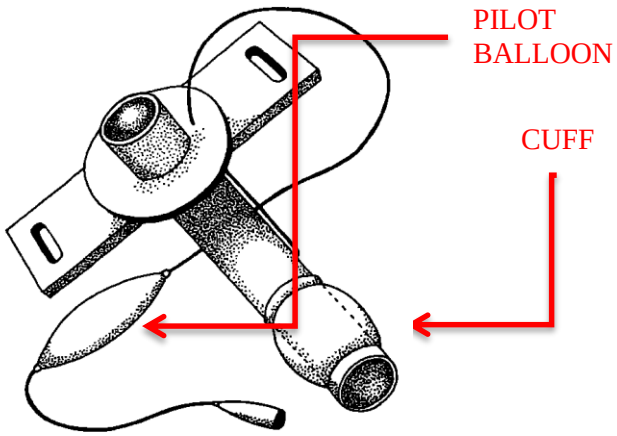
Artificial Airways and Airway Care

A. Tracheostomy Tubes ("trach" tubes)

- A tracheotomy is a surgical procedure whereby an opening is cut into the trachea of the patient for the purpose of inserting a tube (trach tube).
- The trach tube allows airway care (suctioning, etc.) and may serve as a connection for the ventilator.
- It is very important to remember that in patients with a trach tube:
  - The normal mechanisms of the upper airway (filtering, heating, and humidifying the air) are by-passed and must be performed artificially (by using bacteria filters, HME's, humidifiers, heaters, etc.)
  - Good infection control practices (including proper hand washing, by all caregivers) are vital.
- The trach tube will prevent the patient from being able to talk because the tube is inserted below the vocal cords and air can no longer pass through the vocal cords to help produce speech. However, there is a device called a "Speaking Valve" that was developed to facilitate speech in the trach patient. We will discuss the speaking valve in more detail later in this section.
- Trach tubes vary in size and type and the material they're made from.
- Some trach tubes are metal, but most are plastic.
- Some trach tubes are reusable (usually the metal type) while others are disposable or, "single patient use" (usually the plastic type).
- Some have a small balloon at the end ("cuff") while others do not. The purpose of the cuff is to help make an airtight seal in the trachea so that air does not leak around the trach tube. Usually adult trach tubes are cuffed while most pediatric tubes are uncuffed. * *See "Cuff Inflation/Deflation section below.*
- The trach tube has an outer cannula or main body. If the tube is cuffed, the cuff will be located on the outer cannula.
- Some trach tubes have a disposable "inner cannula" while others do not. The inner cannula can be removed for cleaning. Once removed and cleaned it can be reinserted into the outer cannula and "locked" into place, or an alternate clean inner cannula may be inserted. The inner cannula that was removed may be cleaned and stored in a clean dry container and may be alternated when the other inner cannula needs to be cleaned. Usually, pediatric trach tubes do not have an inner cannula, just an outer cannula.
- Some trach tubes have holes at the end on the sides (fenestrated tubes) while others do not.
- Because of the holes present on fenestrated trach tubes adequate mechanical ventilation may not be possible therefore, fenestrated tubes should not routinely be used when ventilatory support is being administered as a life-support intervention.
- To help with inserting the trach tube (outer cannula) in the patient, a device called an "obturator" is used. This hard plastic guide is placed inside the trach tube and the tube is inserted into the tracheotomy opening. The obturator must be quickly removed once the trach tube is in place in the patient.

Cuff Inflation/Deflation

- The cuff on a trach tube serves to cause a seal between the walls of the trachea and the trach tube, allowing air to pass through the trach tube but not around it.
- The cuff also serves to prevent secretions in the upper airway from entering the lower airway.
- To ensure that the pressure exerted by the cuff on the tracheal wall is not excessive, regular monitoring is required. Excessive pressure can cause severe damage to the trachea.
- To prevent excessive cuff pressure, air can be added to the cuff, then slowly withdrawn until a very small leak is noted. This procedure is called the "**Minimal Leak Technique**."
- A similar technique called the "**Minimal Occlusion Volume Technique**" whereby, air is slowly added to the cuff until no leak is heard, may also be used.
- The cuff pressure can be measured using a gauge placed on the cuff pilot line (where the syringe attaches to add or remove air to the cuff).
- The cuff pressure ideally should be below 25 cm H_2O. If more than 20-25 cm H_2O pressure is required to seal the leak, the HME respiratory therapist and the patient's doctor should be notified.
- Air is added or removed to/from the cuff by connecting a 10 cc syringe to the cuff pilot line. If air is to be added, the syringe plunger should be in the "pulled-out" position before connecting it to the cuff pilot line. If air is to be removed from the cuff, the syringe plunger should be in the "pushed-in" position before connecting it to the cuff pilot line.
- **NOTE:** there are also several different types and brands of specialty trach tubes, some of which do not have a cuff but rather a sponge like material that is used to help create a seal between the trach tube and the patient's trachea. Others may have a cuff that is filled with water rather than air.



