidelines could be reasonably relaxed. Patients fed via a tube feeding system should have this stopped and aspirated, and any gastric drainage tubes in situ should be aspirated also.

Positioning the patient with the neck extended brings the trachea anteriorly. This should be done for all patients unless contra-indicated (e.g. cervical spine injury). Tube changes can be performed with the patient supine or reclined in a suitable chair or bed, depending on the clinical condition. The role of any stay sutures should be identified if present as these may elevate and widen the stoma.



Any secretions that may have collected above the cuff of the old tube need to be removed prior to cuff deflation. This reduces the risk of contamination of the airway. In the sedated patient, this will involve oral, pharyngeal and subglottic suction with a soft catheter. Awake patients will find this uncomfortable, but it is important to remove secretions from above the cuff if possible. Tubes with specific sub-glottic suction channels allow some of the secretions to be cleared more easily. Any remaining secretions can be removed by timing cuff deflation (prior to tube removal) with expiration. The patient is asked to take a breath in and exhale strongly or cough as the cuff is deflated. If the patient is ventilated, then deflation is timed with the expiratory phase.

Changing the tube

An elective change of a tracheostomy tube can be performed using essentially 2 techniques: A 'blind' technique where the new tube is inserted directly into the old stoma, or a 'guided' technique using a wire or bougie to remove the old tube over and to 'railroad' the new tube over. There are slight variations in these techniques for different circumstances. Videos of tube changes can be found below and there is a section on the e-learning part of the website www.tracheostomy.org.uk.

Tube changing videos may be found by clicking below:

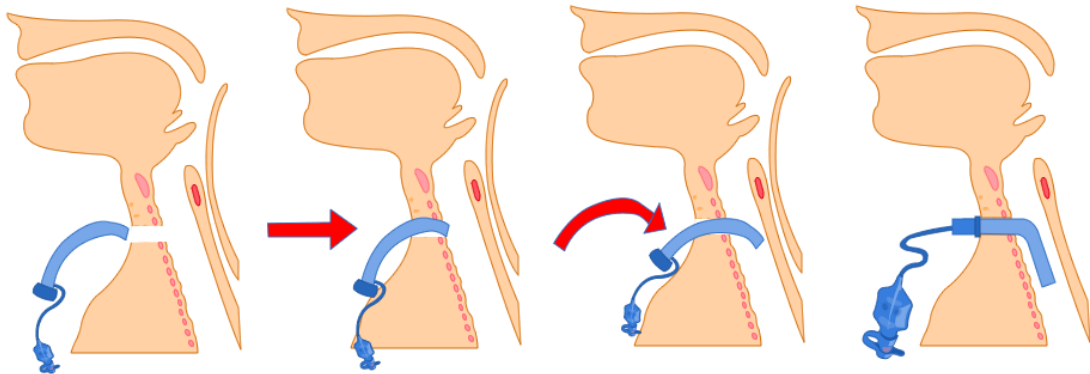
- [Removing a tracheostomy tube \(narrated\)](#)
- [Decannulation and application of oxygen to the stoma](#)
- [Tube changes over a bougie](#)
- [Fibreoptic inspection of a tracheostomy tube](#)

'Blind' insertion

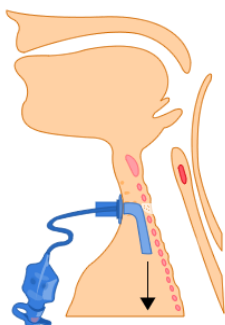
For well-established stomas that had had uneventful tube changes documented previously, changing the tube by simply removing the existing tube and re-inserting the new tube into the stoma is an accepted technique. The new tube is prepared by leaving the 'obturator' in situ, as shown in the image to the right (purple piece in this image). This provides the tube with a smooth, tapered profile as it enters the neck.



The tube is initially introduced with the tracheal portion 'flat' to the stoma as shown in the sequences below. Once the trachea is entered, the tube is rotated through 90 degrees to enter the trachea. This rotation should not occur before the tube is within the trachea as this risks creating a 'false passage' in the anterior tissues of the neck.



