

**RECOMMENDED GUIDANCE FOR PERCUTANEOUS DILATATIONAL
TRACHEOSTOMY DURING THE
COVID 19 PANDEMIC**

I. Introduction:

A. Background:

Coronavirus disease 2019 (COVID-19) is an infectious disease spread to >200 countries with approximately 46 million confirmed cases and over 1.2 million deaths globally. (1) A systematic review and meta-analysis of twenty-eight studies show the Intensive Care Unit (ICU) admission rate was 21% [95% CI 0.12–0.34] and 69% of cases needed Mechanical ventilation (MV) [95% CI 0.61–0.75]. Some of these patients require MV for more than two weeks. (2) Bedside tracheostomy is indicated, allowing for faster liberation from mechanical ventilation and shorter ICU stay, which will enhance better utilization of ICU resources. Bedside-Tracheostomy increases ventilator-free days, shorten hospital and ICU stay, and reduces the incidence of hospital-acquired pneumonia compared with prolonged mechanical ventilation. (3) Therefore, we recommend that tracheostomy be considered in patients with COVID-19 when mechanical ventilation is anticipated to be > 10 to 15 days.

The decision to proceed with bedside tracheostomy is a pure clinical decision and must be individualized protecting patient safety and preventing infection to health care workers (HCWs). Transmission of the virus occurs through aerosolization or contact with contaminated surfaces. (4) Bedside tracheostomy is considered an aerosol-generating procedure (AGP) and poses the risk of infection to HCWs. COVID 19 pandemic has a high risk of transmission of infection to healthcare workers; hence this guideline focuses on general rules relating to performing a tracheostomy in COVID-19 patients requiring mechanical ventilation. (1)

B. Aim & Scope:

This Guidance aims to provide Critical Care staff with the best practices and recommendations related to the bedside tracheostomy in COVID19 patients, this will ensure safety and decrease the chance of infection, however it does not cover the details steps on how to perform bedside tracheostomy.

C. Methodology:

We searched the MEDLINE, EMBASE, CINAHL, Web of Science, and Cochrane databases in all languages using keywords for the topics including COVID 19, percutaneous, open tracheostomy, patient safety, spread of infection, management. The recommendations that been selected are addressed by international critical care societies, resembling the best available evidence and matches the local setup. The guidance was reviewed by a panel that includes in its membership intensivists, nurses, and respiratory specialists representing 22 health care regions and clusters for a review and feedback.

D. Targeted Population:

All adult COVID 19 diseased or suspected patients requiring or with weaning difficulty from mechanical ventilation in critical care units

E. Targeted End User:

- Adult Critical Care physicians
- Respiratory Specialist
- Adult Critical Care nurses
- Anesthesia staff
- Anesthesia technicians
- Surgeons

F. Conflict of interest:

The author and reviewers declare no conflict of interest.

G. Funding: None

I. Disclaimer: This guidance may change as more knowledge and attitude are gained during this pandemic

II. Best Practices in performing Bed side tracheostomy:

II.1. Indication for Bedside Tracheostomy (1,7) :

- COVID-19 patients with anticipated prolonged mechanical ventilation.
- Ventilator parameters to qualify for safe tracheostomy placement include positive end-expiratory pressure (PEEP) < 12 cmH₂O and the fraction of inspired oxygen (FiO₂) < 0.60.
- Fail to wean from mechanical ventilation.

II.2. Contraindication (1,7):

- An anomaly of aortic-arch branches origin and running
- Gross distortion of the neck Anatomy
- Previous anterior neck surgery (e.g., thyroidectomy)
- Abnormal coagulation and bleeding disorders
- Tracheomalacia.
- Limited neck mobility
- Morbid obesity
- Anterior neck soft tissue at the site of insertion.
- Hemodynamic instability.
- High inotropic or vasopressor support

II.3. Equipment (7):

- Cardiac monitors
- Ventilators and their circuits
- CPR Cart
- Medications for sedation and paralysis as per local ICU policy
- Flexible bronchoscope preferably disposable (Video bronchoscope is preferred to allow all staff in the room to visualize ETT positioning)
- Bronchoscope attachment for the ventilator
- Silicone lubricant (which allows the bronchoscope to pass easily down the oral endotracheal tube)
- Saline (bags and small ampules)
- Surgical lubricant
- Dissecting utilities (e.g., tonsil forceps or curved hemostat)

