

# Tracheostomy 101

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No Disclosures

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## Background



**Tracheostomy:** surgical procedure by creating an incision on the anterior aspect of the neck (trachea) to establish a direct airway




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## Indications for Tracheostomy

- 1. Loss of upper airway** (loss of pharyngeal muscle tone or anatomical obstruction of the upper airway)
- 2. Facilitation of ventilation** (need for mechanical ventilator support, respiratory failure)
- 3. Inability to swallow oral secretions/ Secretion retention** (aspiration, impaired airway clearance, vocal fold paralysis)
- 4. Trauma**




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# Tracheostomy Creation




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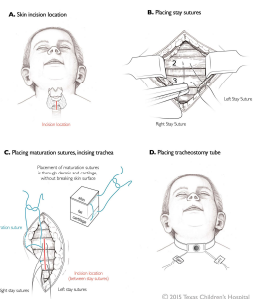
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## Surgical Approach



- A vertical incision is created between the cricoid cartilage and the suprasternal notch
- Subcutaneous fat is dissected and the strap muscles are separated
- The thyroid isthmus is then divided with cautery
- When the trachea is isolated, **stay** sutures are placed
- The cricoid is identified and a vertical incision is made between the second and third tracheal ring
- **Maturation sutures** are placed (some surgeons place prior to incision)
- The ETT is then removed gently and the tracheostomy tube is placed in the airway
- Dressing and Velcro trach collar applied




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# Tracheostomy Identification




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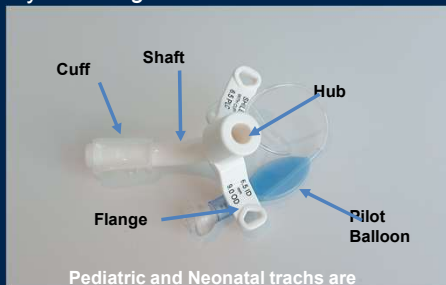
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### Anatomy of a *Single* Cannula Trach Tube



Pediatric and Neonatal trachs are **ALWAYS** single cannula trachs.

Figure 3




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### Adult Tracheostomy Tube with Inner Cannula

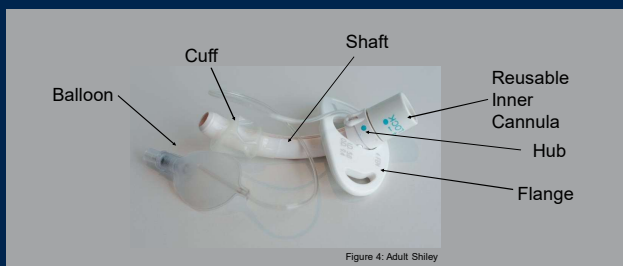


Figure 4: Adult Shiley

**\*Double Cannula trach tubes will always be ADULT sized tubes\***




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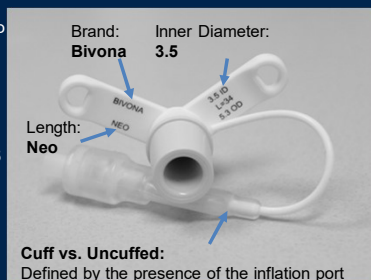
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### Identifying the Correct Size of the Trach Tube

All information needed to identify trach size is on the trach tube

Correct name of trach:  
**Bivona 3.5 Neo TTS**



**Cuff vs. Uncuffed:**  
Defined by the presence of the inflation port

Figure 5




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## Common Pediatric Trach Tube Brands

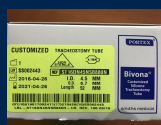
Bivona™ TTS (water cuff most common)



**Standard**  
silicone material  
with a water cuff



**FlexTend**  
extends the hub out,  
internal length is the same



**Customized**  
made to suit patient needs

All Bivona™ trach tubes can be washed indefinitely.  
These tubes can be autoclaved up to 5 times\*\*\*




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## Bivona Adult Trachs



Bivona adult trachs are  
single cannula tubes




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## Notes on Bivona Trachs

A clear inflation cuff inflation port  
means it is a TTS (tight-to-shaft)  
cuff

Inflate with **STERILE WATER**



A blue inflation cuff  
inflation port indicates  
that it is an air cuff




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### Example of a Bivona™ FlexTend



