Head and Neck Cancer: Part 1
Framework for Dysphagia Management

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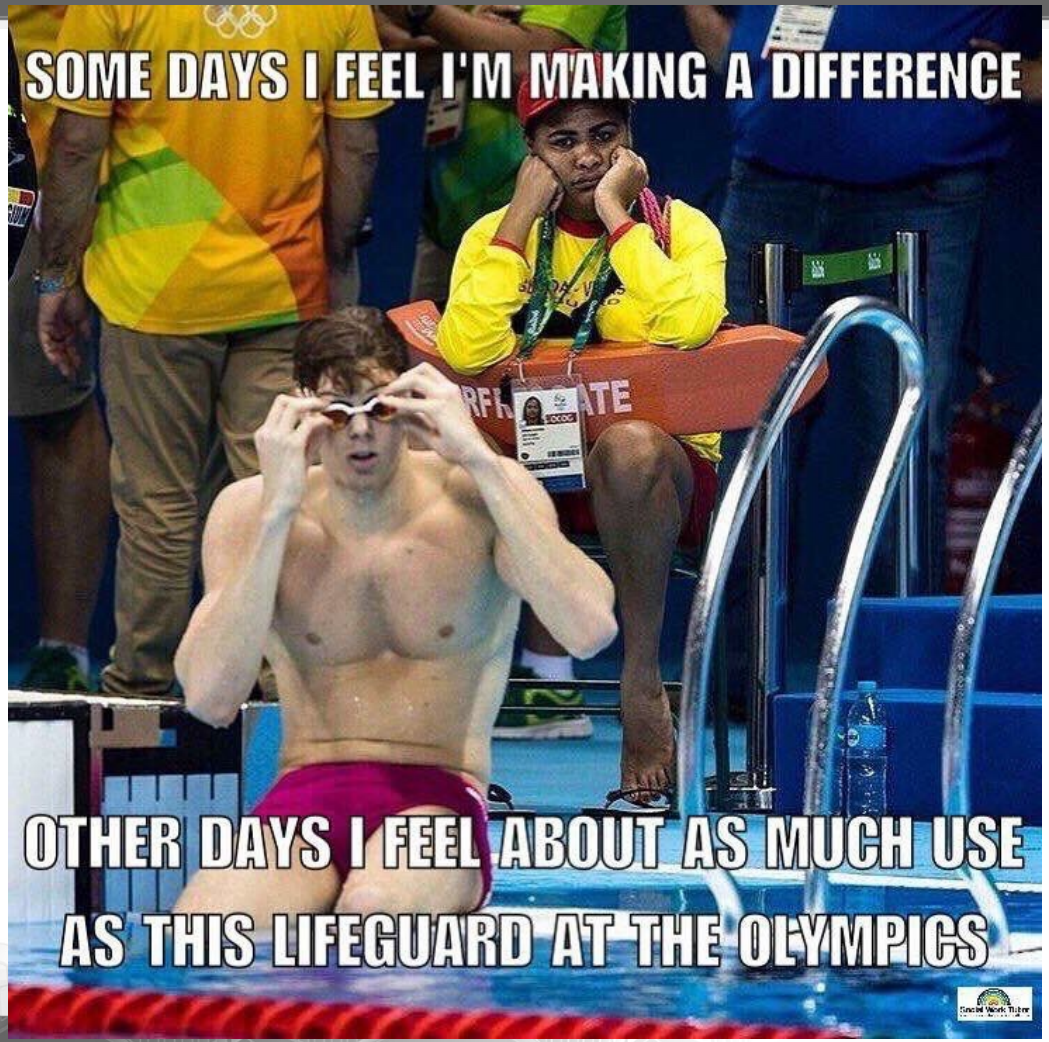
The Ohio State University
Wexner Medical Center



