

**St. James's Hospital
Tracheostomy Care Working Group.**

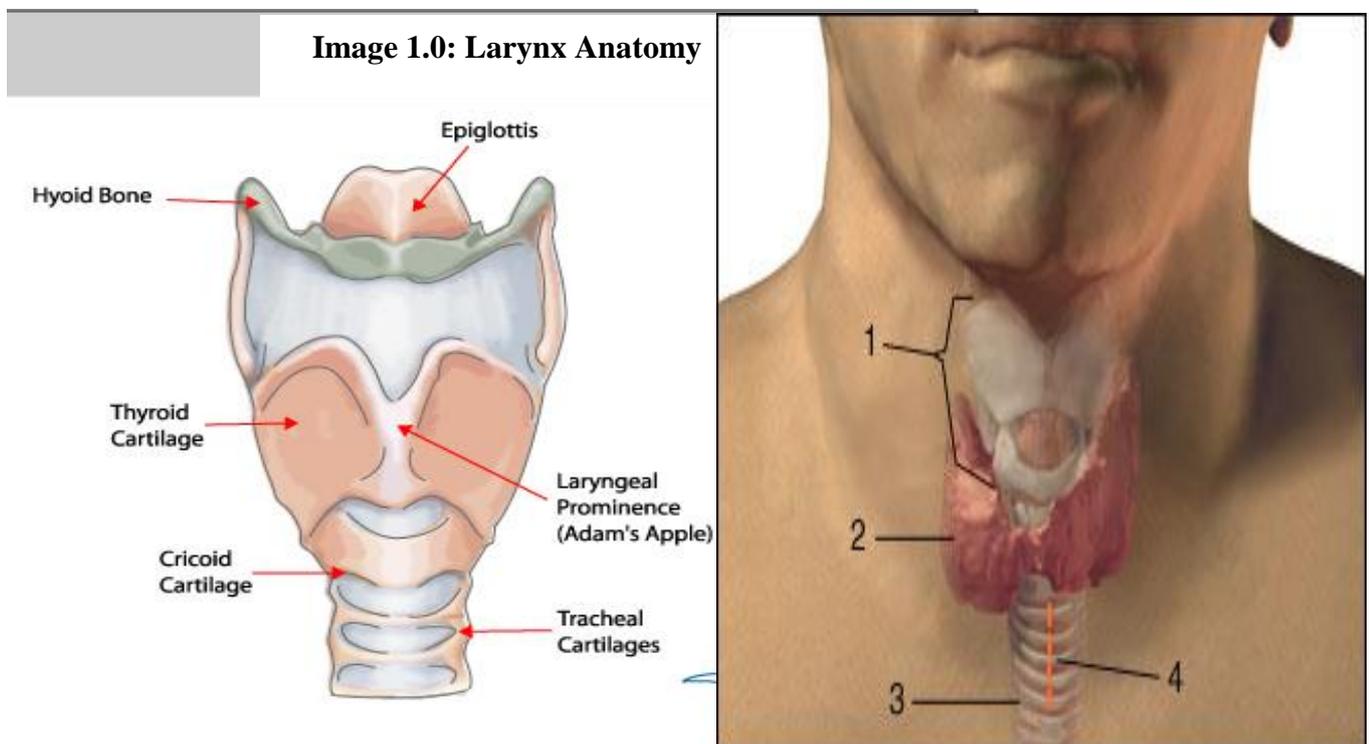
**Tracheostomy Insertion Technique: Standard Operating Procedure
SJH:N069.2 version 5.**

This Standard Operating Procedure (SOP) is effective from September 2020 onwards and is due for renewal in September 2023. It will be reviewed during this time as necessary to reflect any changes in best practice, law, and substantial organisational, professional or academic change. This SOP is supplementary to the [Tracheostomy Care and Management Guideline \(SJH:N069\)](#) and describes standards on Tracheostomy insertion technique.

1.0 Insertion Techniques

1.1 Surgical Insertion

- 1.1.1 This is an 'open' technique that is performed in the operating theatre by Ear Nose and Throat, Oral and Maxillofacial, Plastics or Cardiothoracic Surgeons (See Image 1.0 below).
- 1.1.2 The patient is positioned with the neck hyper-extended. (Engels *et al.* 2009, Muscat et al 2017).
- 1.1.3 The thyroid isthmus may be either divided or retracted to expose the trachea. The stoma is created in the region of the 3rd tracheal ring and the tracheostomy tube inserted.



