Percutaneous Tracheostomy Guideline

Scope: All bedside percutaneously placed tracheostomies

Population: All ICU personnel

Outcomes: To standardize and outline the steps necessary to safely perform a percutaneous tracheostomy at the bedside in adult ICU patients
To delineate the responsibilities of the personnel performing percutaneous tracheostomies at the bedside in adult ICU patients

Protocol:

Surgeon or designee will:

1. Assess the patient for appropriateness for the procedure:
   Indications: Intubated ICU patients requiring prolonged mechanical ventilation, airway protection and to facilitate ventilator weaning.
   Contraindications: Emergency airway access, known difficult airway or upper airway obstruction, anatomical abnormalities such as enlarged thyroid gland or vascular anomalies, anterior neck trauma, inability to palpate tracheal landmarks, anterior neck infections, and neurologic instability
   Relative Contraindications: uncontrolled coagulopathy, cervical spine precautions, morbid obesity, hemodynamic instability or PEEP > 12cm H_20, FiO_2 > 60%.
2. Perform a pre-operative assessment and complete the tracheostomy evaluation note.
3. Obtain consent for procedure and place completed consent form in chart.
4. Write appropriate pre-procedure orders (NPO, IV fluids, labs, blood products, hold anticoagulation etc…) when indicated.
5. arrange for equipment and personnel prior to set time of procedure:

Equipment Required	
Percutaneous Tracheostomy Kit	Sterile Surgilube
#7, #8 & #9 Percutaneous trachs	Shoulder roll
Chlorhexidine prep	(2) pkgs. 2-0 or larger suture
1% lidocaine (10ml)	Soft tracheostomy tube ties
Sterile gowns, gloves, hat, mask, eyewear – 3 each	1 pack sterile towels
Large head to toe drape	IV extension tubing (MRI tubing)

Equipment Readily Available	
Surgical Tracheostomy Set	*Pre-mixed vasopressors

Intubation Box	*IV fluids
Emergency Airway Cart	*Surgicel

*need only for specified cases where there has been determined to be a higher risk of bleeding or hypotension.

6. Arrange for video bronchoscope and cart to be available for procedure by contacting respiratory therapy. *Use standard (small) bronchoscope for ETT size 7.5 or larger; if ETT is size 7 or smaller, ETT must be changed to larger size;* ***Do not use standard (small) bronchoscope for procedure if ETT is size 7 or less.***
7. Arrange for bronchoscopist to be available for the procedure.
8. Arrange for anesthesiologist to be available for the procedure.
9. Notify patient's nurse of anticipated date/time of the procedure.

Additional Personnel Requirements and Responsibilities:

Airway Control Physician:

- Evaluate ventilator settings and confirm placement of patient on 100% FiO_2.
- Assure appropriate monitoring equipment is in working order (consider $ETCO_2$ monitoring).
- Set non-invasive blood pressure cuff for every 3 minutes unless monitoring by arterial line.
- Review chart for previous ETT placements and determine difficulty of airway.
- Assure appropriate rescue airway devices are available and in working order (consider direct laryngoscopy to evaluate upper airway) and determine a plan for unexpected or accidental extubation.
- Check ETT position and double check ETT size. (**must be 7.5 or greater**)
- Review anesthesia plan with the bedside nurse and assess potential need for vasopressors or IV fluids for treatment of peri-operative hypotension.
- Perform bronchoscopy to evaluate upper airway and to optimize pulmonary reserve prior to initiation of tracheostomy.
- Supervise withdrawal of ETT to agreed upon position and secure (usually 16-17 cm at lips) with the bronchoscope in the ETT.
- Maintain a patent airway during the procedure and SaO2 $\geq$ 95%.
- Perform bronchoscopy during and after the procedure. Follow steps below to prevent puncture/laceration of bronchoscope during needle insertion.

Respiratory Therapist:

- Assure availability of appropriate airway devices
- Have available preloaded saline flushes, 1% lidocaine, lubricant/ointment and suction.
- Place patient on 100% FiO_2 15 minutes prior to procedure.
- Provide and monitor full ventilation support during the procedure (by ventilator or manually).

- Place Bodai adapter and bite block once adequate anesthesia has been delivered.
- Position endotracheal tube at direction of the Airway Control Physician and maintain the endotracheal tube in position during the procedure with cuff inflated.
- Assist Airway Control Physician during procedure.
- Secure tracheostomy tube at completion of procedure.