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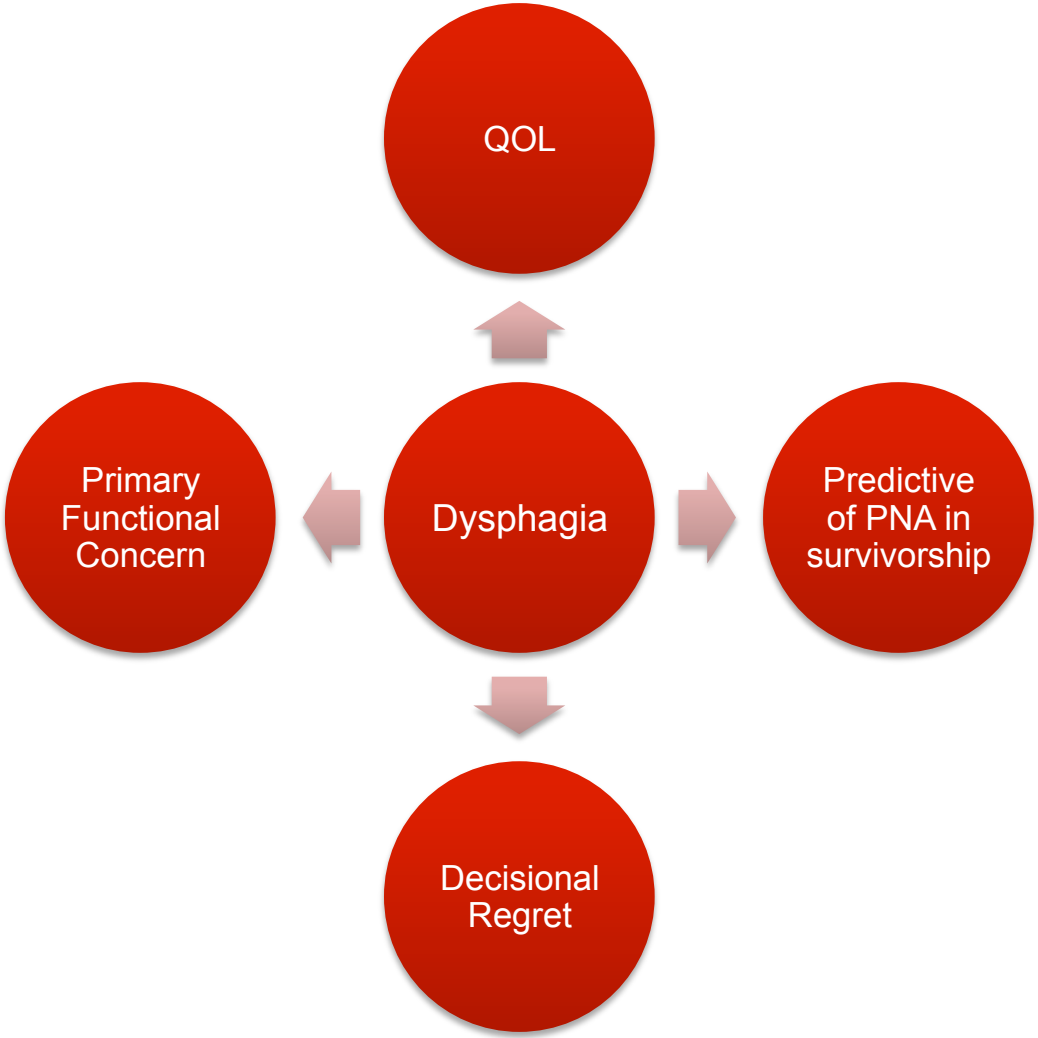