1.1.4 Surgical Insertion Technique:

Step 1: Skin incision between cricoid cartilage and suprasternal notch, horizontal incision gives better cosmetics



Step 2: Strap muscles are separated vertically by blunt dissection



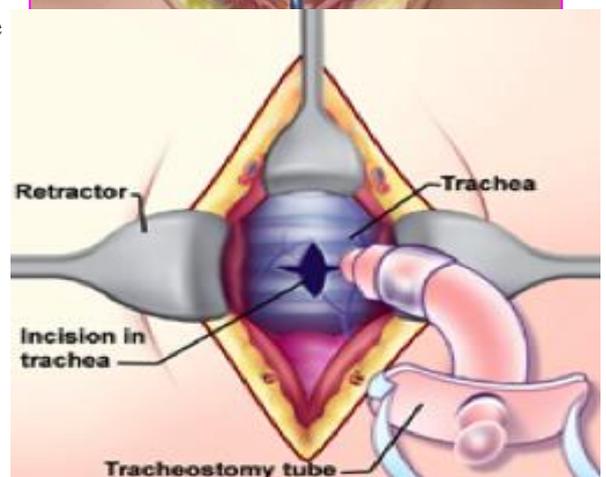
Step 3:

- After dissecting the strap muscles can see thyroid isthmus and cricoid cartilage.
- The thyroid isthmus can be either divided or retracted to expose the trachea.



Step 4:

- Opening into trachea should lie at the level of the 2nd 3rd or the 3rd 4th tracheal ring.
- If include 1st ring can cause subglottic stenosis later.
- In children only vertical incision should be made.
- Tube size: Is dependent on the size of the patient. Typically size 6- 8mm for female, 7 - 9mm for male.
- Cuff checked for leaks before insertion.
- Once tube is inserted obturator/introducer should be removed immediately.



1.1.5 Post operative Care

- 1.1.5.1 Complete haemostasis should be obtained.
- 1.1.5.2 Wound must not be closed too tightly, as this may lead to surgical emphysema.
- 1.1.5.3 Flange of the tube should be sutured to skin.
- 1.1.5.4 Gauze pad should be avoided during first 24 hours because it obscures sign of bleeding.
- 1.1.5.5 Monitor to prevent dislodgement.
- 1.1.5.6 Use heated humidification to deliver Oxygen.
- 1.1.5.7 Leave cuff inflated for minimum first 24hrs.
- 1.1.5.8 Do not change tube - minimum 5days.
- 1.1.5.9 Inspect inner cannula at least once every 4 hrs.
- 1.1.5.10 Suction as needed

1.2 Percutaneous Tracheostomy Insertion

- 1.2.1 For critically ill patients, bedside tracheostomy can also be performed by a percutaneous dilatational technique.
- 1.2.2 Performed by or under the supervision of the consultant intensivist at the bedside in the intensive care unit.
- 1.2.3 The technique involves the insertion of a tracheostomy tube using a guide wire which is inserted into the trachea within a dilator which opens up the airway.
- 1.2.4 The tracheostomy tube is then inserted following appropriate dilation.
- 1.2.5 This bedside dilatational tracheostomy procedure is widely accepted as a safe and cost effective alternative to formal surgical tracheostomy.
- 1.2.6 No surgical wound is made and the tracheostomy tube is inserted between the surrounding tissue reducing movements of the tube. An incision into the tracheal rings is not necessary and the rings remain theoretically intact. The parastomal infection rate is considerably lower than after conventional open tracheotomy (Sanabria 2014, Cipriano et al 2015).
- 1.2.7 **The Advantages of Percutaneous Dilatation Technique:** This method has several advantages over the traditional method of performing tracheostomies and prolonged translaryngeal intubation:
 - A relatively simple technique suitable for trained medical staff in the critical care setting.
 - Easy to perform, and more rapid than the surgical alternative.
 - Less disruptive for patients and ICU staff alike as it can be done at the bedside in ICU.
 - Reduces the inherent risks associated with the possible need to transfer a critically ill patient out of the ICU.
 - Does not require operating theatre, therefore less expensive in terms of human and material resources.
 - Possibly less waiting time for patient.
 - Possibly reduces length of ventilation and days in ICU for the patient, reducing risk of complications and costs.

