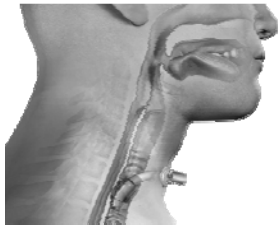


## TRACHEOSTOMY: PROCEDURES, TIMING AND TUBES



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### Objectives

- Explain how the timing of the tracheotomy and tube selection criteria plays a key role in successful use of speaking valves.
- List complications of improper cuff management.
- List how the tracheostomy tube and inflated cuff can impact swallowing and suggest ways to reduce clinical complications.

### Indications for Tracheostomy

- Prolonged mechanical ventilation
- Inability to perform trans-laryngeal intubation (trauma, max/fax deformity)
- Upper airway obstruction (temporary or permanent)
- Secretion management (neuromuscular disease)

### Reputed Benefits

- Improved patient comfort/less need for sedation
- Lower WOB/faster weaning from MV
- Improved safety
- Improved oral hygiene and oral intake
- Less long term laryngeal damage
- Lower VAP rates
- Lower mortality
- Reduced ICU and overall LOS
- Earlier ability to speak/ Improved participation

Durbin, C. Resp Care 2010;55(8):1056-1068

### WHEN: TIMING OF TRACHEOTOMY

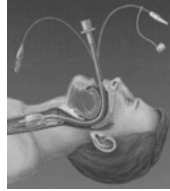
21 Days ?  
7-10 Days ?  
2-3 Days ?

Does timing affect outcomes ?  
What does the literature say ?

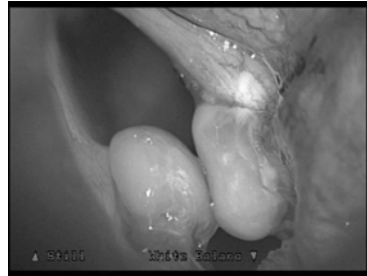
# Tracheostomy: Procedures, Timing and Tubes

## Endotracheal Tube Factors Cited To Contribute To Swallowing Impairment and Aspiration

- Mucosal injury to the oral pharynx and larynx
- Injury to the vocal folds which may be transient or permanent
- Tracheal edema, ulceration and stenosis



## Laryngeal Intubation Granuloma



Reproduced with permission from Houston Otolaryngology [www.ghorayeb.com](http://www.ghorayeb.com)

## HOW: TRACHEOTOMY PROCEDURES

Open or Surgical Tracheotomy  
Tried and True Method

Percutaneous Dilatation or Balloon Dilatation Tracheotomy  
Less costly and more convenient

Cricothyroidotomy  
As seen on ER Shows

Does the method of tracheotomy affect outcomes ?

## Percutaneous Tracheotomy



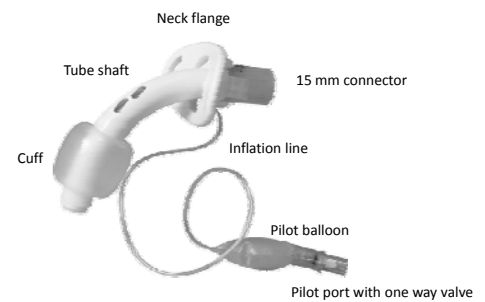
Permission for use granted by Cook Medical Incorporated, Bloomington, Indiana

## Cricothyroidotomy



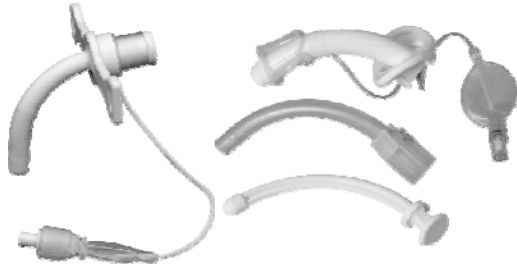
Permission for use granted by Smiths Medical

## Parts of a tracheostomy tube - ISO STANDARDS



## Tracheostomy Tubes

- Single Lumen/Cannula
- Double Lumen/Cannula



## Routine Tracheostomy Tube Changes

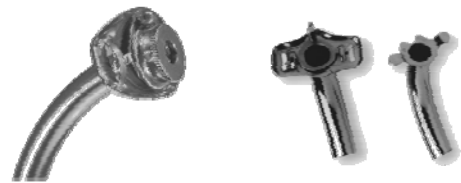
- After initial tracheostomy
  - Surgeon preference
- To assure stoma and tract established
- To reduce complication of granulation tissue
- For down-sizing
- Difficult airways and special considerations