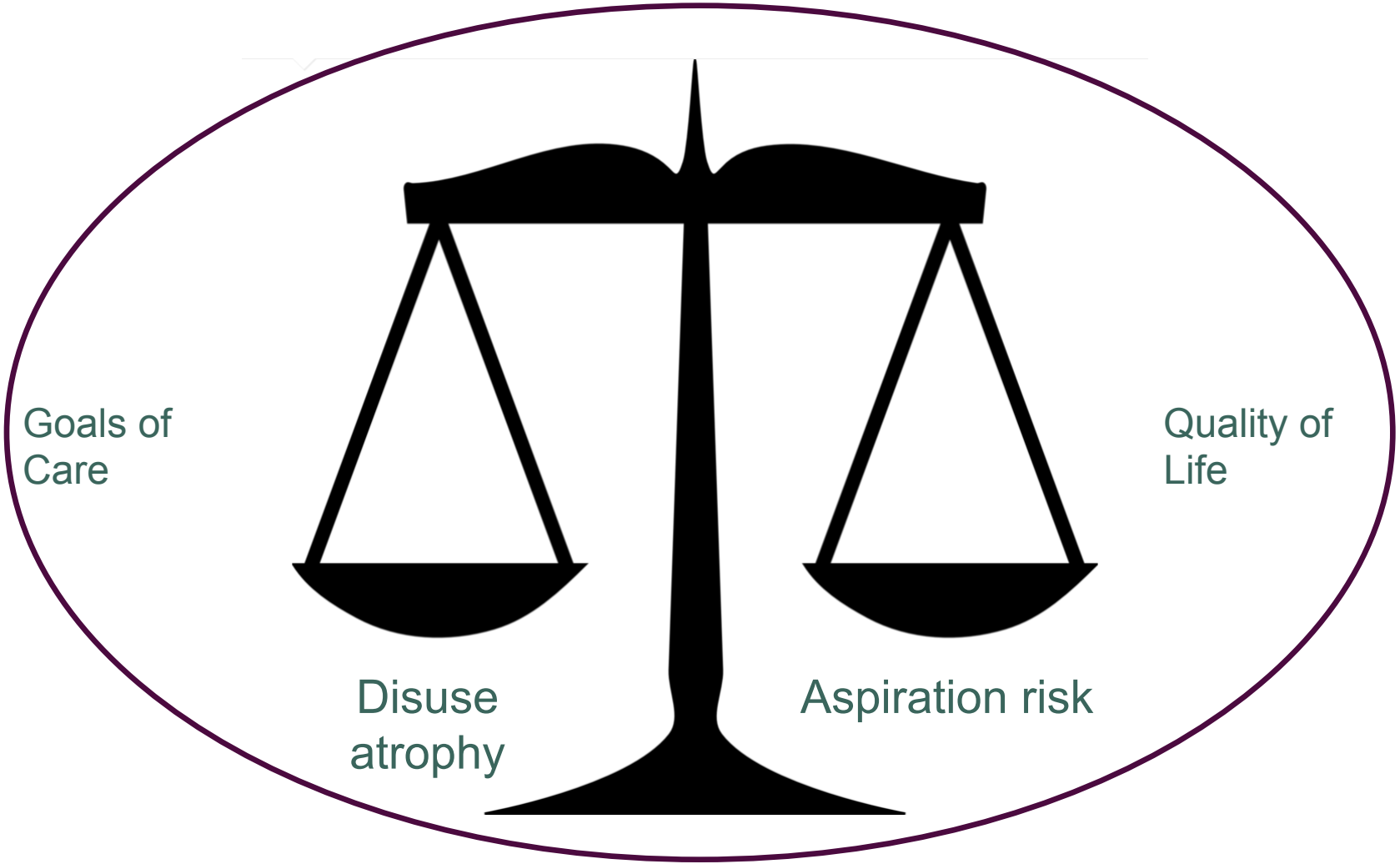
Importance of Dysphagia


