

# Speech and Swallowing Therapy for Tracheostomized Patients

A Basic Understanding



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# Objectives

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- Participants will be able to identify diseases and conditions that can result in respiratory failure.
- Participants will be able to identify components, types and the function of the tracheostomy tube.
- Participants will be able to evaluate and develop treatment plans for communication and swallowing for tracheostomized patients.





# Basic Anatomy and Physiology

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## Upper Respiratory Tract

- The passageway for the air stream to enter and leave the lungs.
- The air is warmed and humidified and large impurities are filtered out before reaching the lungs.

## Lower Respiratory Tract

- Housed in the thoracic cavity (thorax) which is formed by 12 thoracic vertebrae, sternum and rib cage.
- The thorax is divided into left and right halves and contains the heart, blood vessels, nerves and esophagus.





# Diseases and Conditions Affecting the Respiratory System

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- COPD
- Chronic Bronchitis
- Emphysema
- Pneumonia
- Aspiration Pneumonia
- Pneumocystis Carinii Pneumonia (PCP)
- Amyotrophic Lateral Sclerosis (ALS)
- Multiple Sclerosis



# Diseases and Conditions Affecting the Respiratory System


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Cont'd

- Muscular Dystrophy
- Guillain-Barre Syndrome
- Brainstem Cerebrovascular Accidents
- Poliomyelitis
- Spinal Cord Injury
- Congestive Heart Failure (CHF)
- Adult Respiratory Distress (ARDS)



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*Respiratory failure may occur secondary to any of the diseases and conditions previously discussed and an artificial airway may be required.*





# Purposes of an Artificial Airway

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- Provides adequate ventilation and oxygenation
- Maintains an open airway
- Eliminates airway obstruction
- Reduces the potential for aspiration
- Facilitates the removal of secretions
- Provides access to the airway/lungs for pulmonary toilet





# Tracheotomy vs. Tracheostomy

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## Tracheotomy

- A surgical procedure
- Placement of a plastic or metal tube into the airway by the physician
- Performed when there is a need for an artificial airway

## Tracheostomy

- Tubes used to maintain the tracheal opening after the surgical procedure
- Made of polyvinyl (PVC) chloride, silicone, a mixture of plastics or metal
- Disposable/ non-disposable



# Complications Related to Tracheostomy Tube Placement

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- Infection (sepsis, pneumonia)
- Hemorrhage (skin vessels or major artery)
- Tracheal injury (inflammation, submucosal hemorrhage, ulceration, cartilage and mucosal necrosis)
- Tracheal perforation and tracheoesophageal fistula
- Tracheal web or pseudomembrane formation
- Irritation of the carina
- Self-decannulation



# Complications Related to Tracheostomy Tube Placement

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Cont'd

- Air leak
- Ineffective cough
- Pneumonia
- Mechanical problems with tube or cuff  
(obstruction, disconnection from ventilator)
- Patient discomfort



# Tracheostomy Tubes and Components



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# Components of the Tracheostomy Tube

- Outer cannula
- Inner cannula
- Flange
- Obturator
- Button
- Cuff
- Pilot Balloon