B. Tracheostomy Care (trach care)

- The trach tube may need to be cleaned frequently, and it may also need to be replaced from time to time.
- The patient's doctor will determine what needs to be done, when, and by whom.
- Although trach care may seem like a very complicated procedure it is fairly easy and may done by properly trained caregivers. However, there are potential hazards associated with the procedure and caregivers must be trained in the appropriate emergency responses should a problem arise during the procedure.
- The tracheotomy opening ("stoma") also requires regular care. This involves basic cleaning of the area and inspection for signs of infection or skin irritation, and replacing the "trach dressing."
- The material holding the trach tube in place ("trach tie") is usually changed during trach care but should always be changed when soiled (e.g., with patient's secretions).

B.1. Cleaning the Trach Tube

- Secretions must be cleaned from the trach tube otherwise the inside of the tube can become clogged, blocking airflow through the tube and making it hard for the patient to breathe.
- If the trach tube has an inner cannula it may be removed by turning it approximately 90 degrees and then pulling it out and downward toward the patient's chest. NOTE: most pediatric trach tubes do not have an inner cannula.
- The inner cannula may be cleaned by soaking it in a 3% hydrogen peroxide solution (or some other solution approved by the patient's doctor).
- The inner cannula may be cleaned as soon as it is removed and then reinserted. However, it is recommended to have two matching inner cannulas, which are exchanged with each other during each cleaning process. **NOTE:** the patient's doctor may request that the inner cannula be replaced and not cleaned.
- If the exchange method is <u>not</u> used, the inner cannula should not be left out of the outer cannula for more than 10-15 minutes maximum.
- Appropriate hand washing and infection control procedures should be observed at all times. To help reduce the potential for infection, a sterile technique is usually recommended for this procedure.
- Steps in this procedure include:
- [NOTE: <u>READ ALL STEPS **FIRST**</u> BEFORE PERFORMING THE PROCEDURE]

1. Wash hands.
2. Gather all supplies and equipment needed (see the Supplies and Equipment list).
3. Open the trach kit, remove the sterile barrier (plastic or cloth) and spread it over the work area to create a "sterile field."
4. Pour the cleaning solution into one of the compartments of the kit and sterile water into the other. NOTE: the kit may not have compartments - it may have two separate containers that have to be opened first and then filled with solutions. * If the kit has separate containers, proceed to step 5 first <u>before</u> opening the containers.

5. Put sterile gloves on hands (* if there is only one glove, put it on the hand you will be using the most).
6. Remove supplies from the kit (use gloved hand if only one hand is gloved) and place them on the sterile barrier cloth.
7. If indicated, suction the patient before proceeding.
8. * NOTE: Make certain a manual resuscitator with a mask and an extra trach tube is immediately available.
9. Disconnect the patient from the ventilator and remove the trach tube inner cannula (use *ungloved* hand if only one hand is gloved) and place it in the cleaning solution. NOTE: the hand used to perform this task should now be considered unsterile, whether gloved or not.
10. If the inner cannulas are being exchanged, after removing the "dirty" inner cannula, insert the clean inner cannula into the outer cannula (using the sterile gloved hand) and lock it in place by twisting until it is securely fastened, then proceed to Step 11.
    - 10.1. NOTE: An adapter or temporary inner cannula may be used if the inner cannulas are not being exchanged and the inner cannula being removed is to be reinserted into the outer cannula during this procedure.
    - 10.2. If an adapter or temporary inner cannula is used, reconnect the patient to the ventilator at this time UNLESS the doctor does not want the patient connected to the ventilator during the procedure (if the patient is able to spontaneously breathe on his/her own. Always check with the doctor prior to determining how procedures will be performed (this procedure should be addressed in the patient's Care Plan).
11. Reconnect the patient to the ventilator (unless specified otherwise in the Care Plan).
    NOTE: if the inner cannulas *were exchanged*, proceed to Steps 15 through 20, then come back and complete Steps 12 through 14. However in Step 14, do not place the clean inner cannula on the sterile barrier cloth, but rather, place it in a clean container such as a "Zip-loc" bag and store it in a clean dry area, then proceed to Steps 21 through 22.
12. Remove the inner cannula from the cleaning solution with the sterile hand, and rinse it with the sterile water.
13. Using a brush or pipe cleaner, remove any remnant secretions from the inside of the inner cannula, and rinse again with sterile water.
14. Shake the inner cannula to remove any excess water, then dry it with the sterile 4x4 pads. Place the dry inner cannula on the sterile barrier cloth.
15. Using the unsterile hand, remove and discard the trach dressing.
16. Moisten the cotton balls with the approved cleaning solution, and gently dab around the stoma and outer cannula.
17. Moisten a sterile 4x4 with sterile water, and wipe the area clean.
18. Use a dry sterile 4x4 to dry the area.
19. If the inner cannulas were not exchanged, using the sterile hand, replace the cleaned inner cannula making sure to lock it into place once inserted into the outer cannula.
20. Apply the clean trach dressing. NOTE: trach ties should be replaced at this time (see instructions for replacing trach ties).
21. Following appropriate infection control guidelines, discard the used/dirty supplies appropriately.
22. Wash hands.

