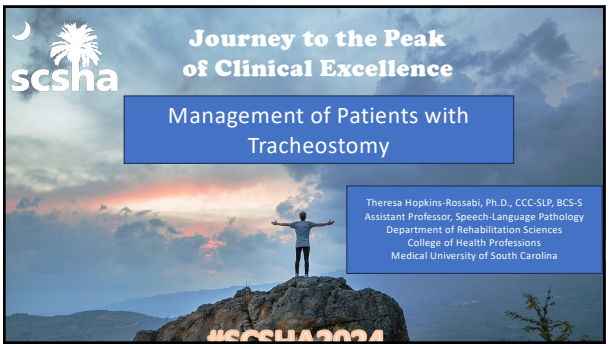


1

Disclosures

Salary from MUSC

2

Overview

- Anatomy and Physiology of a tracheostomy
- Implications for communication and swallowing
- Progression to decannulation

3

Diagnosis

- Obstruction, Edema
- Tumors - Surgery
- Infection
- Subglottic stenosis
- Manage secretions
- Trauma
- Wean off ventilator: decreased work of breathing (WOB) compared to the endotracheal tube

Davis et al. 1999

4

Anatomy and procedures

Tracheostomy

5

Anatomy

Normal airflow on inhalation or exhalation through the oral cavity or nasal passageways

Tracheostomy results in inhalation or exhalation through the tracheostomy and trach tube

Results in aphonia and reduction of cough

Pictures taken of purchased Tracheostomy Tom, https://www.passy-muir.com/education

6

Tracheostomy

Surgical incision

Percutaneous placement

7

Tracheostomy: Surgical Placement

NEJM.ORG

8

Tracheostomy – Percutaneous Placement

- The ability to hyperextend the neck
- No children under 12 years
- No patients with severe coagulopathies
- No patients with unidentifiable landmarks

Cheung et al.

9

10

Trach Tube

1 Pilot balloon

2 Cuff inflation line

3 Disposable inner cannula

4 Trach faceplate, flange

5 Inflated cuff

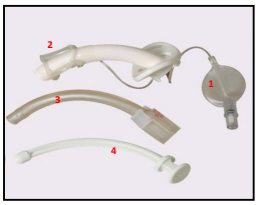
11

Trach Tube

Shiley
Cuffed
Size 6
DIC – Disposable InnerCannula

12

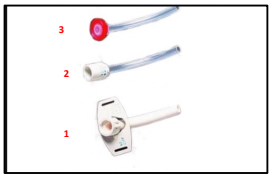
Trach Tube



- 1 Pilot balloon
- 2 Deflated cuff
- 3 Disposable inner cannula
- 4 Obturator

13

Trach Tube



- 1 Trach
- 2 Reusable inner cannula
- 3 Red cap

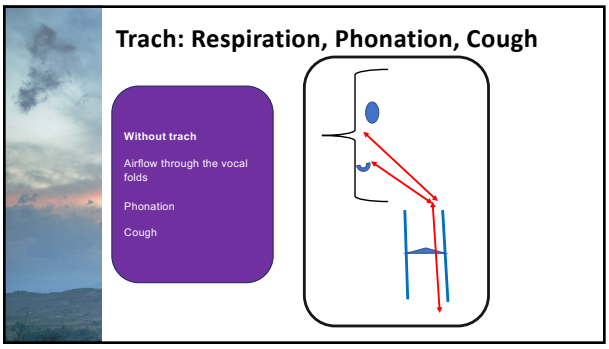
14

15

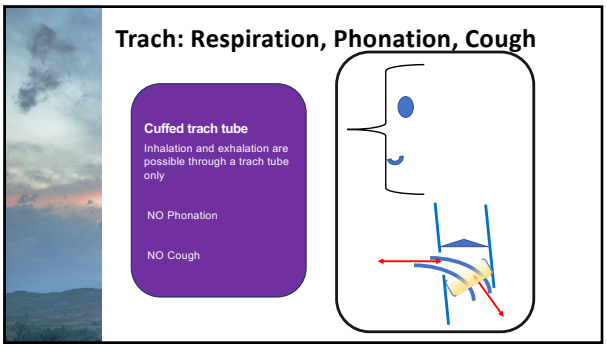
Trach: Respiration, Phonation, Cough

- Inhalation and exhalation through oral/nasal cavities and the vocal folds
- Phonation
- Cough