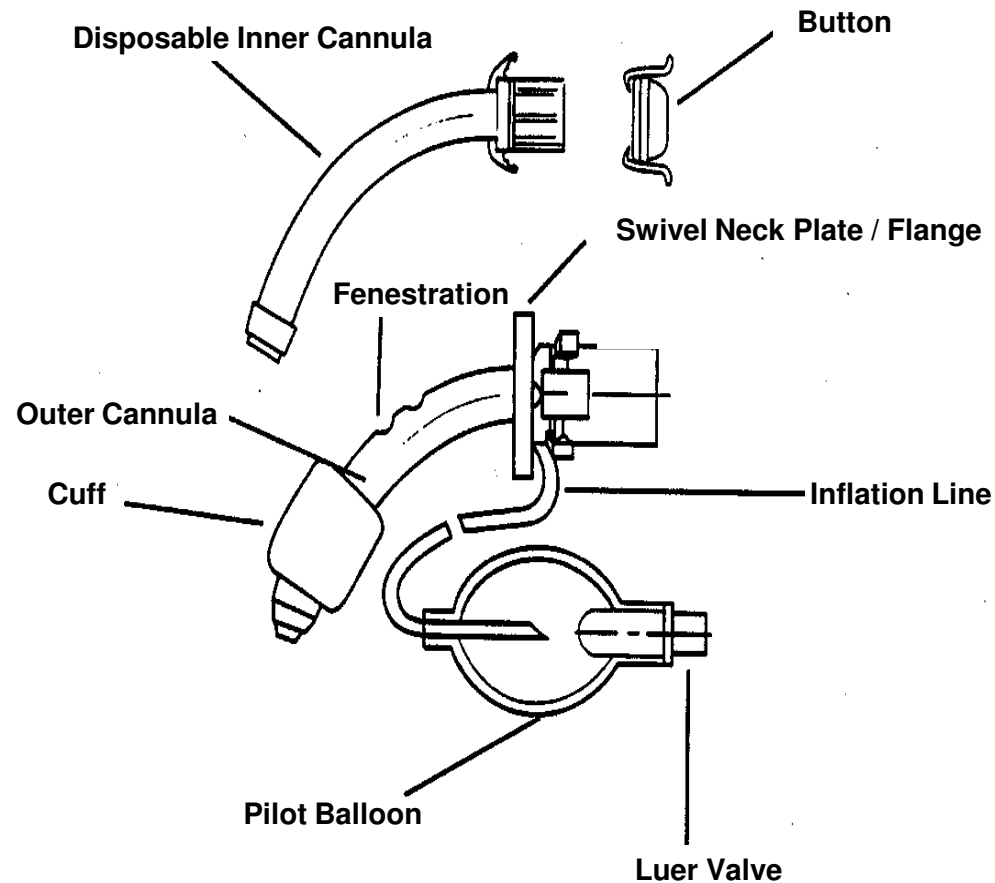


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# Components of the Tracheostomy Tube

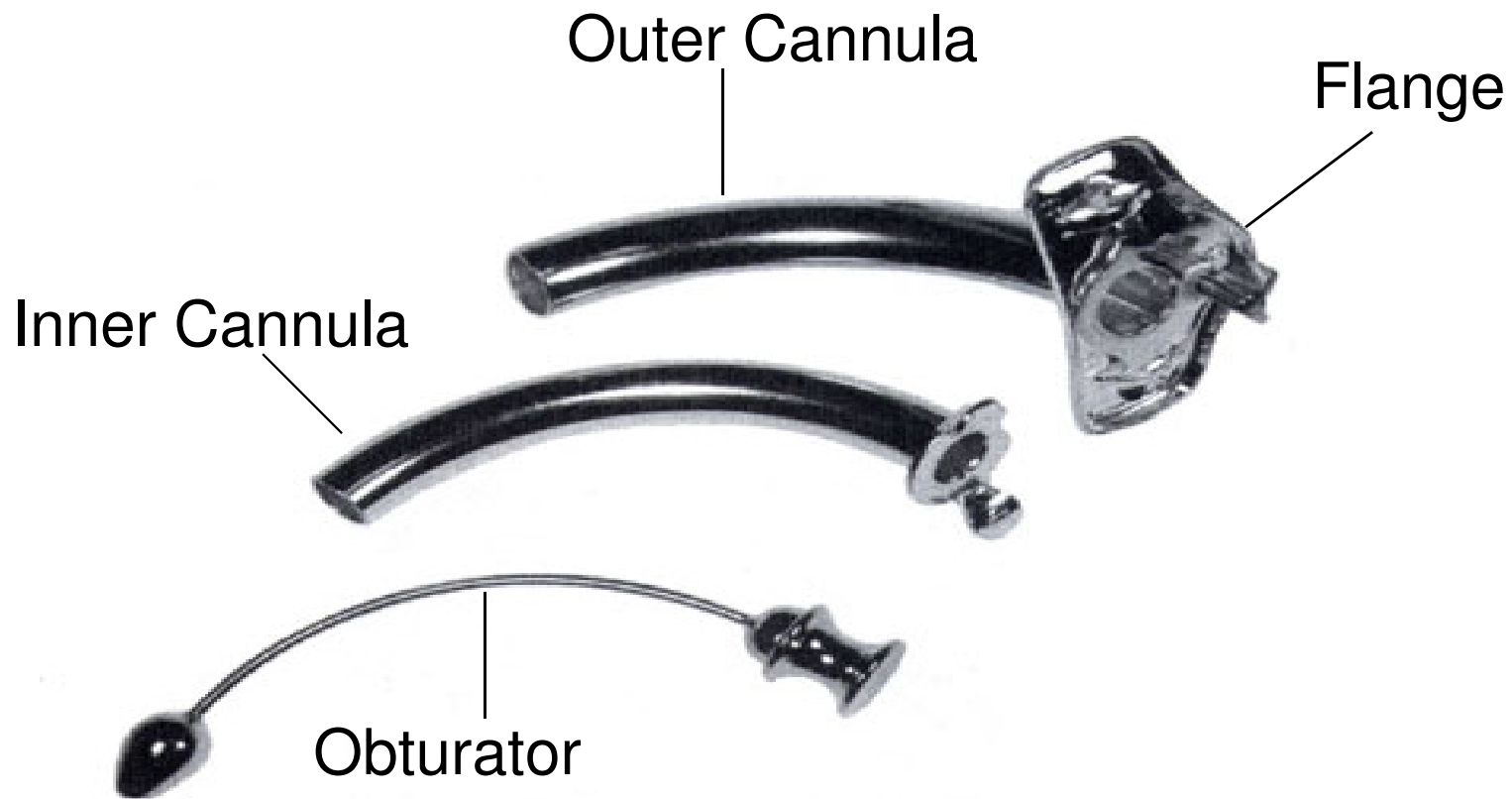
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- **Outer cannula** – the outside wall of the tube that provides the basic structure
- **Inner cannula** – creates a tight fit inside the outer wall and is available in a variety of sizes
- **Flange** – “the neck plate” that secures the tracheostomy tube in place around the patient’s neck
  - Tube size with inner and outer diameter measures are indicated on the flange
  - It extends laterally and has a slit on each side to allow for fastening of a trach collar around the patient’s neck