Supplies and Equipment List:

- ❑ Trach cleaning kit
- ❑ Sterile tray (may or may not be included with kit)
- ❑ Sterile barrier cloth (may or may not be included with kit)
- ❑ Flexible brush (should may or may not be included with kit)
- ❑ Sterile 4" x 4" gauze pads ["4x4 pads"] (may or may not be included with kit)
- ❑ Sterile pipe cleaners (may or may not be included with kit)
- ❑ Sterile gloves (may or may not be included with kit)
- ❑ Sterile cotton balls (may or may not be included with kit)
- ❑ Sterile trach dressing (may or may not be included with kit)
- ❑ Trach ties (may or may not be included with kit)
- ❑ Approved cleaning solution (e.g., hydrogen peroxide)
- ❑ Sterile water
- ❑ Scissors
- ❑ Suction machine and supplies
- ❑ Manual resuscitator and an appropriate sized mask
- ❑ Extra trach tube of the same size, and one of the next smaller size (for emergency only)
- ❑ "Zip-loc" plastic bag or other container

B.2. Changing the Trach Tube

- The doctor will determine how often to change or clean the trach tube. This is usually done on a weekly basis and should be addressed in the Care Plan**.**
- It is very important that a trach tube of the same size (and one of the next smaller size) be available at all times during the procedure in case of an emergency.
- As with the trach tube cleaning procedure, a sterile technique is usually recommended.

[NOTE: READ ALL STEPS **FIRST** BEFORE PERFORMING PROCEDUR**E]**

1. Wash hands.
2. Gather all supplies and equipment needed (see the Supplies and Equipment list).
3. * NOTE: Make certain a manual resuscitator with a mask and extra trach tubes are immediately available.
4. If a kit is used, open the kit and remove the sterile barrier cloth.
   4.1. Open the sterile barrier cloth and place it on a stable surface.
5. Open the other sterile supplies and place them on the barrier cloth (these supplies may or may not be included in the kit if a kit is used).
6. If indicated, suction the patient prior to continuing the procedure.

7. NOTE: the Care Plan may specify to pre-oxygenate the patient with 100% oxygen source prior to removing the tube – always check the Care Plan first.
8. Using a syringe, deflate the cuff of the trach tube.
9. Remove trach dressing.
10. Disconnect the patient from the ventilator at this time * Review the Care Plan first to determine whether the patient is to be disconnected from the ventilator for the entire procedure or just the minimal amount of time possible.
11. Apply sterile glove(s). If only one glove is used it should be applied on the hand to be used most during the procedure, and that hand should remain sterile throughout the procedure. If both hands are gloved, determine which one will remain sterile throughout the procedure (usually the hand you normally use most).
12. Check the new sterile trach tube at this time using the gloved hand. Visually inspect tube for cleanliness, and check the cuff (if applicable) to ensure that it works by filling it with air from the syringe. Deflate the cuff after checking (do not use a tube with a defective or leaking cuff).
13. Lubricate the tip of the new trach tube with a water-soluble gel.
14. Clean the stoma area with a sterile 4 x 4 gauze pad and peroxide (or other approved cleansing agent) using the "unsterile" hand.
15. Place the obturator into the new trach tube using the sterile hand.
16. Hold the new trach tube in the sterile hand and with the other hand remove the old trach tube by pulling it outward and down toward the chest. Quickly set the removed tube down and with the sterile hand gently insert the new trach tube into the stoma in the opposite manner as you used to remove the old trach tube.
17. Quickly remove the obturator from the newly inserted tube.
18. Insert the inner cannula (if applicable).
19. Inflate the cuff (if applicable).
20. Check for air movement through the trach tube by holding your hand slightly above the opening of the tube. NOTE: if air movement cannot be felt, remove the tube, oxygenate the patient, and assess the problem.
21. If air movement is noted, secure the trach tube with the hand until it can be secured with the "trach ties."
22. If twill tape is used for the "trach tie," do not tie it in a "bow," always use a "square knot." NOTE: the knot should not be positioned at the back of the head but rather, at the side of the neck.
23. Reconnect the patient to the ventilator at this time unless the Care Plan directs otherwise.
24. Apply the new trach dressing.
25. Following all applicable infection control guidelines, discard the used supplies appropriately.
26. Wash hands.