- Identify FlexTend trachs by the extra distal length on the outside of the tube
- If this is present, then it must be included in the name
  - Ex: Bivona 4.0 pedi TTS FlexTend

Figure 11



### Shiley™ Trach Tubes

- Shiley uses abbreviations to denote different types of trach tubes
- The abbreviation indicates the stock length and if the trach has a cuff
- This abbreviation can be found on the box or the flange of the trach tube



Shiley 6.0  
CFS  
(Adult cuffless  
non-fenestrated)



### Shiley Trach Tubes

#### Shiley™ Pediatric/ Neonatal trach examples

- Neo (NEF)
- Neo cuffed (NCF)
- Pedi (PEF)
- Pedi cuffed (PCF)
- Pedi Long (PELF)
- Pedi Long Cuffed (PELCF)

#### Shiley™ Adult Trach Examples

- Disposable Inner cannula cuffless (DCF)
- Disposable Inner Cannula Cuffed (DCFS)
- Low Pressure Cuff (LPC)
- Reusable inner cannula cuffless (CFS)
- Proximal Longer (XLTP)
- Distal Longer (XLTD)
- Adult Single Cannula (SCT)
- Adult Disposable Inner Cannula, cuffed (DCT)



## Tracheostomy Cuffs



Tracheostomy  
Cuffs

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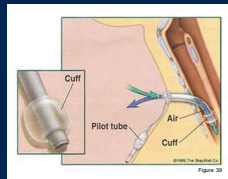
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### Trach Cuffs

- Tracheostomy cuffs are inflated based on the patient's respiratory needs
- It is ok for a vent-dependent patient to have a leak if they are appropriately ventilating and not in any distress
- Overinflating cuffs can lead to pressure necrosis of the trachea and lead to stenosis
- Cuff pressures should be periodically monitored:
  - Check that the appropriate volume of air or water is in the cuff



Tracheostomy  
Cuffs

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### Trach Cuffs

- Neo/Pedi trach cuffs: maximum of **5cc** of sterile water (Bivona™) or air (Shiley™)
- Adult trach cuffs: maximum of **10cc** sterile water (Bivona™) or air (Shiley™)
  - Normal saline should **not** be used to inflate cuffs
  - Amount of air/water in the cuff is determined by the MD and should be inflated the **minimal** amount possible to facilitate adequate ventilation
  - Too much volume can lead to pressure necrosis and tracheal stenosis

**ALWAYS** deflate the cuff before changing a trach, *even if you think it is already deflated!*

Tracheostomy  
Cuffs

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## Different Types of Tracheostomy Cuffs

- Please check the packaging insert to confirm the maximum inflation volume of your patient's trach
- Adult cuffs can be inflated to a maximum of 10cc of water or 25mm<sup>2</sup> water (pressure) of air
- Cuff pressure must be monitored daily!
- Bivona™ TTS cuffs are inflated with sterile water **NOT** normal saline



Bivona™ Foam Cuff with red inflation tube (inflate with air)



Bivona™ Cuff with blue inflation tube (inflate with air)



Bivona™ TTS Cuff with clear inflation tube (inflate with water)



Shiley™ cuffs are air inflation only

Shiley™ cuffs are air inflation only

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## Inflating a Trach Cuff

- Gather supplies:
    - Two – 5cc or 10cc syringes
      - 1 empty syringe for deflating
      - 1 prefilled syringe for inflating
    - Sterile water (if inflating a Bivona™ cuff)
  - Prefill one syringe with sterile water to inflation volume if inflating a Bivona™ trach
- \*This may be completed with one syringe if inflating a Shiley™ air cuff\**



Figure 20

Shiley™ cuffs are air inflation only

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## Inflating a Trach Cuff cont.