# Components of the Tracheostomy Tube

Cont'd



# Components of the Tracheostomy Tube

Cont'd

- **Obturator** – the portion of the tube that is only used in the insertion process and is removed immediately afterwards
  - A curved piece which assists in guiding the tube through the tracheal opening and extends beyond the distal part of the tube to create a rounded end
  
- **Button** – referred to as a “plug” “cap” or “cork”
  - A small round piece of plastic placed in the tracheostomy tube to occlude the opening
  - Used for patients learning to breathe on their own

# Components of the Tracheostomy Tube

Cont'd



**Button** – also referred to as a “plug,” “cap” or “cork.”

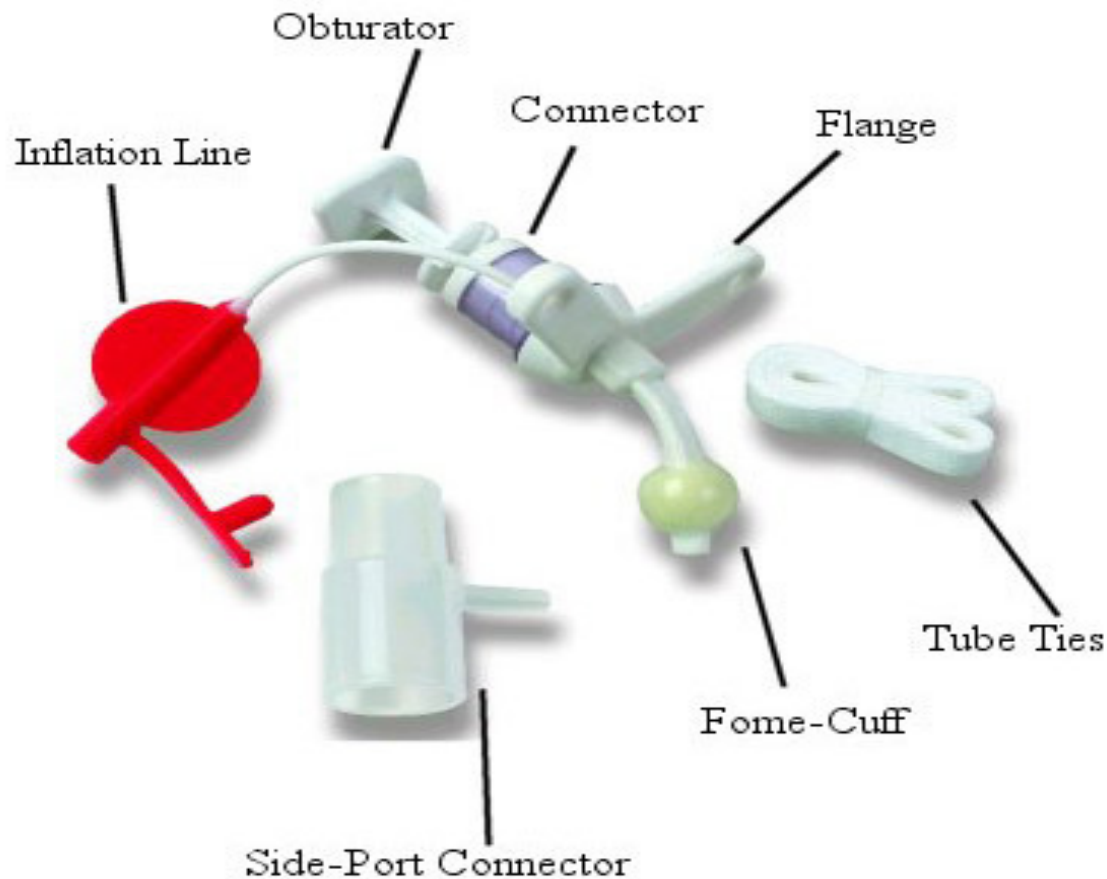
Photo: <http://www.respertise.com>



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# Components of the Tracheostomy Tube

Cont'd



# Components of the Tracheostomy Tube

Cont'd

- **Cuff** – described as an internal balloon designed to keep air from escaping around the tube from the lower to upper airway
  
- **Cuff components**
  - **Inflation line** – pathway for air to inflate and deflate
  - **Pilot balloon** – indicates how much air is in the balloon
  - **Syringe** – adds or removes air through the valve of the pilot balloon