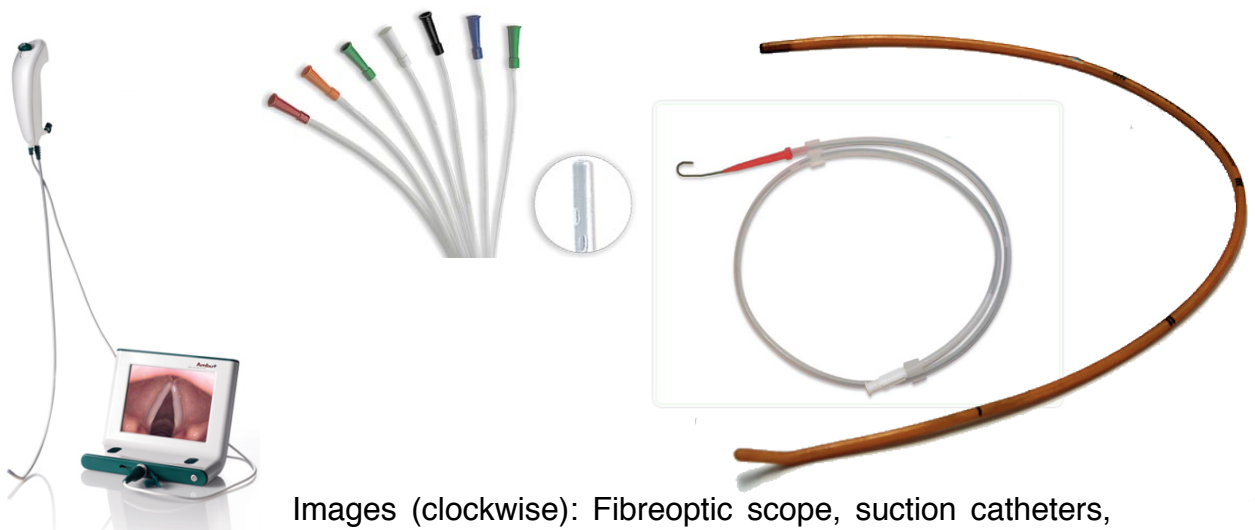
The image to the left and below demonstrates an tube which has been placed into a false passage. The tube lies in the anterior tissues of the neck. Attaching the tube to any sort of gas supply and attempting ventilation could rapidly result in airway obstruction, pneumothorax, pneumomediastinum or subcutaneous (surgical) emphysema which could rapidly become life threatening. This also means that the stoma is not effective as a means of oxygenation and the trachea itself could be compromised.



'Guided' tube changes

For the first tube change, or if there is either an unknown or predicted degree of difficulty in changing the tracheostomy tube, the exchange is usually performed over a guide. This can be a gum elastic bougie, an airway exchange catheter, a guide-wire or suction catheter. The principle is to insert the guide into the trachea via the old tube and leave it in situ when the old tube is removed. This ensures that the path from the skin, through the tissues of the neck to the trachea remains 'marked' and should make insertion of the new tube easier. This technique is especially useful if the patient has a relatively new tracheostomy stoma or the neck is large, making the stoma deep. The superficial and deeper layers in the neck may 'spring' back into their anatomical positions following removal of the existing tracheostomy tube as shown in the images below. Using a guide will help to reduce the impact of this.

A selection of guides suitable for this purpose are shown below. It should be remembered that this technique relies on the old tube being correctly placed within the tracheal lumen when the guide is inserted. If there is any doubt about this, a fiberoptic inspection is recommended. Some airway exchange catheters can be first loaded over a suitable fiberoptic endoscope so that the catheter's position within the airway is confirmed visually. New tubes can be rail-roaded directly over a 'scope, but 'scopes are more easily damaged than a cheap, disposable bougie.



Images (clockwise): Fibreoptic scope, suction catheters, guidewire, gum-elastic bougie



The image to the left shows a bougie inserted into a tracheostomy tube. Because this is potentially unpleasant for the patient and risks trauma to the trachea, coughing or irritation of the carina (with associated vagal side effects), the bougie should be inserted for as short as possible. This

means preparing the patient by first removing the dressings around the tube and the sutures or ties that hold the tube in place. The bougie should be held by a dedicated assistant, so that another 'pair of hands' concentrates on cuff management and tube exchange. It is useful to have a 'talk through' rehearsal between operators before undertaking the procedure.

Gum elastic bougies are not primarily designed for tracheostomy tube exchanges. Several specific airway exchange catheters are available. Some of these allow connection to standard anaesthetic circuits to allow oxygenation during the exchange procedure and some have a large enough internal diameter to allow a fibroptic scope to be inserted as described above.



Image above shows a Cook Aintree Catheter connected to a 15mm port.

What to do if the new tube won't go in

Sometimes, new tubes won't insert easily. It is important not to force a new tube into a stoma. Similarly, blindly attempting to pass a bougie or introducer into a deep or fresh tracheostomy stoma may lead to the creation of a false passage, cause bleeding and delay attempts at more conventional airway management.

