Swallowing and Breathing ~ Sharing a Common Connection

Doreen Kelly Izaguirre, MA, CCC-SLP
Manager, Internal Staff Development ~ RIC Academy
Speech-Language Pathologist, Spinal Cord Injury Program
June 2011
Rehabilitation Institute of Chicago
Upon completion of this course, participants will be able to:

1. Describe normal and disordered **swallowing function**
2. State the role and importance of **upper airway airflow** for swallowing function
3. Discuss the relationship between **breathing** and **swallowing**
4. Describe how to use the **relationships** between the respiratory and digestive systems to improve swallowing function
The Swallow Evaluation

- dysphagia is a major cause of morbidity, mortality and costly disability
- proper assessment is critical
- typical choices in the medical setting
  - CSE, FSS, FEES
- must choose the best examination for our patients under the existing constraints of our setting
- swallow eval of the future must include a closer look at breathing
Cranial Nerves

- CN V: Trigeminal
- CN VII: Facial
- CN IX: Glossopharyngeal
- CN X: Vagus
- CN XI: *Spinal Accessory
- CN XII: Hypoglossal
Phases of Swallowing

- anticipatory phase
- oral preparation phase
- oral phase (<1 second)
- pharyngeal phase (<1 second)
- esophageal phase (8-20 seconds)

- These phases are very fluid and recent research “highlights the artificiality of separating the swallowing continuum into isolated phases”.
  - (B. Martin-Harris)
Common Etiologies of Dysphagia

- stroke
- traumatic brain injury
- other neuromuscular disorders and disease
  - Parkinson’s disease
  - Multiple Sclerosis
  - Myasthenia Gravis
  - Amyotrophic Lateral Sclerosis
- head and neck tumors
Common Etiologies of Dysphagia

- generalized weakness secondary to cardiovascular procedures, other surgery or severe metabolic disorders
- spinal cord injury
- tracheostomy tube / mechanical ventilation
- idiopathic
- iatrogenic
Exhale-Swallow-Exhale is the preferred pattern for healthy adults
Normal vs. Diseased States

- What can disrupt the coordinated pattern?
- Can swallow-respiratory discoordination increase aspiration risk?
- What do we know about swallow-respiratory coordination of the disordered groups?
  - Parkinson’s disease
  - COPD
  - Cancer
  - Sleep apnea
  - Trach / Vent
  - Aging swallow
Are We Inextricably Linked?

- Do lung volumes play a role?
- What do we understand about the subglottis?
- What about pressure?
- What do we know about the timing of the swallow in the respiratory cycle?
- How about those lung-thoracic unit recoil forces?
All Things to Consider
High Risk for Aspiration

- reduced arousal / alertness
- reduced responsiveness to stimulation
- absent swallow response
- absent productive cough
- difficulty handling secretions
- significant reduction in ROM and strength of oral motor and laryngeal movements
- ? decreased swallow-respiratory coordination
Clinical Signs of Aspiration

- coughing / choking
- throat clearing
- wet “gurgly” vocal quality
- chest heaving / increased respiratory rate
- other signs of distress
- elevated temperature
- acoustic changes in the lung fields
Severe Respiratory Distress

- diaphoresis and nasal flaring
- heightened sternomastoid activity
- recession in suprasternal and supraclavicular spaces
- tachypnea over the course of a minute
- intercostal space recession
- paradoxical motion of the abdomen
- tachycardia
“The Blue Dye Test”

- blue dye placed on patient’s tongue at preset intervals
- patients secretions monitored for presence of blue dye upon suction
- presence of blue dye in secretions indicates aspiration of patients own secretions

**advantages**
- no food or liquid presented
- non-invasive and requires no special equipment
- can serve as a “screening” for determining if some patients are appropriate for more formal swallow evaluation

**disadvantages**
- does not allow for assessment of the effects of consistency
- does not indicate the cause of aspiration
“Modified Evan's Blue Dye Test (MEBDT)”

- food and/or liquids are dyed blue
- patient’s secretions monitored for presence of blue dye upon suctioning