# Components of the Tracheostomy Tube

Cont'd

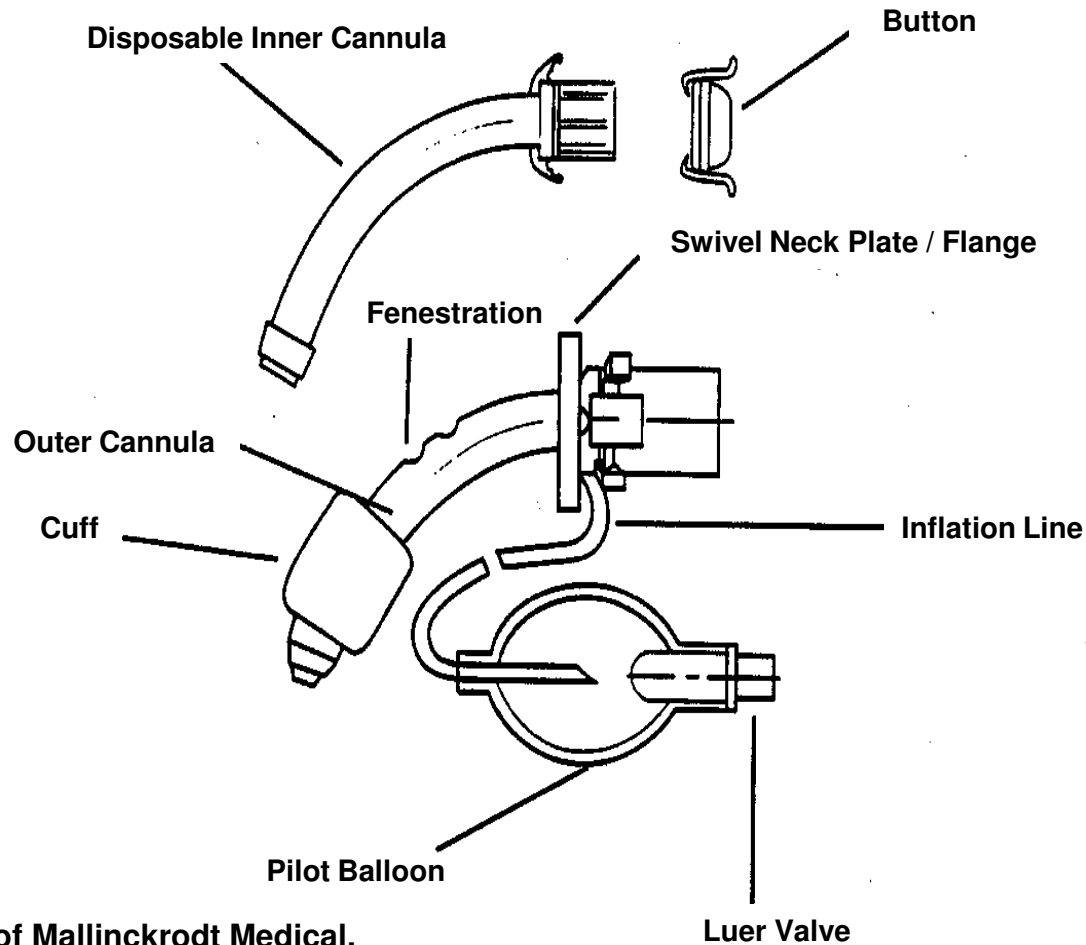


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# Types of Tracheostomy Tubes

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## ■ Disposable

- Plastic – designed to avoid tissue reaction; more compliant; less traumatic to the airway. There are two types:
  1. Polyvinyl Chloride (PVC) – designed for single patient use
  2. Silicone – may be sterilized for re-use

## ■ Non-Disposable

- More likely to cause irritation and may react to temperature changes (heat and cold)
- Usually silver or stainless steel metal
- Can also be made of silicone plastic



# Types of Tracheostomy Tubes

Cont'd

- **Nonfenestrated** – a standard tube that may be cuffed or cuffless



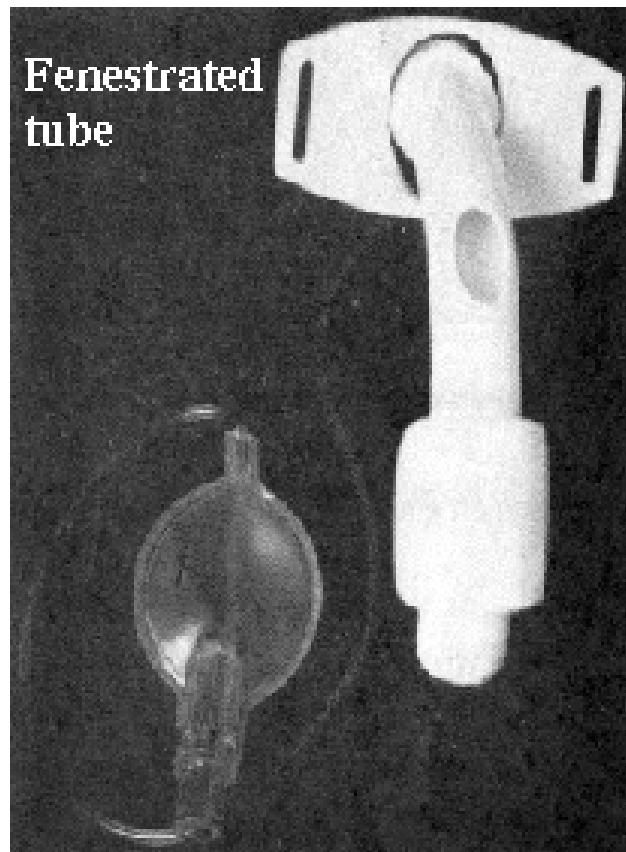
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# Types of Tracheostomy Tubes

Cont'd



- **Fenestrated** – has a singular or multiple holes on the body of the outer cannula
  - Allows air to flow from the trachea through the fenestration to the vocal folds



# Manufactured Types

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- Bivona
- Lanz
- Portex
- Shiley
- Jackson



# Communication



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The inability to communicate can cause frustration and fester anxiety, fear and panic in many patients. The inability to communicate can also compromise the appropriate medical treatment because patients are unable to effectively describe their condition or problems. Providing the tracheostomized patient with the most effective and efficient means of communication is critical to the rehabilitation and well being of the patient.