- Attach prefilled/preset syringe and push plunger to inflate cuff
- **DO NOT** inflate pediatric cuffs more than 5cc of water or air

Shiley™ cuffs are air inflation only

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## Deflating a Trach Cuff

To deflate the cuff

- Attach the syringe to the inflation hub
- Pull back on the plunger the entire amount of air or water to deflate the cuff



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## Tracheostomy Accessories



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## Velcro Trach Collars



Neo/Pedi Velcro trach collar



Teenage/Adult Velcro trach collar



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### Humidity and Moisture Exchanger (HME)

- Artificial nose
- Humidifies air
- Some come with oxygen port
- Also comes as an in-line option for patients on a ventilator
- Gives the patients the ability to be mobile without a humidified trach collar
- **Trach tube cuff should ALWAYS be deflated while patient is on standard HME (not in-line HME)**



Figure 45

Trach Collarless Humidifier

### Humidified Trach Collar (HTC)

- Provides optimal humidification for trachs
- 8-10 L Flow at room air, 34-36°C
- Can regulate the FIO2 as needed
- TCH policy states that all trach patients must be placed on the trach collar when sleeping
- **Trach tube cuff should be deflated while on HTC**



Figure 46

Trach Collarless Humidifier

### Trach Dressings: Mepilex Ag

- Historically used as the initial dressing post-operatively
- Ag (silver) has antimicrobial properties which aids in wound healing and debridement
- Provides padding
- Indicated for increased secretions, stomal breakdown, wounds, infections, and granulation tissue
- Can be left in place for up to 5 days, if not heavily soiled



Figure 48

Trach Collarless Humidifier

### Trach Dressings: Mepilex/Optifoam

- Use for additional padding and pressure offloading
- Can use for additional absorption of secretions
- Mepilex™ has adhesive, Optifoam™ does not



Figure 33




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### Trach Dressings: Mepilex White

- Current fresh trach dressing of choice based on recent study
- Can use for additional absorption of secretions



Figure 32




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### Trach Dressings: Split Gauze

- Standard trach dressing
- Good for minimal secretions and a healthy stoma
- Can use 4x4 or 2x2 based on child's size.

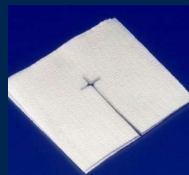


Figure 40




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## Inner Cannula Care

Reusable  
inner cannula  
locks into place



**Do not reuse these!**

Disposable  
inner cannula  
clicks into place



Figures 36-37

\*Inner cannulas should be cleaned OR changed once per shift\*




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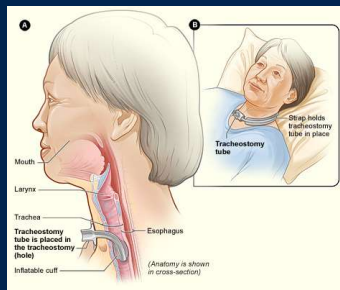
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## Changing the Trach



[https://en.wikipedia.org/wiki/Tracheostomy#/media/File:Tracheostomy\\_Ant.jpg](https://en.wikipedia.org/wiki/Tracheostomy#/media/File:Tracheostomy_Ant.jpg)




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## Trach Change Procedure

### Step 1. Gather supplies:

- Trach tube of current size and smaller size
- Syringes if tube is cuffed
- Scissors (for removing stay sutures)
- Velcro trach collar
- Dressing
- Water-soluble lubricant
- Shoulder roll
- Ambu bag and mask
- Suction supplies

**This is a  
2-person  
procedure**




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### Trach Change Procedure...cont.

- Step 2.** Wash your hands and put on gloves
- Step 3.** Open trach package; be sure it is the correct size
- Step 4.** Place obturator into new trach tube
- Step 5.** If using a cuffed trach, test cuff by inflating cuff fully and deflating (use air for Shiley and sterile water for Bivona trach tubes)
- Step 6.** Dip trach in water based lubricant
- Step 7.** Prepare Velcro trach ties
- Step 8.** Place a roll under patient's shoulders so that the neck is slightly extended




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### Trach Change Procedure...cont.

- Step 9.** Remove the old dressing
- Step 10.** Suction the trach tube
- Step 11.** The first person will remove old trach ties while the second person is holding the tube in place
- Step 12.** The second person will deflate cuff if trach is cuffed




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### Trach Change Procedure...cont.



**Step 13.** The second person will remove old trach tube following the natural curve of the tube



**Step 14.** The first person will insert new tube with one smooth curved motion directing the tube to the back of the neck and down

Figure 43-44




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## Trach Change Procedure...cont.