ICU Nurse:

- Assist with “Time-Out” procedure.
- Review anesthesia plan with the Anesthesiologist and have appropriate medications at the bedside.
- Determine treatment plan for peri-operative hypotension with the Anesthesiologist.
- Establish medication access away from sterile field (extension tubing).
- Administer medications as indicated by the Anesthesiologist.
- Assist operator and airway control physician during the procedure when necessary.
- Monitor vital signs of the patient during the procedure and alert physicians of any abnormalities.
- Review medications used with the Anesthesiologist and confirm that the medication orders are accurate.

Procedure

1. Perform “Time-Out”: The operating surgeon confirms with the ICU nurse, bronchoscopist, respiratory therapist and assisting surgeon that there is informed consent. The operating surgeon will confirm the name of the patient and operation being performed, review the roles of personnel in procedure, anticipated difficulties, ventilator management, hemodynamic management and sedation/paralytic plan as well as planned steps to minimize damage to all equipment.
2. Assure that appropriate personal protective equipment is available for all personnel in the room.
3. Communicate with the Anesthesiologist and confirm that the patient is adequately sedated.
4. A direct laryngoscopy may be performed at this point to assess the upper airway and determine potential difficulties with re-intubation if necessary.
5. Place bite block and consider administration of intravenous paralytic agent in addition to sedation and analgesia to minimize coughing, biting and motion of the neck and trachea during the procedure.
6. Widely prep and drape patient from head to toe in sterile fashion assuring all personnel at the bedside have donned their personal protective equipment.
7. Prepare and check all equipment prior to surgical incision. (Preload trach equipment, lubricate necessary tools, check trach balloon, organized tools etc.)

8. Palpate landmarks including the thyroid and cricoid cartilage and sternal notch. Mark landmarks as necessary including the planned incision site.
9. Inject 1% Lidocaine into skin and subcutaneous tissues at planned incision site.
10. Make appropriate skin incision after adequate local anesthesia is obtained.
11. Perform minimal dissection to delineate/confirm landmarks.
12. Withdraw endotracheal tube under direct vision with laryngoscope or bronchoscope to the desired position just at or below the cricoid cartilage. The ETT will then be resecured and held in place by respiratory therapist.
13. Confirm position of the intended needle puncture site by balloting the anterior tracheal wall and/or transillumination. The ETT should be positioned just proximal to the intended puncture site.

If step 13 is not achieved, **do not proceed**; readjust the position of the ETT and confirm the intended puncture site.

14. The bronchoscope must be withdrawn and protected by the ETT prior to needle insertion to avoid potential damage by the needle.
15. Insert needle with sheath perpendicularly or slightly cephalad into the trachea at the $1^{st}/2^{nd}$ or $2^{nd}/3^{rd}$ tracheal ring interspace and visually confirm intraluminal position. Confirm that the needle with sheath is located near the 12 o'clock position in trachea via video bronchoscopy.

If the needle cannot be visualized, withdraw needle and reassess position of ETT and bronchoscope relative to puncture site. This may be accomplished by slowly withdrawing bronchoscope into endotracheal tube and visualizing a puncture site. Go back to step 12.

16. Direct the needle caudad and slide sheath over the needle and remove the needle.
17. Pass guide wire through sheath and remove sheath.
18. Visually confirm intraluminal and caudal direction of wire with bronchoscopy.
19. Bronchoscope may be left *in situ* as long as O_2 sats and ventilation are adequate and easily maintained.
20. Progressively dilate trachea over white plastic guide and wire.
21. Pass tracheostomy tube and internal dilator into trachea.
22. Inflate the cuff of the tracheostomy tube.
23. Leave ETT in place and confirm intraluminal position of tracheostomy tube and balloon with bronchoscope while ventilating patient through tracheostomy tube.
24. Bronchoscopically confirm positioning through tracheostomy tube. Measure distance from carina of tracheostomy tube tip.
25. Suture tracheostomy tube to skin and attach trach collar.

26. Withdraw ETT after aspiration of tracheal secretions proximal to the tracheostomy tube cuff. The vocal cords may be visualized/photographed at the time of ETT removal.
27. Finally, bronch or suction through trach to clear airway lumen of remaining secretions and blood.

Post Procedure Recommendations

1. Remove shoulder roll.
2. Secure tracheostomy with soft trach ties.
3. Check trach cuff pressure.
4. Reconcile all orders/medications.
5. Order CXR if needed.
6. Document procedure on the trach operative note form and dictate.
7. Call family.
8. Clarify post-op orders using the post-operative trach order set.
9. Communicate results and orders with the ICU team.

Key Word Search: trach, tracheostomy, tracheostomy, percutaneous