Source: Honsinger, M. Yorkston K., Dowden, P.; Communication Options for Intubated Patients Respiratory Management, May/June pp. 45-52 (1987)



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# Conditions Affecting Communication

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- **Temporary conditions** – refers to a patient who requires short term intubation or does not require a permanent tracheotomy.
- **Static conditions** – refers to a physical condition that is not expected to change significantly, even after the acute episode has passed.
- **Degenerative conditions** – refers to a medical status that is expected to decline.



# Assessment



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# Assessment Considerations

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- Physical – Motor status
- Speech and Voice status
- Cognitive – Linguistic status
- Behavioral status
- Candidacy for Speaking Valves





# Physical – Motor Status

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- Physical motor impairment may limit the choice of oral communication by impacting upper extremity function and endurance.
  - Normal
  - Fair
  - Poor
  - Quadriplegia
  - Pentaplegia
- Gross motor can be assessed for pointing and gestures. Fine motor should be assessed for writing.





# Speech and Voice Status

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- Speech and voice conditions may influence treatment approach.
- In assessing speech and voice, consider:
  - Phonation intensity, articulation all WNL
  - Phonation with decreased intensity, articulation good
  - Phonation poorly coordinated with ventilation/respiration
  - Aphonic with good mouthing
  - Aphonia with mild, moderate, severe dysarthria





# Cognitive – Linguistic Status

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- Cognitive-linguistic impairment can often limit the patient's ability to benefit from intervention because it can interfere with new learning and the use of carryover techniques.
- Determine the following:
  - No deficits
  - Mild deficits in memory, orientation, reasoning, anomia
  - Moderate deficits in receptive/expressive language
  - Severe deficits
  - Profound deficits





# Screen/Assess Cognition

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## ■ Attending Behaviors (Yes or No)

- Does the patient attend when his/her name is spoken?
- Does patient attend when directed to “look at me.”

## ■ Orientation Questions (Yes or No)

- Is your name \_\_\_\_\_?
- Is the year \_\_\_\_\_?
- Is your home in \_\_\_\_\_?
- Are you married \_\_\_\_\_?



# Screen/Assess Cognition

Cont'd

- **Single Step Commands**

- “Close your mouth.”
- “Open your mouth.”

- **Vision & Hearing**

- Vision and hearing acuity need to be considered because they affect communication.



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# Behavioral Status

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- Behavior can be emotional or physical. It is not uncommon for trach/ventilator-dependent patients to experience some anxiety.
- Consider the level of anxiety:
  - Patient indicates concerns; highly motivated for treatment
  - Mild anxiety, but can be reassured
  - Moderate anxiety, difficulty transitioning through intervention; treatment is impacted
  - Severe anxiety, no treatment possible





# Candidacy for Speaking Valves

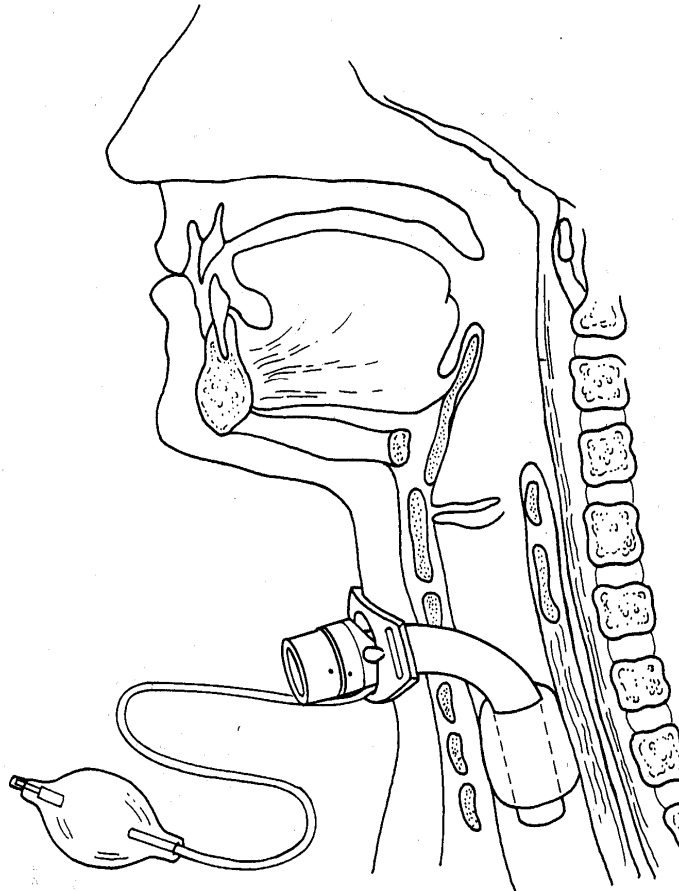
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1. Tolerance of cuff deflation
2. Proper size of the tracheostomy tube relative to the tracheal lumen
3. Acceptable baseline of respiratory status