## Types of Tubes

- MATERIALS
  - PVC, Silicone, Metal
  - Metal Reinforced
- SHAPE
  - Curved, Angular, Non-pre formed
- LENGTH
  - Standard
  - Extra length
    - Proximal
    - Distal
    - Adjustable Flange
- SINGLE LUMEN
- DOUBLE LUMEN
- FENESTRATED
- MRI COMPATIBLE
- Subglottic Suction
- Trach Talk
- CUFFS
  - Air, water, or foam
  - Double cuffed
  - Un-cuffed
- Custom Made

## Jackson Tracheostomy Tubes

- Improved Inner Cannula
- Original Style



## Jackson Metal Tracheostomy Tubes

- Original Style
- Improved
- Permanent 15mm Adapter



## PMV® 2020 (clear) With Jackson Improved



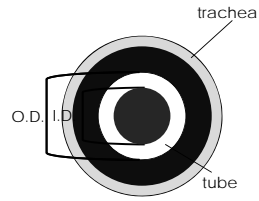
# Tracheostomy: Procedures, Timing and Tubes

## Calculating Tube Size

- ATS Consensus: The tracheostomy tube should take up no more than 2/3 the ID of the trachea.

(for pediatrics, no adult standard)

- AP Diameter of trachea
  - Male: 18 +/- 5mm
  - Female: 12 +/- 3 mm



## Fenestrated Tracheostomy Tube



Image used by permission from Nellcor Puritan Bennett LLC, Boulder, Colorado, doing business as Covidien

## Not all size 6 trachs are equal !!



### Size 6.0 Tracheostomy

	ID	OD	L
Portex	6.0	8.3	55.0



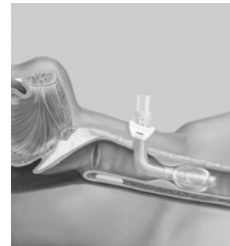
Bivona	6.0	8.8	70.0
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Shiley	6.4	10.8	74.0
SCT	6.0	8.3	67.0

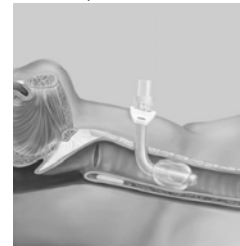
## Extra Length Tubes

distal



Tracheal Malacia or Stenosis

proximal



Increased skin-to-tracheal-wall distance

Image used by permission from Nellcor Puritan Bennett LLC, Boulder, Colorado, doing business as Covidien.