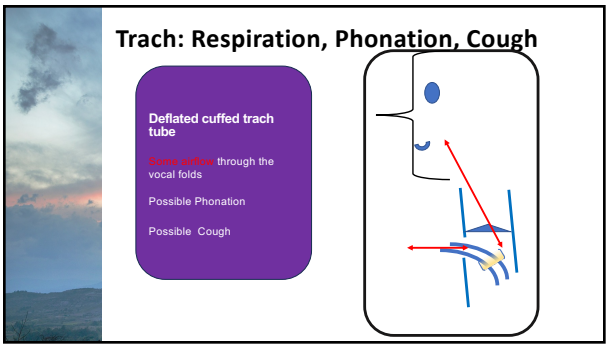
16


Trach: Respiration, Phonation, Cough
Without trach
Airflow through the vocal folds
Phonation
Cough

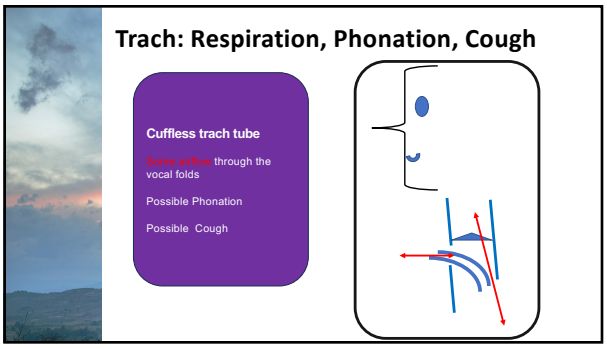
17


Trach: Respiration, Phonation, Cough
Cuffed trach tube
Inhalation and exhalation are possible through a trach tube only
NO Phonation
NO Cough

18


Trach: Respiration, Phonation, Cough
Deflated cuffed trach tube
Some airflow through the vocal folds
Possible Phonation
Possible Cough

19


Trach: Respiration, Phonation, Cough
Cuffless trach tube
Some airflow through the vocal folds
Possible Phonation
Possible Cough

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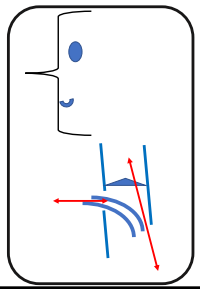
Trach: Respiration, Phonation, Cough

Speaking valve cuffless or deflated cuffed trach

Airflow through the vocal folds

Phonation on exhalation
Speaking valve in the closed position until the patient inhales
Closes at the end of the inspiratory cycle

Able to cough



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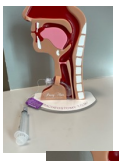
Cuffed vs Deflated cuff trach

22

Cuffed vs Deflated cuff trach

Cuff inflated

Inhalation and exhalation via trach tube

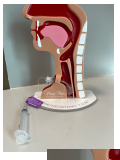
No exhalation passes thru the vocal folds

Voicing only if there is a leak between the inflated cuff and anatomical trachea

Inhalation and exhalation via trach tube

No exhalation passes thru the vocal folds

Voicing only if there is a leak between the inflated cuff and anatomical trachea




23

Cuffed vs Deflated cuff trach


Cuff deflated or no cuff

Inhalation and exhalation via trach tube or upper airway/trach

Exhalation can pass through vocal folds

Voicing possible

24

SLP Role: Speaking valves

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Tracheostomy

Trach placed to manage airway

Trach placed after extended ventilator support

26

Post-tracheostomy

- A cuffed trach is typically inserted
- The patient is medically stable and appropriate for speaking valve evaluation
- Typically wait 24-48 hours for speaking valve evaluation (patient status and facility)
- The patient must be able to tolerate cuff deflation