# Cuffed Tracheostomy Tube

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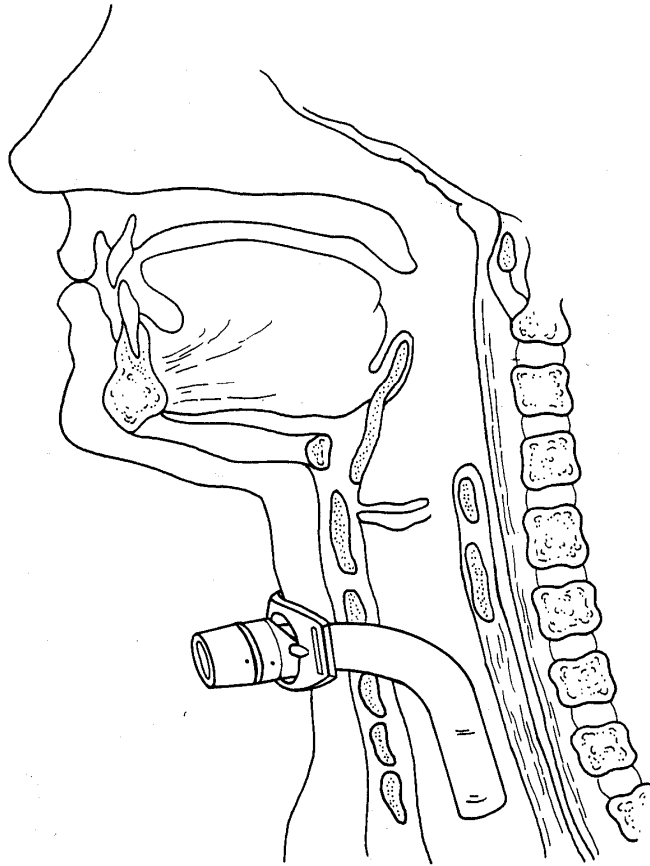
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# Cuffless Tracheostomy Tube

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# Candidacy for Speaking Valves

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## 1. Tolerance of Cuff Deflation

- Ventilator-dependent patients rely on having the cuff inflated to maintain settings on the ventilator
- A deflated cuff allows air to escape through the nose and mouth from the lungs
- A speaking valve should never be placed unless the cuff is fully deflated





# Candidacy for Speaking Valves

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## 2. Proper Size of Tracheostomy Tube

- Downsizing (decreased diameter) of the tube may be necessary to compensate for increased breathing effort when a speaking valve is placed
- Downsizing is a positive indicator for enhanced communication and swallowing function





# Candidacy for Speaking Valves

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## 3. Acceptable Baseline of Respiratory Status

- Pulse oximetry – determines the oxygen saturation of arterial hemoglobin; non-invasive
- Pulse oximetry values should be above 90% to reduce risk of hypoxemia
- A digital display provides information regarding oxygen saturation levels as well as the heart rate or pulse





# Contraindications for Speaking Valve

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- Severe tracheal/laryngeal stenosis
- Airway obstruction
- Inability to tolerate full cuff deflation
- End stage pulmonary disease
- Unstable pulmonary or medical status
- Anarthria
- Laryngectomy
- Severe anxiety and/or severe cognitive impairment





# Phases of Swallowing: A Review

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## ■ Normal Swallow: 3 Phases

1. Oral
2. Pharyngeal
3. Esophageal





# Phases of Swallowing: A Review

Cont'd

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## ■ Oral

- Tongue pushes bolus posteriorly
- Tongue tip and back of tongue are elevated; sides of tongue are touching the hard palate