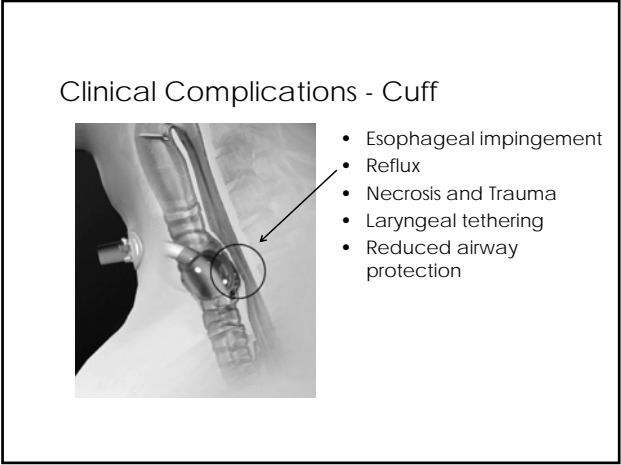
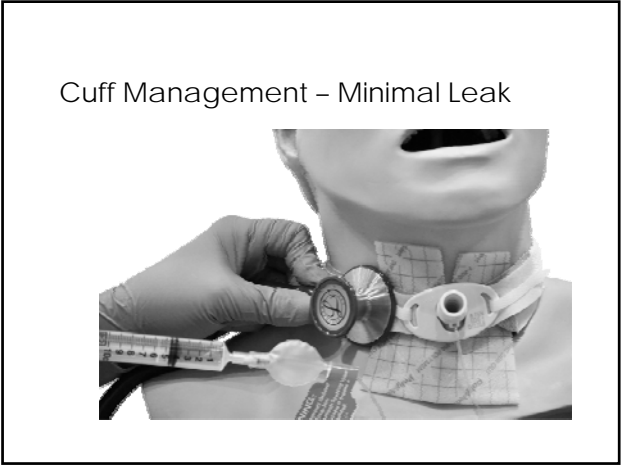
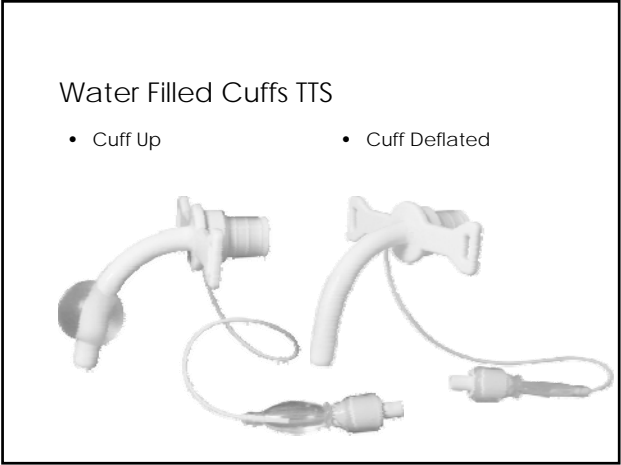
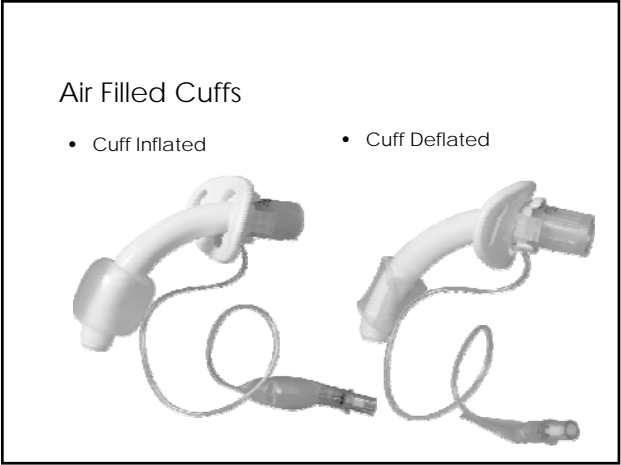
## Adjustable Flange Tube



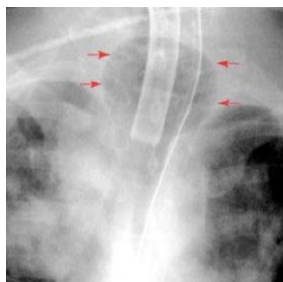
## Cuff Choices



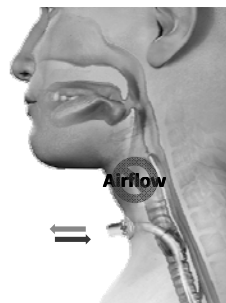
- AIR FILLED – minimal leak
- TTS™ : WATER FILLED – minimal occlusion (can be air filled)
- FOME-Cuf® – self sealing



## Cuff Over-Inflation



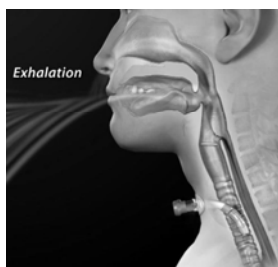
## Clinical Complications



- Reduced Airflow
  - Taste, Smell, Sensation
  - Voice
- Reduced Positive Airway Pressure
  - Physiologic PEEP
  - Cough
  - Valsalva
  - Swallow
- Late Complications
  - Granuloma-Stenosis
  - Tracheal Malacia
  - Fistulae

## Benefits of Passy-Muir® Valve

- Improved Voice/Speech
- Improved Smell & Taste
- Improved Swallow
- May Reduce Aspiration
- Improved Secretion Management
- Restored PEEP
- Improved Oxygenation
- Improved Quality of Life
- Expedites Weaning and Decannulation
- Cost Savings
- Shorter Lengths of Stay