**Step 15.** The first person will remove the obturator while holding the trach tube securely

**Step 16.** The second person will replace the ventilator tubing

**Step 17.** Inflate cuff, if indicated

Nursing should update LDA flowsheet with every trach tube change

**Step 18.** Secure trach with Velcro trach collar

**Step 19.** Place new stoma dressing, ensure **only one finger width between trach collar and neck**

**Step 20.** Suction to appropriate depth and auscultate breath sounds

**Step 21.** Use scissors to cut stay sutures

*If you are not able to pass suction and cannot appreciate breath sounds the trach may be in a false passage*




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## Accidental Decannulation

**Always have a plan and have all emergency supplies ready!**

**Step 1.** Hyperextend the neck

**Step 2.** Using the obturator reinsert the tube immediately

*\*If possible, reinsert new tube\**

**Step 3.** If unable to reinsert same size tube, use smaller size to maintain patent airway and notify ENT immediately

**Step 4.** Hyperoxygenate and assess respiratory status

*\*The number one reason a patient accidentally decannulates is due to a loose trach collar!!!*




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## Suctioning the Trach




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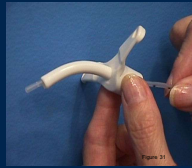
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## Suctioning a Tracheostomy Tube

- Suction as needed
- Trach suction guide or depth should be at bedside for all patients with trach tubes (Respiratory Therapist to provide)
- Suction depth charts can found on the TCH Intranet
- **DO NOT** suction deeper than recommended depth as this can cause tracheal damage, bleeding, and/or granulation tissue



**Do not place Neo Sucker or Yankauer suction into trach tube!**




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## Steps to Suctioning with a Catheter Kit

- Step 1.** Wash hands
- Step 2.** Open the suction catheter kit and put on gloves
- Step 3.** Pick up suction catheter with dominant hand
- Step 4.** Use your non-dominant hand to attach suction tubing to catheter
- Step 5.** Use your dominant hand to insert suction catheter to pre-measured depth (number should be flush with tracheostomy tube hub)
- Step 6.** Apply suction with non-dominant hand as you remove the catheter in a pill-rolling fashion for no more than 4-5 seconds
- Step 7.** Assess your patient's respiratory status and repeat if needed
- Step 8.** Remove gloves and wash hands




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## Steps to Suctioning with an In-line Catheter



- Step 1.** Wash hands and apply gloves
- Step 2.** Attach in-line suction catheter to suction tubing and insert catheter to pre-measured depth, this number should be visible in the window distal to the patient
- Step 3.** Hold the hub of trach tube with one hand while applying suction and removing the catheter with the other hand so that the in-line suction catheter is not disconnected from the trach tube
- Step 4.** Assess your patient and repeat if needed




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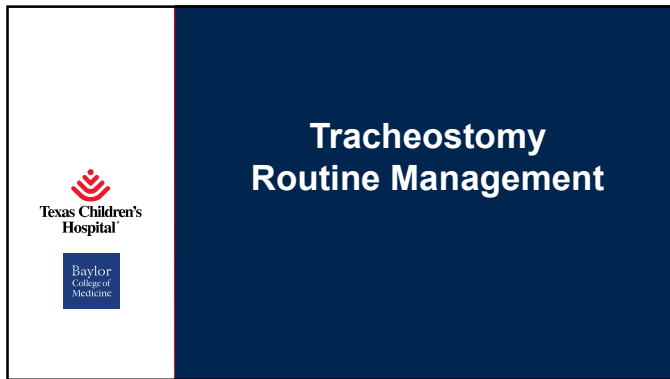
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### Routine Management

- Stoma care BID
- Neck Care and Tie change with stoma care
- Change trach tube out monthly
- Bivona tubes can be sterilized up to 5 times or washed with soap and water as long as integrity is intact
- Shiley tubes are one time use




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### Emergency Equipment

**All patients with a tracheostomy must have these with them at all times:**

- Ambu bag with mask
- Oxygen supply
- Suction setup
- Suction catheters
- 1 trach tube that is the **same size** as the patient's trach
- 1 trach tube that is **1 size smaller** than the patient's trach
- Pulse oximeter
- Water-based lubrication
- Velcro trach collar


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# Tracheostomy Complications