Receive MD order for speaking valve evaluation

27

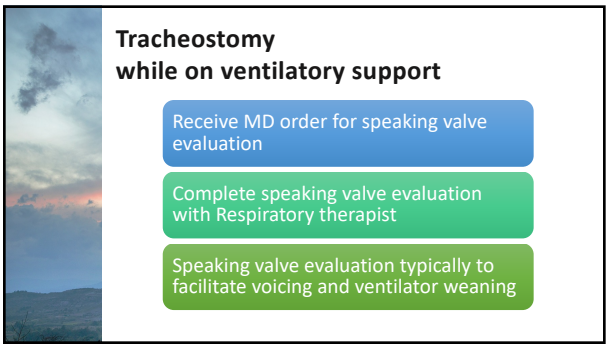
Tracheostomy after ventilatory support

Trach placed to wean off ventilator

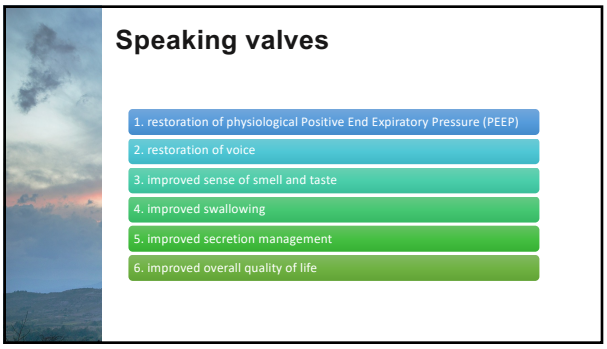
Tracheostomy typically completed after patient on ventilator 10-14 days and not able to wean

This timeline changed during COVID-19

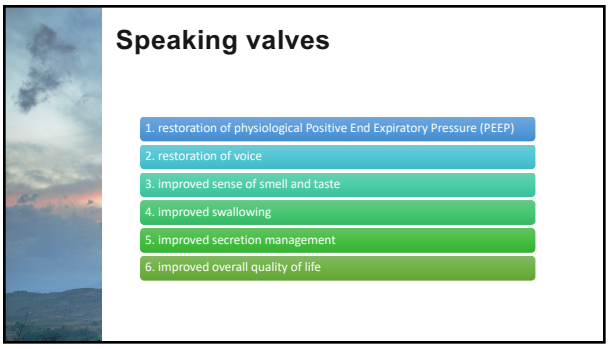
28


Tracheostomy
while on ventilatory support
Receive MD order for speaking valve evaluation
Complete speaking valve evaluation with Respiratory therapist
Speaking valve evaluation typically to facilitate voicing and ventilator weaning

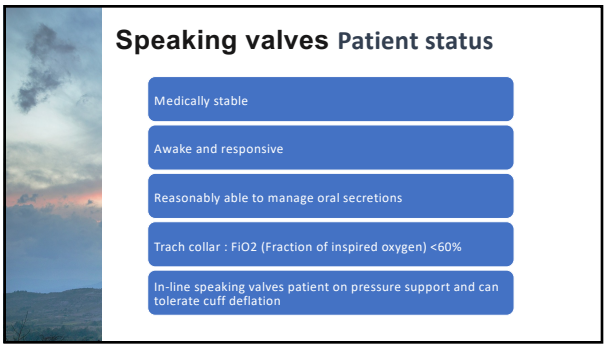
29


Speaking valves
1. restoration of physiological Positive End Expiratory Pressure (PEEP)
2. restoration of voice
3. improved sense of smell and taste
4. improved swallowing
5. improved secretion management
6. improved overall quality of life

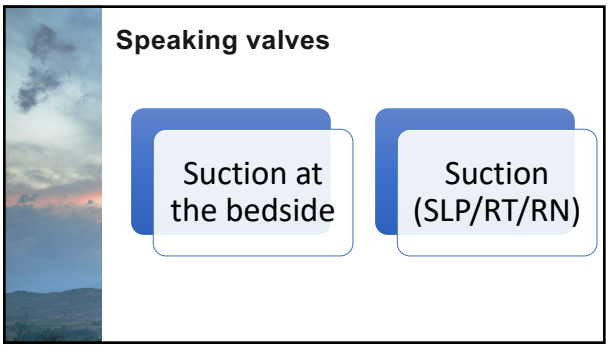
30


Speaking valves
1. restoration of physiological Positive End Expiratory Pressure (PEEP)
2. restoration of voice
3. improved sense of smell and taste
4. improved swallowing
5. improved secretion management
6. improved overall quality of life

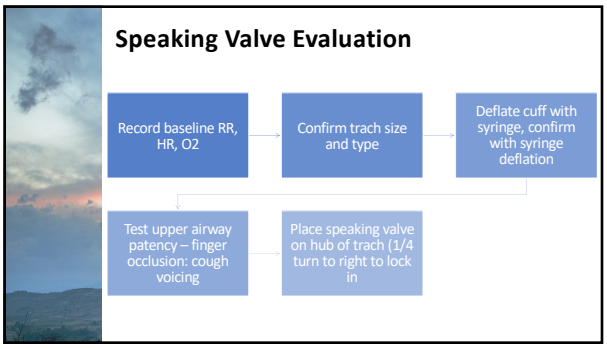
31


Speaking valves Patient status
Medically stable
Awake and responsive
Reasonably able to manage oral secretions
Trach collar : FiO2 (Fraction of inspired oxygen) <60%
In-line speaking valves patient on pressure support and can tolerate cuff deflation