## Airway Assessment

- How does tube size and type affect airway assessment?
  - Tube must be small enough for adequate airflow.
  - Cuff takes up space in the airway
  - Tube length may cause resistance to airflow
  - Foam cuff is absolute contraindication



## Routine and Emergency Procedures

- Suctioning
- Broncho-pulmonary Hygiene
- Oxygen and Humidity Therapy
- Trach Care/Stoma Care
- Inner Cannula Change Cleaning
- Oral Care
- Unplanned Decannulation
- Blocked Tube or Inner Cannula

## Decannulation Plan

- Begins at Intubation-What is the Plan ?
- Evaluation for Decannulation
  - Reason for tracheotomy has resolved
  - Medically stable
  - Patent upper airway
  - Tolerates speaking valve
  - Can manage oral and tracheal secretions
  - Tolerates capping/plugging
  - Risk of aspiration assessed

## Airway Management Team

- "Tracheostomy expertise must follow the patient wherever they go in the hospital." Hefner, John E.
- Team Approach
  - Timing and tube selection
  - When to downsize
  - Plan of care
    - Communication
    - Swallowing
  - Decannulation
  - Impacts continuity of care
  - Impacts safety, length of stay and costs



## Resources

- Hess DR. Tracheostomy tubes and related appliances. *Respir Care*. Apr 2005;50(4):497-510.
- Yaremchuk K. Regular tracheostomy tube changes to prevent formation of granulation tissue. *Laryngoscope*. Jan 2003;113(1):1-10.
- Epstein, S. Late Complications of Tracheostomy. *Respir Care*. Apr2005;50(4); 542-549.
- Johnson, et al. Tracheostomy Tube Changes. *Clinical Procedures* Jan 2010 (Medscape.com)

## Resources

- Cameron, T et al. Outcomes of patients with spinal cord injury before and after introduction of an interdisciplinary tracheostomy team. *Crit Care Resus* Mar 2009;11(1):14-19.
- Kamel KS et al. In vivo and In vitro morphology of the human trachea. *Clin Anat*, 22:571-79, 2009.
- Durbin, CG. Tracheostomy: Why, When and How? *Respir Care* Aug 2010; 55(8):1056-6
- Hefner, JH. Toward Leaner Tracheostomy Care: First Observe, Then Improve. *Respir Care*, 2009;50(12)

## Resources

- LeBlanc, et al. (2009) Outcome in Tracheostomized Patients with Severe TBI following Implementation of a Specialized Multidisciplinary Tracheostomy Team. Published in: *Journal of Head and Trauma Rehab*.
- Tobin A and Santamaria J (2008) An Intensivist-Led Tracheostomy Review Team is Associated with Shorter Decannulation Time and Length of Stay: A prospective cohort study. *Critical Care on-line* at: [www.medscape.com/viewarticle/575833](http://www.medscape.com/viewarticle/575833)

## Resources

- [www.Smiths-medical.com](http://www.Smiths-medical.com)
- [www.Cookmedical.com](http://www.Cookmedical.com)  
Cook Medical Inc., Bloomington, Indiana
- [www.Premusa.com](http://www.Premusa.com)  
Premier Medical, Inc.
- Shiley Tracheostomy Pocket Guide  
<http://respiratorysolutions.covidien.com/LinkClick.aspx?fileticket=AF0%2b2G%2bTVaU%3d&tabid=184>
- [www.hopkinsmedicine.org/tracheostomy/about](http://www.hopkinsmedicine.org/tracheostomy/about)

## Additional Educational Opportunities

- Self-study webinars available on demand
  - Getting Started
  - Ventilator Application
  - Swallowing
  - Pediatric
  - Special Populations
- Live group webinars
- [www.passy-muir.com](http://www.passy-muir.com)
- Passy-Muir Inc. is an approved provider of continuing education through ASHA, AARC, CMSA and California Board of Nursing Credit

## Receiving CEU's for this Course

- You will have 72 hours from the time this courses ends to complete the evaluation, which is required to receive credit.
  - Look in your email for a reminder link, or type this into your Internet browser's address bar:
    - [ep.passy-muir.com](http://ep.passy-muir.com)



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