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## Trach Complications During Fresh Trach Period

- Pneumothorax
- Mucous Plug
- Accidental Decannulation
- Bleeding
- Difficulty Ventilating (differential diagnosis can be backwalling of trach tube to tracheal wall)




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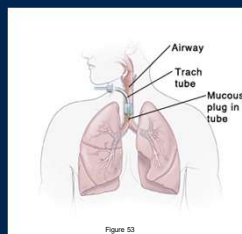
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## Mucous Plug

- Patient may have signs of respiratory distress
  - Tachypneic, tachycardic, low  $O_2$  sats
- Generally will have difficulty passing suction
- Use Ambu® bag to give a few manual breaths
- If difficult to bag or suction, or if patient continues to deteriorate **change the trach tube**




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## False Passage/Tract

- Occurs when trach is inappropriately placed between mucosa and cartilage
- Signs and symptoms will include increased work of breathing, inability to pass suction, decreased breath sounds, hypoxia, and crepitus to the neck area
- Interventions will include removing the trach tube from the false track and replacing with one size smaller trach tube; If unable to do so, remove trach tube, occlude stoma and begin bag ventilation by mouth; Call for a code response



Figure 94

Tracheostomy  
Nursing

## Mature Tracheostomy Concerns

- Bleeding
- Difficulty ventilating or Concern for obstruction (positioning, airway granuloma)
- Tracheitis
- Malacia (will likely need to be evaluated for custom length tracheostomy tube)
- Stoma Granuloma
- Granulation Tissue

Tracheostomy  
Nursing

## Bleeding

- Suction Trauma: Likely resolves in 24 hours; reiterate suction depth
- Distal airway granuloma: May need a nebulized treatment (ie ciprodex), custom length tracheostomy tube, or surgical excision depending on obstruction
- Tracheitis: May be treated with nebulized tobramycin, gentamycin, or ciprodex
- Poor humidification
- Pulmonary Hemorrhage**
- Tracheoinnominate Fistula**

Tracheostomy  
Nursing

## Difficulty Ventilating

- Backwalling or abutment of trach tube to tracheal wall
  - Consider upsizing the trach tube or ordering a custom length trach tube
- Mucous plug
  - Change the trach tube
- Distal airway granuloma
  - Discuss with surgeon (treatment options previously mentioned)
- Poor lung compliance
  - Will require further respiratory optimization by CCM
- Tracheomalacia
  - Increase in PEEP and/or custom tracheostomy
- Inadequate trach tube cuff inflation
  - Consider inflating the trach cuff if patient unable to tolerate deflation




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## Tracheitis

- Increase in tracheal secretions
- Discolored secretions ie yellowish green, cloudy
- Blood-tinged secretions
- Increased WOB
- Increase in ventilation settings/oxygen
- Diagnosis: Trach aspirate, flex scope
- Treatment: nebulized antibiotics, systemic antibiotics




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## Trach Scope

- Will likely be done in conjunction with attending if during working hours
- Performed to diagnose trach related concerns




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## Stoma Granuloma Management

- New/Fresh (silver nitrate, Mepilex AG, Ciprodex, steroid ointment)
  - Can bleed during trach care
- Mature (excision in OR if difficulty with trach changes)



Figure 56




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## Granulation Tissue

### Can occur in trachea/airway:

- **Suprastomal:** occurs above the trach stoma within the airway
  - May be asymptomatic
  - Can present as intolerance to wearing Passy-Muir Valve (PMV) or cap
- **Distal:** occurs at the end of the trach tube within the airway
  - Should be on the differential diagnosis for blood-tinged secretions, difficulty passing suction catheter, and respiratory distress
- **ENT should always be notified for any granulation tissue**



Figure 57




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## Common Questions

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### Swallowing with a Tracheostomy Tube

- **Most patients can**
- Must have Speech and Language Pathology evaluation for swallow:
  - Trach tube cuff **must be deflated** while eating and drinking




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### Voicing

- **Many patients are able to talk with a trach**
- Speech and Language Pathology is required in order to evaluate patient for a speaking valve ie: Passy-Muir Valve (PMV)
- PMV is a one way valve that allows patients to inhale through the valve and exhale through their nose and mouth



Source: passy-muir.com




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