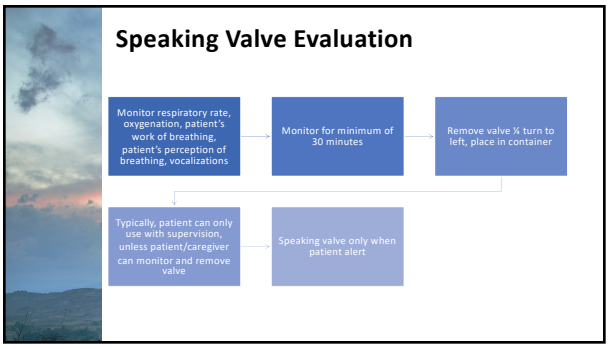
32


Speaking valves
Suction at the bedside
Suction (SLP/RT/RN)

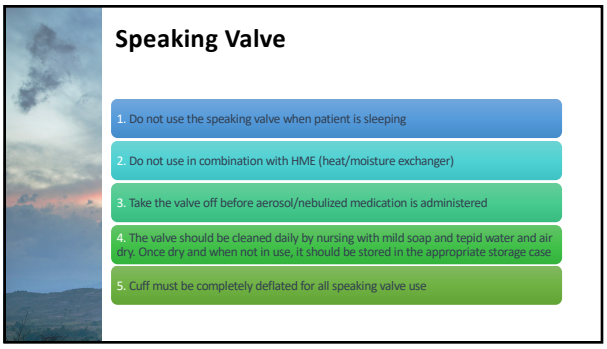
33


Speaking Valve Evaluation
Record baseline RR, HR, O2
Confirm trach size and type
Deflate cuff with syringe, confirm with syringe deflation
Test upper airway patency – finger occlusion: cough voicing
Place speaking valve on hub of trach (1/4 turn to right to lock in

34


Speaking Valve Evaluation
Monitor respiratory rate, oxygenation, patient's work of breathing, patient's perception of breathing, vocalizations
Monitor for minimum of 30 minutes
Remove valve ¼ turn to left, place in container
Typically, patient can only use with supervision, unless patient/caregiver can monitor and remove valve
Speaking valve only when patient alert

35


Speaking Valve
1. Do not use the speaking valve when patient is sleeping
2. Do not use in combination with HME (heat/moisture exchanger)
3. Take the valve off before aerosol/nebulized medication is administered
4. The valve should be cleaned daily by nursing with mild soap and tepid water and air dry. Once dry and when not in use, it should be stored in the appropriate storage case
5. Cuff must be completely deflated for all speaking valve use

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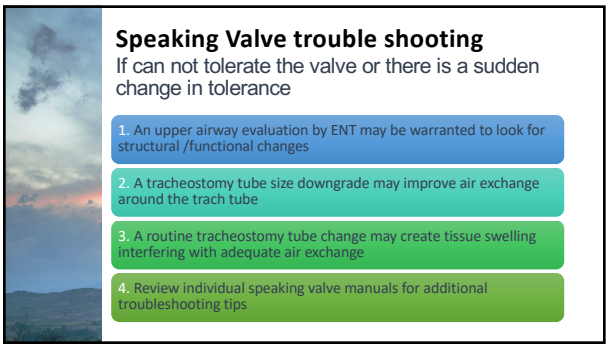
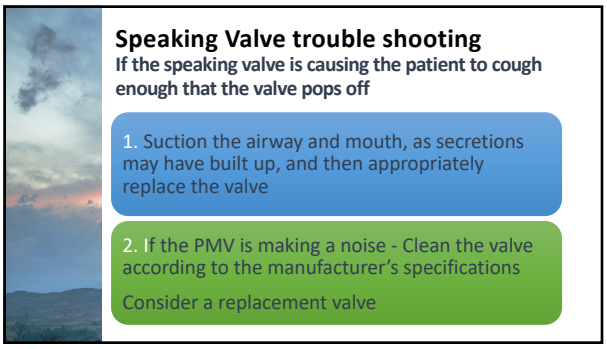