# Phases of Swallowing: A Review Cont'd

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- **Pharyngeal** - Swallow reflex is triggered.
- Two major functions:
  1. **Protects Airway**
    - Velum moves back and the posterior pharyngeal wall moves forward – closes sinus/ velopharyngeal port (prevents bolus from entering the nose)
    - Epiglottis descends and muscles of upper airway close to protect airway (v.c. adduct & larynx moves anteriorly)

*This phase occurs within 1 second or less in a normal swallow*



# Phases of Swallowing: A Review Cont'd

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- **Pharyngeal** - Swallow reflex is triggered.
- Two major functions:
  2. **Movement of the bolus**
    - Peristaltic waves begin in the pharynx & propel the bolus into the esophagus (through cricopharyngeal sphincter)
    - Cricopharyngeal/ upper esophageal sphincter opens to allow bolus to pass into esophagus

*This phase occurs within 1 second or less in a normal swallow*



# Phases of Swallowing: A Review

Cont'd

- **Esophageal Phase (after food enters the esophagus)**
  1. Upper esophageal sphincter closes
  2. Peristaltic waves propel bolus down esophagus
  3. Lower esophageal sphincter opens
  4. Bolus is transferred into the stomach
  5. Lower esophageal sphincter closes – prevents reflux



# Effects of the Tracheostomy Tube on Swallowing and Risk of Aspiration

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- Decreased laryngeal elevation
- Decreased laryngeal sensitivity
- Latent glottal closure
- Decrease in subglottic pressure
- Over-inflation of the tracheostomy tube cuff on the esophagus
- Pressure of the tracheostomy cuff on the esophagus
- Vertical folds in the cuff (caused by increased cuff diameter and thickness)
- Mechanical ventilation





# Bedside Swallowing Evaluation

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- Collect case history data
- Oral Peripheral Examination
- Pulse Oximetry (before, during and after)
- Dye Test
  - a. Deflated/inflated cuff
  - b. Frequency of suctioning
  - c. Oral secretions only (no food or liquids)
  - d. Collaboration with interdisciplinary team



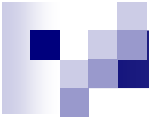


# Bedside Swallowing Assessment Data Worksheet

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- Vital Signs
- Oxygen Needs
- Trach Status
- Oral Secretions
- Tracheal Secretions
- Oral Motor Exam
- Nutritional Status
- Swallow Status
- Compensatory Strategies





# Information Tool: “Speaking Valve”

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- Used as an information tool to inform members of the interdisciplinary team of the patient’s tolerance for a speaking valve.



# Mechanical Ventilation



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# Mechanical Ventilation

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- Most commonly indicated as a result of respiratory failure
- Respiratory failure occurs as a result of a lack of adequate gas exchange within the lungs
- Failure of one or more of the following systems: central nervous, neuromuscular, musculoskeletal and cardio-pulmonary could result in respiratory failure



# Mechanical Ventilation

Cont'd

- Disorders of pulmonary gas exchange:
  1. The inability to eliminate carbon dioxide
    - Emphysema and chronic bronchitis are 2 kinds of lung disease that effect the elimination of carbon dioxide
  2. The inability to achieve adequate oxygenation
    - **Hypoxia** - inability to get adequate oxygenation to tissue
    - **Hypoxemia** - inability to get adequate oxygenation to the blood



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# Modes of Ventilation

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- **Full Ventilator Support (FVS)** – the mechanical ventilator does all the breathing for the patient
- **Controlled Mechanical Ventilation (CMV)** – is a formed sequence of the respiratory cycle (spinal cord injury)
- **Partial Ventilator Support (PVS)** – the labor of breathing is shared between the patient and the mechanical ventilator
- **Assist Control (AC)** – assists the patient's own spontaneous breathing efforts (respiratory muscle fatigue)





# Handouts

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1. Assessment Data Worksheet
2. Bedside Swallowing Step-by-Step
3. Speaking Valve
4. General Guidelines for Speaking Valve
5. Diagrams (Cuffed, Cuffless, Fenestrated)
6. Case Study
7. Speech-Language Pathology Goal Bank
8. Dysphagia Food Color Alternatives List
9. NeighborCare Medication List
10. Standard Abbreviations
11. Glossary





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