- Tracheostomy tube and tracheostomy collar, and a percutaneous tracheostomy kit include a number 15 surgical scalpel blade, an introducer needle, a guidewire, a small tracheal dilator, a protective sheath, a single-stage progressive tracheal dilator, a tracheal loading trocar, and a small slip-tip syringe.
- Tracheostomy tube size selected should be appropriate for the patient.
- Percutaneous tracheostomy kits are designed to be used with a specialized tracheostomy tube that loads onto a dilator.
- A thin, flexible tracheostomy tube is helpful because it maximizes the diameter of the airway while minimizing pressure on the tracheal wall.

III. **General Rules of open surgical tracheostomy (OST) and Ppercutaneous dilatational tracheostomy (PDT) checklist must be filled before and after the procedure (Table 1). (1,4):**

III.1. Introduction

- Ppercutaneous dilatational tracheostomy (PDT) involves extensive airway manipulation, which increases aerosolization risk. In comparison to open surgical tracheostomy (OST), PDT results in minor bleeding, can be done in ICU, require fewer HCWs, and can be done with ultrasound guidance, minimizing the risk of spread of infection. Studies show shorter procedure duration and lower bleeding using ultrasound compared with bronchoscopic guidance during PDT. (1, 3-6)

III.2. Selection and preparation

- Either OST or PDT can be performed in patients expected to require prolonged mechanical ventilation. However, it is unclear which technique is safer for patients with COVID-19 while reducing transmission to HCWs.
- Selection of OST or PDT should be individualized and upon discretion and expertise of the performing operator and the ICU team; in general, PDT is the preferred method.
- If OST is selected, it is better done at the bedside to avoid disconnection of the ventilator circuit during patient transport.
- No need for routine RT-PCR testing before performing tracheostomy in patients with confirmed COVID-19 related respiratory failure.
- PDT or OST should be done in a negative pressure room.
- High-efficiency particulate air (HEPA) filters in the presence of a strict door policy should be used if a negative pressure room not available.
- Consent should be taken before the procedure.
- Review indication and contraindications.
- Before start, perform a trial of apnea to mimic apnea:
 - a) Withhold ventilation (apnea) by switching to pressure support of 10 to overcome the circuit resistance.
 - b) Discontinue PEEP or max of 5 cm H₂O.
 - c) Increase the Fio₂ to 100% for a duration of 30 seconds to 1 min.
 And If apnea is not tolerated, decrease the pressures and respiratory rate slowly to ovoid aerosolization.
- Prepare all needed equipment and medications with checklist and procedure kits before entering the room.
- Normal coagulation profile.

III.3. During Procedure:

- Use enhanced PPE with gowns, gloves, face shields, and surgical masks augmented with respiratory filtration systems, including N95 masks and powered air-purifying respirator (PAPR) systems.
- Minimize using carts in the room to reduce the need to undergo decontamination.
- Universal protocol and time-outs may be performed outside the room with the procedure team, using appropriate enhanced PPE as per institutional protocol.
- Preoxygenation with Fio2 100% before 5 - 10 minutes of the procedure and during the procedure.
- Continuous SpO2 and cardiac monitoring
- Blood Pressure monitoring every 3 minutes
- Use volume or pressure control ventilation during the procedure
- Use of bedside sonography to assess anatomy and point of entry. Ultrasound and its equipment will need to be decontaminated at the end of the procedure.
- Disposable Bronchoscopy-guided PDT is highly recommended.
- Use deep sedation and neuromuscular blockers to minimize cough and agitation.
- Intervals where apnea must be performed as follows:
 - a) When a bronchoscope adaptor is added to the circuit.
 - b) Before inserting the bronchoscope into the Endotracheal tube (ETT).
 - c) During ETT pullback when the cuff is deflated.
 - d) Time of insertion of needle, dilator, bronchoscopy and until connected to closed-circuit connection with the ventilator.
 - e) Removal of the ETT from the oropharynx.
- Packing of the oropharynx and the hypopharynx.
- A suction tip should be kept in the mouth to lessen the risk of aerosolization of oral secretions during the ETT pullback.
- Place a moist gauze around the guidewire, during dilation and neck stoma as needed.
- During an open tracheostomy, avoid or minimize the use of diathermy and suction because it carries a risk of aerosolizing particles.
- The suction circuit should include a HEPA filter to capture aerosolized viral particles and avoid aerosolizing them.
- Minimize the use of suction and diathermy.