The key principle is to maintain oxygenation by whatever means necessary. In the elective situation, this may be as simple as reassuring the patient and awaiting a more experienced practitioner. In the oxygen or ventilator-dependant patient, this can be more arduous. All necessary equipment, drugs and personnel should be on hand to manage this situation if the patient and clinical area have been adequately prepared.

The commonest solution to this problem is to insert a new tube that is a size smaller than the tube that has been removed. If necessary, the stoma can be formally dilated at a later time. If your experience and local guidelines allow, tracheal dilators (right) may be used to temporarily dilate the stoma whilst a new tube is inserted.



If the patient has a patent upper airway, oxygen should be applied to the face whilst more invasive attempts at intubating the stoma are made. The goal is a safely oxygenated patient, and a formal re-insertion of the tube may need to occur in a planned manner in an operating theatre environment. If the clinical condition of the patient means that tube exchange needs to be more urgent, options include:

- Identification of the tract and trachea using a fiberoptic 'scope
- A 'scope and airway exchange catheter
- Digital manipulation of a bougie into the trachea*
- Blind passage of a bougie or guide-wire into the stoma*
- Formal refashioning of the stoma surgically or percutaneously

*These options are more likely to result in incorrect placement of the tube tip and should only be considered in an emergency.

A video demonstrating cannulation of a stoma using an Aintree catheter and fiberoptic 'scope is [available here](#). There is more detail on managing a deteriorating tracheostomy or laryngectomy patient whose airway is compromised in the emergency management section.

Summary

The table below summarises key actions related to tube changes and their rationales (adapted from NPSA expert working group)

Action	Rationale
Identify need for tracheostomy tube change and clarify type of tube to be inserted	To ensure tube change is necessary and the correct tube type is selected for current and on-going patient care needs
Patient preparation may include ensuring 'nil by mouth' for 2-6 hours (liquid-solid) and/or aspirate gastric tube	To limit the risk of aspiration during tube change procedure
Decide on blind or guided technique and assemble appropriate equipment	Guided techniques more appropriate for first or (potentially) difficult exchanges
Explain the procedure to the patient and obtain verbal consent if appropriate	To ensure the patient understands the procedure & improve co-operation
Ensure appropriate staff and equipment are available	To deal appropriately with additional measures to secure an airway.
Set up bedside suction and oxygen equipment	To ensure oxygen and suction are available (when needed)
Prepare, check and lubricate new tube. Remove any inner cannulae from both old and new tubes	To ensure new tube has no faults and is prepared for insertion and application.
Remove any obstructing clothing or equipment	To ensure neck area is accessible for tube change
Position patient for procedure by placing a roll under the patient's shoulders, extending the stable neck. Patient may be placed lying down or sitting upright depending on individual patient assessment.	To bring the trachea closer to the skin and to stretch stoma opening in order to aide tube insertion
Identify the roles of any stay sutures	Elevate and open the stoma
If the tracheostomy tube is sutured in-situ, remove all sutures. Skin sutures may be considered for removal if appropriate.	To allow tube removal and to prevent sutures becoming embedded or an infection risk
Pharyngeal and sub-glottic suction orally or via dedicated port on tube	Reduces risk of aspirating collections above the cuff
Deflate cuff (if present) simultaneously suctioning	To enable existing tube to be removed and for secretions to be cleared.
Untie tapes and remove dressing whilst tube is held firmly in place	To remove old dressings and tapes
Insert guide via old tube (if used)	Maintains patency of stoma

Day-to-day management of Tracheostomies & Laryngectomies

Remove existing tube with a firm out and downwards movement as patient breathes out	To reduce patient coughing
Observe stoma site and tracheal opening	To identify signs of infection, granulation tissue and/or bleeding
Holding the introducer (obturator) in place, insert new directly tube into stoma OR using the guide, railroad the new tube	To pass tube along contour of tract
Remove introducer / guide	To allow patient to breathe and to allow confirmation of correct tube position
<p>Check correct positioning:</p> <ul style="list-style-type: none"> • Ask patient to breathe out, air should be felt through end of tracheostomy • Auscultate • Bilateral chest movement • Suction below the end of the tracheostomy to confirm placement within trachea • Capnography* • Fibreoptic endoscopy* 	Evidence of airflow exiting the tube will confirm correct placement within the airway. *Capnography and endoscopy should be immediately available for difficult cases

Following successful exchange:

<p>Re-attach any oxygen or ventilation needs</p> <p>Inflate cuff and check cuff pressure, (as per guidelines)</p> <p>Apply tapes and dressing (as per guidelines)</p>	To recommence respiratory requirements and secure tube position
Re-position patient as to patient requirements and comfort	To maintain patient comfort