- Early tracheostomy associated with decreased ventilator associated pneumonia, decreased length of ICU Stay, and decreased hospital mortality.
- Associated with less peri-stomal bleeding (Brass 2016).

1.2.8 Contraindications to Percutaneous Dilatation Technique include the following:

- Age < 15 years.
- Gross distortion of the neck due to hematoma, tumor, thyromegaly, scarring from previous neck surgery or previous tracheostomy.
- Un-correctable bleeding diathesis.
- Obese, short or bull neck that obscures the anatomical landmarks in the neck.
- Inability to extend the neck because of cervical fusion, rheumatoid arthritis, or other cervical spine instability.

1.2.9 Percutaneous Tracheostomy Insertion Procedure

1.2.9.1 Airway Management:

- A fibre optic bronchoscope with video display is routinely used when employing the percutaneous dilatational technique in ICU. It allows for assessment of the airway before the procedure and affords the operator excellent visibility throughout the procedure, ensuring a secure airway without risk of endotracheal cuff puncture.
- The bronchoscope also ensures correct placement of the tracheostomy, and allows for early identification of potential problems such as bleeding.
- In addition, the bronchoscope affords rigid support for the trachea, reducing the risk of posterior tracheal wall perforation or tracheal ring fracture (Engels *et al.* 2009, Paw 2004). Typically, a disposable bronchoscope e.g. AMBU scope is used to avoid damage to the reusable scopes.

1.2.9.2 The patient is administered a combination of pain relief, sedation and neuromuscular blockade, e.g. Propofol +/- an opioid, typically Fentanyl, via an IV bolus or infusion, and Atracurium or rocuronium bolus.

1.2.9.3 Full monitoring is instituted including ECG, blood pressure (arterial or NIBP), continuous O2 Saturation & End Tidal CO2 monitoring.

1.2.9.4 Ventilator parameters may be altered during the bronchoscopy to maintain adequate oxygenation, for example:

- Patient changed to PRVC mode.
- FiO2 increased to 100%.
- Tidal volume increased to compensate for air leak around deflated ETT cuff.
- Peak airway pressure alarm adjusted to allow for the raised pressures during ETT manipulation.

1.2.9.5 The patient's eyes are taped closed using Eye Pro Dressing.

1.2.9.6 The patient is positioned with a rolled towel placed between the shoulder blades, bringing as much of the trachea as possible into the neck.

1.2.9.7 Following induction of anaesthesia, the patient is prepped and draped.

- 1.2.9.8** The bronchoscope is passed through the patient's endotracheal tube and the anatomy of the airway visualised.
- 1.2.9.9** The larynx and cricoid cartilage with the intervening cricothyroid membrane are identified. From the cricoid, moving caudally, the tracheal rings are identified.
- 1.2.9.10** The tracheostomy should ideally pass between the second and third tracheal rings, although a space one higher or lower may be employed. Placing the airway higher, next to the cricoid, can cause tracheal erosion and long-term problems.

1.2.9.11 Equipment Required

- Fenestrated drape x 1.
- Non-fenestrated drape x 1.
- Sterile gown.
- Sterile gloves.
- Visor facemask or standard mask with protective goggles.
- Dressing pack.
- Suture pack.
- Tracheostomy instrument tray (store room B).
- Pack of gauze squares x 3.
- Rolled towel.
- 15mm fibre optic bronchoscope swivel connector.
- Propofol infusion.
- Atracurium 50mgs in 5mls/ Rocuronium 50mg in 5mls.
- Noradrenaline infusion.
- Bolus or infusion Morphine or Fentanyl opioid.
- Local anaesthetic [Xylocaine 1% with adrenaline (stored in fridge in the main unit)].
- 2% chlorhexidine 10ml antiseptic solution.
- Surgical lubricant for the tracheostomy tube and the bronchoscope.
- 1 x 20ml syringe, 1 x green needle, 1 x orange needle.
- Percutaneous tracheostomy kit, "*Cook Ciagila Blue Rhino kit*".
- Tracheal dilator.
- 500ml bottle of sterile water (to activate lubricant on Cook Ciagila Blue Rhino kit dilator).
- Portex tracheostomy tube (size 7-8 for female, size 8-9 for a male).
- Disposable spare inner cannulas.
- Spare tracheostomy tubes: 1 x size smaller, 1 x same size.
- Tracheostomy signage.
- Trachy length closed suction system, new catheter mount, in line End tidal CO2 detector (check the date on the vent circuit and change as necessary).
- Spare suction tubing (to apply suction to the bronchoscope).
- Size 9.0 Endotracheal tube. NB a larger endotracheal tube size 9/10 may be requested by some intensivists to facilitate re-intubating the patient with a larger more accessible airway. Please ensure that the ETT is checked and lubricated and that all necessary emergency equipment is available at the patient's bedside.
- Bag Valve Mask Device.
- Suction Unit/High Flow wall suction set up.
- Emergency Intubation tray (contents checked).
- Any Emergency drugs/fluids as requested by doctor.