**advantages**
- allows for assessment of consistency (thick vs. thin, etc.)
- allows for assessment with one-way speaking valve

**disadvantages**
- validity has been questioned in the research
- may not identify aspiration that occurs later due to pharyngeal residue
- if more than one consistency is presented, there is no way of determining which consistency was aspirated

- What are the other options?
2 critically ill patients with sepsis received enteral feedings with blue dye no. 1

- Skin and serum turned green / blue
- patients died of refractory hypotension and acidosis
- FD&C Blue No. 1 and related dyes have a toxic effects on mitochondria, suggesting that dye absorptions is harmful
- recommend judicious use of food dye in patients with sepsis


Why Fluoroscopic?

- measures speed of swallow
- measures efficiency of swallow
- defines movement patterns
- determines if penetration or aspiration occurs
  - when, why, how much
- examines effectiveness of treatment
FSS

- examination of treatment strategies by X-ray can impact diet and recovery from dysphagia
- ~83% of patients receiving a FSS may receive changes in at least 1 of 5 important clinical variables
  - referrals to other specialists
  - swallow therapy
  - compensatory strategies
  - change in mode of nutritional intake
  - diet

Fluoroscopic Swallow Study Images
Vent Swallowing and Breathing

- sharing of system
- changes in timing of airway closure
- discoordinated pattern of swallowing and breathing
- disruption of normal apneic interval
- reduced secretion and saliva management
- reduced respiratory defenses
Aspiration

- Langmore and colleagues found that while dysphagia and aspiration are important risk factors for aspiration pneumonia, they are insufficient to cause pneumonia unless other factors are present. Predictive risk factors for included dependency for feeding and oral care, number of decayed teeth, tube feeding, more than one medical diagnosis, number of medications and smoking.

Predictors of Aspiration Pneumonia

- cross-sectional retrospective analysis of nursing home residents
- N = 102,824
- 18 significant predictors of aspiration pneumonia from strongest to weakest

Predictors of Aspiration Pneumonia

- suctioning use
- COPD
- CHF
- presence of tube feeding
- bedfast
- high case mix index
- delirium
- weight loss
- swallowing problems
- mechanically altered diet

- UTI
- dependence for eating
- bed mobility
- locomotion
- number of medications
- age
- stroke
- tracheostomy care
individuals with tracheostomy and receiving mechanical ventilation are among the most ill and medically complex patients prone to aspiration critical to regularly assess these patient in multiple scenarios no single scenario works for all patients every patient is unique
Trach / Vent Population

- flaw in the literature – no pre-trach data
- very complicated subjects that confound the data
- some studies have shown that 67% of vent patients do NOT aspirate
- yet of the 33% that do aspirate, in 82% of those patients – the aspiration is SILENT
Course Objectives

Upon completion of this course, participants will be able to:

1. Describe normal and disordered **swallowing function**
2. State the role and importance of **upper airway airflow** for swallowing function
3. Discuss the relationship between **breathing** and **swallowing**
4. Describe how to use the **relationships** between the respiratory and digestive systems to improve swallowing function
Acknowledgements

Thank you to the Respiratory Team at RIC and to John Parson, RRT, Manager of Respiratory Care Department, Northwestern Memorial Hospital / Rehabilitation Institute of Chicago
Contact Information

Doreen Kelly Izaguirre, MA, CC-SLP
Rehabilitation Institute of Chicago
345 East Superior Street, Suite 1649
Chicago, IL 60611
312.238.6111
dizaguirre@ric.org

Coyle JA. Ventilation, Respiration, Pulmonary Disease and Swallowing. Perspectives.


Gross RD. *Subglottic Air Pressure and Swallowing*. Perspectives.


- Leder SB. Aspiration following use of one-way tracheostomy speaking valve in previously aspirating patients. *ASHA Leader* 1998;3:133.


Research / References

All Rights Reserved

No part of this presentation may be reproduced, stored in a retrieval system or transmitted in any form or by any means (electronic, mechanical, photocopying, recording, or otherwise) without prior written permission from the Rehabilitation Institute of Chicago.