Early Intervention in the Critically Ill Patient: What does Speech Therapy have to do with this?

Mindy McCumber, MCD, CCC-SLP
Objectives

- Understand the multiple functions of the aerodigestive tract
- Identify factors that negatively impact communication and swallowing
- Identify the impact of impaired swallowing, phonation, and communication on the pt’s hospital course and outcome
- Review benefits of the use of a speaking valve for more than just allowing a pt to communicate
- Identify pt candidacy for speaking valves
- Review of assessment and treatment for speaking valves and the critically ill pt
The upper Aerodigestive Tract

- Oral cavity
- Sinuses
- Pharynx
- Larynx
- Trachea
- Esophagus
The Larynx

- Nasal cavity
- Mouth
- Epiglottis
- Supraglottis
- Cartilage (vocal cords are behind cartilage)
- Glottis
- Subglottis
- Trachea
- Esophagus
- Vocal cords
- Thyroid cartilage
- Ventricular fold (false vocal cord)
- True vocal cord
- Tracheal cartilages
Roles of the Upper Aerodigestive Tract

- Multifunctional
  - Breathing
  - Airway protection
  - Phonation
  - Swallowing
- Closely related
- Not mutually exclusive
Swallowing

- Bolus of food
- Epiglottis up
- Esophageal sphincter contracted
- Esophageal sphincter relaxed
- Glottis up and closed
- Epiglottis down
- Glottis open and relaxed
- Esophageal sphincter contracted
- Stomach

To lungs
To stomach

Relaxed muscles
Contracted muscles
Relaxed muscles
Swallowing and Breathing

- A period of apnea is sustained during the swallow
- Exhale-hold breath/swallow-exhale
- Aspiration further complicates/exacerbates pulmonary disorders
Breathing and Phonation

breathing in
chest expands
ribs
diaphragm expands
diaphragm contracts
breathing out
chest contracts
lung
diaphragm relaxes

Tongue
Vocal cord
Epiglottis
Pyriform fossa
Vestibular fold
Trachea
Esophagus
Factors that Impact Communication and Swallowing

- Neuromyopathy and neuromuscular weakness
  - Peripheral muscular disorder/polyneuromyopathy
  - Disuse atrophy

- Altered Sensorium
  - Delirium
    - Underlying critical illness
    - Medications/Sedation
      - Central nervous system side effects:
        - Decreased level of arousal
        - Suppression of brainstem swallowing regulation
        - Movement disorders
      - Peripheral nervous system side effects:
        - Neuromuscular junction blockade
        - Myopathy
        - Oropharyngeal sensory impairments
        - Disturbance of saliva

- Dyssynchronous breathing/swallowing
  - Increased risk of aspiration
  - Poor volume and reduced intelligibility
Oropharyngeal and Laryngeal Trauma from Intubation

- Damage to the laryngeal structures
- High incidence for post-extubation dysphagia
- Labial, lingual, and/or dental injuries
Postoperative Dysphagia and Dysphonia

- Surgeries involving structures of the neck
  - Carotid Endarterectomy
  - Cervical fusion
- Posterior fossa and skull base surgeries
- Stroke
- Cardiothoracic surgeries
  - Lung/Heart transplantation
  - Lobectomy
  - CABG, AVR, MVR
Tracheostomy

- System now open: leak under the vocal cords
- Sensory Deprivation
- Reduced tone
- Loss of Subglottic pressure in an open system
  - The pressure that is present in the trachea below a closed glottis
  - Loss of physiological PEEP
Subglottic Air Pressure and PEEP

- Provides internal pressure support for:
  - Phonation, Swallowing mechanics, coughing, and secretion management
  - Posture/Balance
  - Valsalva Maneuver
  - Upper extremity/force
  - Physiological PEEP and appropriate lung volumes
Doesn’t an inflated cuff prevent aspiration?