Speaking Valve trouble shooting
If can not tolerate the valve or there is a sudden change in tolerance
1. An upper airway evaluation by ENT may be warranted to look for structural /functional changes
2. A tracheostomy tube size downgrade may improve air exchange around the trach tube
3. A routine tracheostomy tube change may create tissue swelling interfering with adequate air exchange
4. Review individual speaking valve manuals for additional troubleshooting tips

37


Speaking Valve trouble shooting
If the speaking valve is causing the patient to cough enough that the valve pops off
1. Suction the airway and mouth, as secretions may have built up, and then appropriately replace the valve
2. If the PMV is making a noise - Clean the valve according to the manufacturer's specifications
Consider a replacement valve

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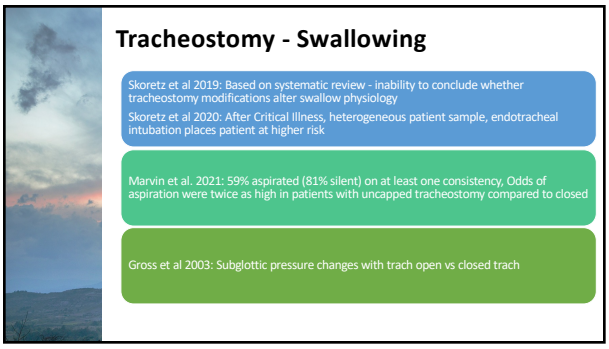
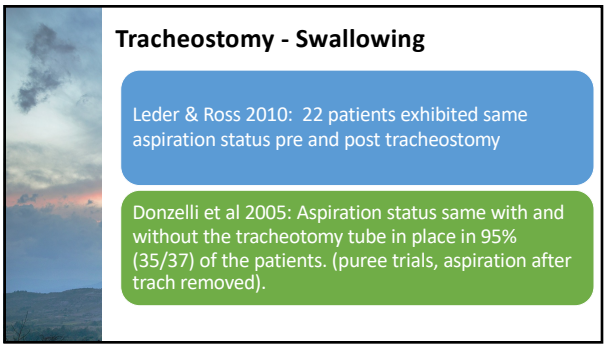

Tracheostomy - Swallowing
Skoretz et al 2019: Based on systematic review - inability to conclude whether tracheostomy modifications alter swallow physiology
Skoretz et al 2020: After Critical Illness, heterogeneous patient sample, endotracheal intubation places patient at higher risk
Marvin et al. 2021: 59% aspirated (81% silent) on at least one consistency, Odds of aspiration were twice as high in patients with uncapped tracheostomy compared to closed
Gross et al 2003: Subglottic pressure changes with trach open vs closed trach

39


Tracheostomy - Swallowing
Leder & Ross 2010: 22 patients exhibited same aspiration status pre and post tracheostomy
Donzelli et al 2005: Aspiration status same with and without the tracheotomy tube in place in 95% (35/37) of the patients. (puree trials, aspiration after trach removed).

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Tracheostomy - Swallowing

- Speaking valve facilitates smell and taste
- Improved cough therefore improved protection
- Instrumental swallow evaluation with speaking valve on and off
- Typically recommend speaking valve in place for all meals
- Patients can eat/drink without speaking valve if specific situations, recommend instrumental swallow evaluation

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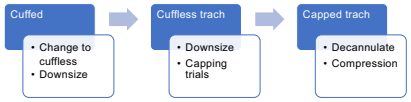
Decannulation - Trach teams



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Trach Team

- Physician – Intensivist/Pulmonologist
- Respiratory Therapist
- RN – Clinical Specialist
- Speech Pathologist
- Physicians Assistant – trauma/ICU
- Case manager
- Nurse

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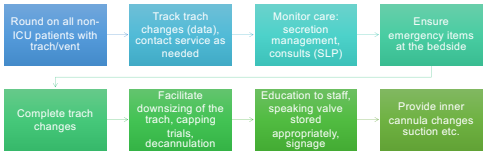
Trach Team



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Progression to Trach Removal

- Dependent on hospital and service :
- First trach change from cuffed to cuffless by the service that placed the trach
- ENT: 5-7 days for mature trach
- Surgery: 10-14 days for mature trach
- Change to cuffless when 5 days off the vent
- Size 8 to 6 to 4
- Capping trials on cuffless size 6 or 4
- De-cannulation (Compression bandage)