Note: Typically, a disposable bronchoscope, e.g. AMBU scope is used to avoid damage to the re-usable scopes. If a re-usable scope is used, the intensive care team are responsible for organising the fiberoptic

bronchoscope at all times, i.e. delivery, documenting serial number details in the patients record and procedure book, flushing immediately after use, and return of the device to theatre accompanied by x2 patient addressogram labels. This is coordinated through the technician in theatre (bleep 566).

1.2.9.12 Patient Preparation prior to procedure

- 1.2.9.12.1** A blood sample for group and hold is sent to the laboratory in advance.
- 1.2.9.12.2** Ensure an up to date Coagulation screen and Haemoglobin level are available.
- 1.2.9.12.3** If the patient is on anticoagulants discontinue/hold 2-4 hours in advance of the procedure.
- 1.2.9.12.4** If the patient is on Continuous Renal Replacement Therapy (CRRT) with Anticoagulant, check with the intensive care team if it is to be discontinued and/or if CRRT is to continue with the anticoagulant discontinued.
- 1.2.9.12.5** Draw bedside curtains to ensure that the patient's privacy and dignity are preserved throughout the procedure.
- 1.2.9.12.6** The procedure is explained in full to the patient and/or significant others.
- 1.2.9.12.7** Ideally written consent should be obtained from the patient or the patient's next of kin. However, discussion and verbal consent obtained from the patients Next of Kin if the patient is unable to sign and/or consent. The doctor must record this in the medical notes. However, on occasion, medical necessity may override the later.
- 1.2.9.12.8** The patient should fast for 6 hours. If a nasogastric feeding tube is in place, discontinue feeding 6 hours prior to the procedure, and aspirate the nasogastric tube again immediately prior to the procedure.
- 1.2.9.12.9** Prepare all required equipment as listed in 1.2.9.11.
- 1.2.9.12.10** Position the patient supine with a rolled towel placed between the scapula to allow for maximum extension of the neck and visualisation of the relevant anatomical landmarks.
- 1.2.9.12.11** Ensure that the head of the bed area is free from obstruction to allow ease of access to the patient's airway by the anaesthetic/nursing team.

1.2.9.13 Nurse's Role Throughout the Procedure

- 1.2.9.13.1** Clean silver dressing trolley, using detergent and water. Wipe down with large 70% alcohol wipe following washing.
- 1.2.9.13.2** Check the expiry date of solutions and packaging.
- 1.2.9.13.3** Remain with the patient throughout the entire procedure.

- 1.2.9.13.4 Monitor the patient's vital signs, cardiac and respiratory status throughout the procedure.
- 1.2.9.13.5 Assist the Intensivist with the insertion procedure.
- 1.2.9.13.6 Ensure appropriate protective equipment is worn throughout the procedure, i.e. gloves, apron/gown, visor mask / goggles.
- 1.2.9.13.7 Following insertion of tracheostomy tube, secure tube using the tracheostomy ties.
- 1.2.9.13.8 Ensure inner cannula is inserted.
- 1.2.9.13.9 Tracheostomy tube cuff pressure is checked and recorded.
- 1.2.9.13.10 Review mode of ventilation, set tidal volume, alarm limits and FiO2 requirements.
- 1.2.9.13.11 Remind the medical staff to flush the bronchoscope through with sterile water following completion of the procedure and wipe same down using gauze.
- 1.2.9.13.12 The medical team must record the procedure both in the ICU invasive procedure record book and on ICCA – Intellispace Critical Care & Anesthesia, noting the patient's medical record number, and the serial number of the reusable bronchoscope used.
- 1.2.9.13.13 Ensure post tracheostomy procedure that a portable chest x-ray is ordered, carried out promptly and reviewed by the medical team.
- 1.2.9.13.14 Send an EPR referral to SALT and the Tracheostomy CNS.