III.4. After the procedure and Post-tracheostomy Care

- Patients are maintained with a closed-circuit while on mechanical ventilation with a tracheostomy tube and in-line suction.
- Do chest x-ray post-insertion.
- Cuff should be kept inflated and check for leaks.
- Monitor and adjust cuff pressures routinely.
- Avoid disconnecting or interrupting the close circuit or keep that to the minimum
- Avoid repeated suctioning, and if needed, use closed, in-line suction whenever possible.
- AGPs should be avoided unless they are medically necessary.
- Limit the number of HCWs present during AGPs.
- Place an HME with the viral filter or a ventilator filter once the tracheostomy tube is disconnected from mechanical ventilation.
- Delay routine postoperative tracheostomy tube changes until COVID-19 testing is negative.
- Use heat moisture exchanger (HME) with HEPA-level filter.
- Minimize nebulization, installation of liquids.

- Avoid all unnecessary procedures and decannulation until the patient is considered COVID-19 negative.
- Rapid decannulation protocol is recommended to minimize aerosol generation.

IV. Complications types (7)

Early complications

- Bleeding and obstruction or dislodgement of the tracheostomy tube.

Late complications

- Tracheoinnominate fistula
- Tracheoesophageal fistula
- Tracheal stenosis.

V. References

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Patient Name:	DOB:	MRN:	Hospital	City
				Yes No
	Prolonged mechanical ventilation is anticipated.			
	Positive end-expiratory pressure (PEEP) < 12			
	Fraction of inspired oxygen (FiO2) < 0.60.			
	No contraindications			
Equipment	Cardiac monitors			
	CPR Cart			
	Medications for sedation and paralysis			
	Bronchoscope attachment for the ventilator			
	Silicone & Surgical lubricant & Saline			
	Dissecting tool (e.g., tonsil forceps or curved hemostat)			
	Percutaneous tracheostomy kit			
	Tracheostomy tube			
Before Procedure:	Hold feeding 12 hours before the procedure			
	Normal Coagulation profile			
	Consent should be taken prior to the procedure.			
	PDT or OST should be performed in a negative-pressure room			
	If negative pressure room not available use HEPA filters with a strict door policy.			
	Prior to start, perform a trial of apnea to mimic apnea.			
	a) Withhold ventilation (apnea).			
	b) Discontinue positive end-expiratory pressure.			
	c) Increase Fio2 to prevent desaturation, for a duration of 30 s to 1 min.			
	If apnea is not tolerated, reduce ventilatory pressures and respiratory frequency.			
Initials & date	Intensivist	Registered Nurse	Reparatory Specialist	
During Procedure	Use enhanced PPE augmented N95 masks and PAPR.			
	Perform time-out outside the room			
	Use deep sedation and neuromuscular blockers.			
	Key intervals where apnea must be performed during bronchoscopic-guided percutaneous dilatational tracheostomy :			
	a) Adding bronchoscope adaptor to the circuit.			
	b) Before bronchoscope insertion into the Endotracheal tube (ETT).			
	c) During the ETT pullback with cuff deflation.			
	d) Time of insertion of any instrument, dilation, and insertion of the tracheostomy, bronchoscopic placement, until connected to closed-circuit connection with the ventilator.			
	e) ETT removal from the oropharynx.			
	The oropharynx and the hypopharynx are packed.			
	A suction tip placed in the mouth			
	The suction circuit should include a HEPA filter.			
After the procedure and Post-tracheostomy Care	Use closed circuit and with in-line suction.			
	Use petrolatum gauze dressing at the site of the fresh stoma.			
	Do chest x-ray post-insertion.			
	Cuff is inflated and checked for leaks.			
	Use heat moisture exchanger with HEPA-level filter in the ventilator circuit.			
	Check for immediate bleeding and obstruction.			
Initials & date	Intensivist	Registered Nurse	Reparatory Specialist	