45

Bedside

- Suction
- Ambu bag
- Replacement trachs
  - Current size and type
  - One size smaller
  - Obturator

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Wake Medical Center 2013-2014 ENT and Surgery

	ENT patients	Surgery Patients
Total	48	25
Trach to 1st change	11.97	20.44
Vent DC to 1st change	7.78	11.44
Trach to DC	24.17	38.61
Trach to Decannulation	28.29	39.75
% Decannulated	31%	24%
LOS	33.11	48.75

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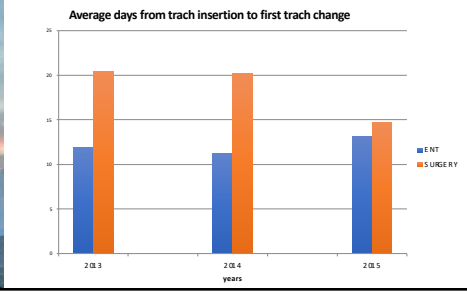
Wake Medical Center 2013-2014



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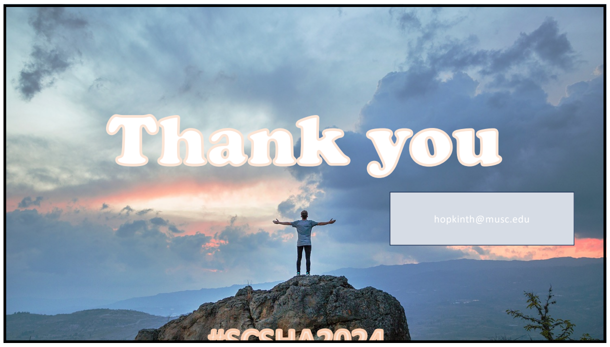

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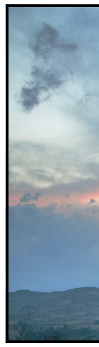

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1. Cheung, N., Napolitano, L., Tracheostomy: Epidemiology, Indications, Timing, Technique, and Outcomes, *Respiratory Care* Jun 2014, 59 (6) 895-919; **DOI:** 10.4187/respcare.02971
2. DAVIS et al. WOD World of DATA
3. Donzelli, J., Brady, S., Wesling, M., & Theisen, M. (2005). Effects of the removal of the tracheotomy tube on swallowing during the fiberoptic endoscopic exam of the swallow (FEES). *Dysphagia*, *20*, 283-289.
4. Gross, R. D., Mahlmann, J., & Grayhack, J. P. (2003). Physiologic effects of open and closed tracheostomy tubes on the pharyngeal swallow. *Annals of Otology, Rhinology & Laryngology*, *112*(2), 143-152.
5. Leder, S. B., & Ross, D. A. (2010). Confirmation of no causal relationship between tracheotomy and aspiration status: a direct replication study. *Dysphagia*, *25*, 35-39.
6. Marvin, S., & Thibeault, S. L. (2021). Predictors of aspiration and silent aspiration in patients with new tracheostomy. *American Journal of Speech-Language Pathology*, *30*(6), 2554-2560.
7. Skoretz, S. A., Anger, N., Wellman, L., Takai, O., & Empey, A. (2020). A systematic review of tracheostomy modifications and swallowing in adults. *Dysphagia*, *35*, 935-947.
8. Skoretz, S. A., Riopelle, S. J., Wellman, L., & Dawson, C. (2020). Investigating swallowing and tracheostomy following critical illness: a scoping review. *Critical care medicine*, *48*(2), e141-e151.

- Nora H Cheung, Lena M Napolitano Respiratory Care Jun 2014, 59 (6) 895-919; **DOI:** 10.4187/respcare.02971

Images:

Alamy.com (n.d.) Upper Airway High Resolution. Retrieved January 26, 2024 from https://c8.alamy.com/comp/ADW4K7/anatomy-of-upper-airway-ADW4K7.jpg

Nejm.org (n.d.) Tracheosomy. Retrieved January 26, 2024 from https://www.nejm.org/na101/home/literatum/publisher/mms/journals/content/nejm/2020/nejm_2020.383.issue-20/nejmvcm2014884/20201106/images/img_medium/nejmvcm2014884_f1.jpeg

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