Supplies and Equipment List:

- Trach tubes: one of the same size, and one the next smaller size
- Sterile gloves (if not provided in the kit)
- Water soluble lubricating gel
- Sterile barrier cloth (if not provided in the kit)
- Suction equipment and supplies
- 10 cc syringe

- Manual resuscitator with an appropriate sized mask
- Sterile 4"x 4" gauze pads (if not provided in the kit)
- Trach dressing (if not provided in the kit)
- Approved cleaning solution (e.g., hydrogen peroxide)
- Trach tie (twill tape or "other")

B.3 Stoma Care

- The tracheotomy opening is called the stoma.
- The stoma and surrounding skin/tissue require frequent care and cleaning.
- Cleaning is required daily and may even be required several times a day.
- In addition, the trach dressing should be changed daily and whenever it becomes "soiled" to help prevent skin irritation and/or infection.
- Stoma care is relatively simple:
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1. Always wash hands prior to any procedure in which you will come in contact with the stoma or trach tube, and always follow approved infection control procedures.
2. Remove the trach dressing and observe the area for signs of irritation or infection: redness, discharge (yellow or greenish), blood, etc. If any of these signs are noted, the patient's doctor should be notified.
3. Clean the site using a 4 x 4 gauze (Q-tips may also be used) and an approved cleansing agent. * The cleansing agent to use should be addressed in the patient's Care Plan.
4. Remove all dried secretions from around the stoma area.
5. Rinse the area with sterile water after cleaning.
6. Thoroughly dry the area with a clean 4 x 4 gauze pad.
7. Apply a clean trach dressing and change trach ties if indicated (if they're wet or soiled).
8. Dispose of all supplies appropriately.
9. Wash hands.

Supplies and Equipment List:

- Approved cleansing agent (hydrogen peroxide, mild detergent/water solution, etc.)
- Sterile water
- Containers for the cleaning solution and sterile water
- 4 x 4 gauze pads (and Q-tips if desired)

B.4. Trach Tie & Dressing Changes

- Trach ties are used to secure the trach tube from becoming dislodged, and should be changed on a daily basis (or more frequently if indicated, e.g., if soiled or wet).

- The trach dressing protects the skin from irritation and should be changed daily along with the trach ties (or more frequently if indicated, e.g., if soiled or wet).
- The trach dressing also serves to cushion the patient's neck from the neck plate of the trach tube.
- A dressing can be made by cutting 4 x 4 gauze pads or they can be purchased already pre-cut and stitched.
- Trach ties may be made using cotton twill tape, or they can be purchased already cut and stitched. (Note: there are several different brands and types of trach ties commercially available).

Changing Trach Ties (cotton twill tape):

1. Wash hands.
2. Collect equipment/supplies: gloves, cotton twill tape, scissors.
3. Remove twill ties from the plastic pouch (Shiley Twill Tape).
4. Place one end of the tie through a neck plate hole on the trach tube flange, and leave one end of the tie 3-4" longer than the other. (Note: if using pre-packaged ties, follow the manufacturer's instructions).
5. Secure the shorter end of the twill tie into the other neck plate hole on the trach tube flange.
6. Place one finger between the patient's neck and the tie, and tie the ends together in a square knot. (Note: alternate the side on which the knot is tied with each trach tie change).
7. Cut excess twill tie, leaving approximately 2" remaining.
8. Cut and remove old ties.
9. Following appropriate infection control practices, dispose of all used/soiled supplies.
10. Wash hands.

C. Speaking Valve

- The speaking valve was designed to help facilitate speech in the tracheostomy patient.
- There are basically two different types of speaking valves:
  - one for use with a ventilator, and
  - one for use without a ventilator.
- The speaking valve can be used with both adult and pediatric patients, but an adapter is required when used with pediatric ventilator tubing circuits. The 15mm pediatric circuits are too small to allow for insertion of the speaking valve. An adapter is needed to convert the smaller tubing requirements.
- The Passy Muir Tracheostomy Speaking Valve (part #005) is white and its dimensions are 15mm I.D./23mm O.D.
- The Passy Muir Ventilator Speaking Valve (part #007) is aqua colored and its dimensions are 15 mm I.D./22mm O.D.

- When a speaking valve is used the cuff of the trach tube (if present) must be deflated.
- If a ventilator is being used the ventilator may need to be adjusted to compensate for leakage around the trach tube when the cuff is deflated. Pressure ventilators will adjust automatically, but volume ventilators may have to have the set volume increased.
- Alarms that measure exhaled volumes should be disabled when the speaking valve is in place.
- Adjustments to the ventilator when a speaking valve is used should be addressed in the Care Plan.
- When the speaking valve is removed remember to re-inflate the trach tube cuff (if applicable).
- Remember to reset all ventilator parameters and alarms to pre-speaking valve use settings after the speaking valve is removed (if applicable).