1.2.9.14 Percutaneous Dilatational Technique: Ciaglia Or Blue Rhino Method

- 1.2.9.14.1 The primary requirement for performing the percutaneous dilatational technique is the presence of a skilled intensivist or anaesthetist for managing the patient's airway. He/she should be equipped with the necessary instrument and drugs for rapid sequence intubation with an ETT.
- 1.2.9.14.2 Suction the oropharynx to prevent aspiration of any collected secretions then deflate the endotracheal tube cuff and withdraw the tube under guidance from the bronchoscope until visualisation of the cuff in the larynx. The ETT must be secured at all times and the cuff re-inflated.
- 1.2.9.14.3 Local anaesthetic with adrenaline is infiltrated subcutaneously. Keeping in the midline at all times, advance an introducer needle with a saline filled syringe attached at 45 degrees to the skin. Entrance of the needle into the trachea is verified visually with the aid of the bronchoscope and video camera and also by aspiration on the syringe resulting in an air bubble.
- 1.2.9.14.4 Remove the syringe and pass a "J" guide-wire through the introducer needle, and then remove the needle. Then a small blue dilator is passed over the "J" wire to make a small incision at either side of the dilator using a scalpel.

- 1.2.9.14.5** Remove the blue dilator and advance a white guiding catheter over the “J” wire into the trachea. Remove the “J” guide-wire, and leave the white guiding catheter in the trachea.
- 1.2.9.14.6** Pass the tracheal blue rhino dilator over this, gradually dilating the incision to accommodate the appropriately sized tracheostomy tube. Plenty of lubricating gel is applied to the dilator. Pass the dilator down the tract with a twisting arc type motion. Only moderate downward force is applied.
- 1.2.9.14.7** Load the previously lubricated tracheostomy tube (cuff already checked) onto the dilator, and pass the tracheostomy tube over the introducer into the trachea. Once again, undue force should not be necessary, and plenty of lubricant should be used. The tracheostomy tube cuff is inflated and the cuff pressure checked and recorded.
- 1.2.9.14.8** With the tracheostomy tube in place, deflate the endotracheal tube cuff, and remove the tube. Immediately remove the introducer and insert the tracheostomy tube inner cannula and connect to the ventilator.
- 1.2.9.14.9** Primary confirmation of tube placement is performed using the CO₂ detector, and by auscultating the chest for adequate ventilation.
- 1.2.9.14.10** Reset alarm limits and check the ventilator for appropriate tidal volumes, FiO₂, airway pressures and alarm limits.
- 1.2.9.14.11** The tracheostomy tube is secured with sutures, tapes and ties, and the patient is placed in a comfortable position with the rolled towel removed.
- 1.2.9.14.12** Observe the patient carefully for evidence of respiratory distress.
- 1.2.9.14.13** A post procedure chest x-ray is performed and reviewed as soon as possible.
- 1.2.9.14.14** An EPR referral is sent immediately to SLT and the Tracheostomy CNS.
- 1.2.9.15 COMPLICATIONS:** The use of the bronchoscope coupled with the expertise and honed technique of the operator have measurably reduced the incidence of complications associated with the percutaneous dilatational technique. Potential complications however and are summarised below:
- Damage / perforation of the posterior wall of the trachea.
 - Accidental endotracheal extubation.
 - Damage to the cuff of the endotracheal tube.
 - Damage to the tip of the bronchoscope.
 - Perforation of the oesophagus.
 - Major haemorrhage (rare).
 - Minor haemorrhage (0-3%).
 - Wound infection (0-3%).
 - Erythema.
 - Cardiac dysrhythmias.
 - Procedure failure (1%).
 - Tracheal ring fracture.

- Mal position of the tracheal tube.

Links to related PPPGs:

- [Tracheostomy Care and Management Guideline \(SJH:N069\)](#)
- [Tracheostomy Care and Management Guideline: Associated Documents](#)