- NO: Aspiration occurs at the level of the vocal cords
- Cuffs do not form a complete seal against the tracheal wall
- Swallow physiology is impaired with an inflated cuff:
  - Reduced laryngeal elevation
  - Impaired reflex timeliness
- Aspiration with the cuff inflated is more likely than with the cuff deflated
  - Safer, then, to feed a pt with a DEFLATED cuff
Impact of Impaired Swallowing and Phonation/Communication

- Lack of participation and decision making in their own care and limited personal interaction
  - Motivation
  - Misunderstandings
  - Increased anxiety and/or delirium

- Over-medication and sedation
  - Increased delirium
  - Reduced mobility and positioning
  - Increased risk for aspiration/complications from aspiration
    - CNS/PNS depression
    - Altered swallowing mechanics and management of own secretions
    - Reduced cough
    - Disuse atrophy
  - Nutritional compromises: parenteral vs. enteral feedings and use of gut
  - Increased risk of reflux
  - Dependent oral care

- REDUCED WEANING FROM VENTILATION and reduced patient outcomes
What are the benefits of a “speaking” valve?

- “Speaking” valve use: safe On or Off the vent
- **Physiological benefits:**
  - Biased to closed position (Passy-Muir Valve)
    - Traps pressurized column of air in trach tube
    - Closes the system
    - Allows restoration of airflow through the vocal folds
    - Restores subglottic pressure, and therefore, “Natural” PEEP
Speaking Valves

Passy-Muir Valves

Shiley Valve
Speaking Valves

Montgomery

Tracoe
What are the benefits of the use of a “Speaking” Valve?

- **Clinical**
  - **Restores:**
    - Communication of wants/needs
      - Participation in care and therapy
      - Improve patient cognitive and physiological status
      - Reduce delirium and anxiety
    - **Laryngeal/pharyngeal sensation and tone**
      - Improve swallowing for secretion management and PO intake
      - Reduces tracheal secretions and need for suctioning
      - Allows for coughing and clearance of material in the airway
    - **Physiological PEEP**
      - Reduce atelectasis, improve weaning:
        - Improves oxygenation saturations and reduces ventilator support
        - Combo of trach collar/PMV off vent has demonstrated faster weaning times vs. straight trach collar
      - Improve balance/support for sitting/dangling/ambulation
      - Improve upper extremity force
      - Improve bowel/bladder emptying
So who would be a candidate?

**Speaking valve candidacy and patient selection**

- Cognitive status/Anxiety level
- Medical/Pulmonary status and lung compliance
  - On or off vent
  - **Ventilator criteria:**
    - PEEP <10
    - PIP <40
    - FiO2 <60%
    - PS <40
- Able to tolerate cuff deflation
- Amount/consistency of secretions and management
- Airway patency
  - Off vent: Determined by finger occlusion trials to trach hub
  - On vent: Determined by significant reduction of exhaled Tidal Volume and (possibly) the Peak Inspiratory Pressure upon cuff deflation
Contraindications and prevention of hypoventilation and Barotrauma

- Severe COPD/poor lung compliance
- Poor airway patency and/or toleration of cuff deflation
- Monitor vitals and any pt c/o
Is the patient “too sick” for a Speech/Swallow Therapy consult?

- Benefits of early intervention:
  - Activation of the larynx, pharynx, and oral cavity for facilitation of rehabilitation for functional movement
  - Cortical/Neural reorganization, blood flow changes, peripheral muscle changes
  - Rest does nothing and may exacerbate symptoms
    - “Vicious Cycles”
So, when do we initiate evaluation & treatment?

Considerations regarding Evaluation:
- Trach: On or off vent?
  - With or without cuff deflation?
  - With or without PMV?
- Clinical Assessment vs. Instrumental Assessment

Pt example: Patient A
- PMV, off vent
- Unable to tolerate full PO, trials of puree with ST only with strict use of swallow protocol

Pt example: Patient B
- No PMV, cuff inflated, on vent
- Able to tolerate a regular consistency diet
Therapy

- ST/RT collaboration
- Co-treating with PT/OT

Focus/Activities
- Pt/caregiver training
- Improve toleration
- Coordination of exhalation/voicing
- Typical Speech/Language/Cognitive Tx
- Resistive Breathing training/Expiratory Muscle Strength Training or other breathing ex’s
- Oral motor ex’s
  - Lingual resistance
- Laryngeal elevation ex’s
- Oral sensory stimulation
- Use of PMV to enhance swallowing tx
References

- Bonnie Martin-Harris, Ph.D. (2006) Coordination of respiration and swallowing. GI Motility online. doi:10.1038/gimo10/2006.05.016
References


References