QOL
Primary Functional Concern
Dysphagia
Predictive of PNA in survivorship
Decisional Regret


Goals of Care
Quality of Life
Disuse atrophy
Aspiration risk

What's Your Value? Acute Care Wants to Know

When hospital administrators look to cut costs, everything is on the table. SLPs can protect themselves by bolstering efficiency and proving their value.

Nancy B. Swigert, MA, CCC-SLP, BCS-S

The ASHA Leader, April 2015, Vol. 20, 36-38. doi:10.1044/leader.OTP.20042015.36

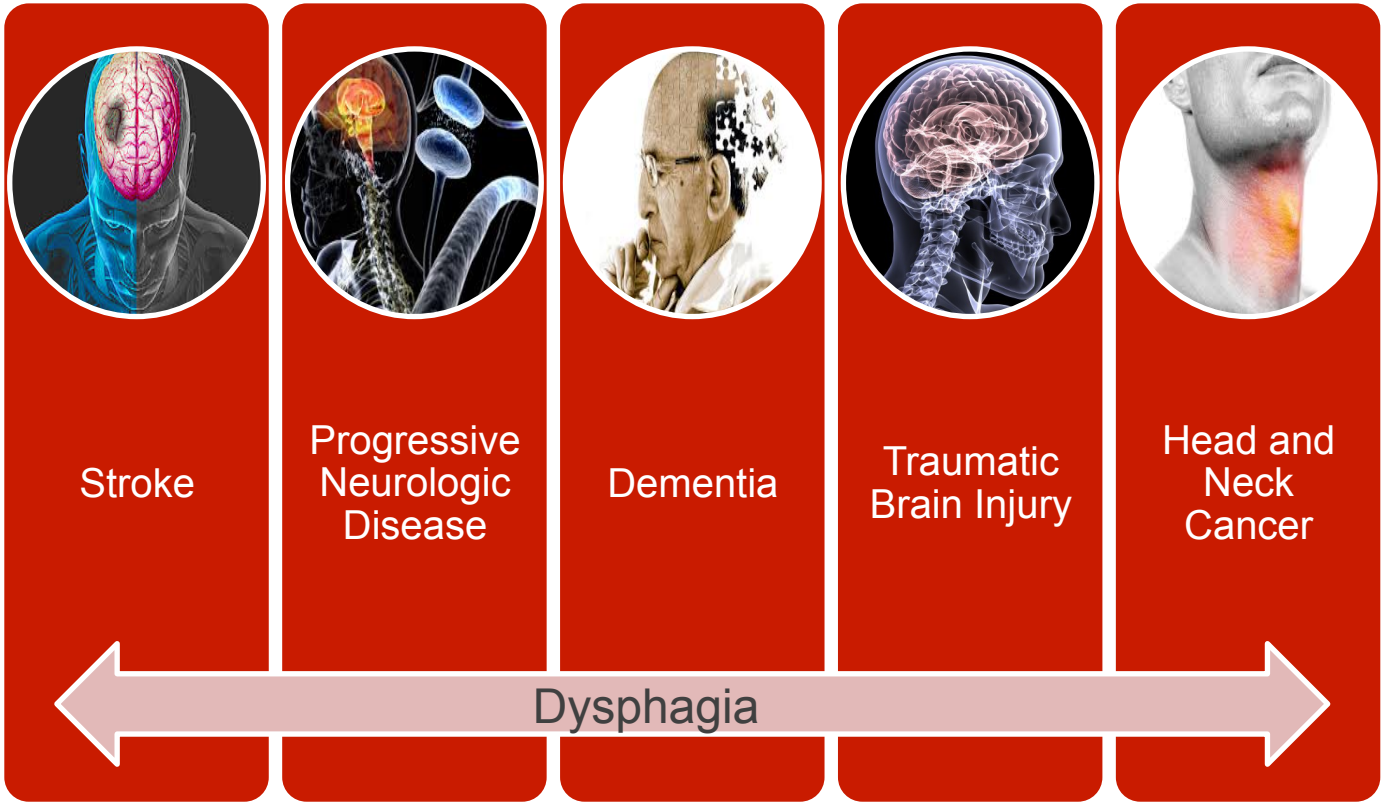
- **Look for hospital teams on which the SLP could play a vital role.** Hospitals are scrutinizing re-admissions, and for two of the top re-admission diagnoses—stroke and pneumonia—SLPs have a wealth of knowledge to share.

- **Develop programs or processes that could help the hospital reach its re-admission target.** For example, developing a nurse screening for all patients admitted with pneumonia could reveal which of those patients presumed to have community-acquired pneumonia really have an aspiration pneumonia.

Prevalence of Dysphagia by Age

- General population
  - Prevalence varies between 2.3% and 16% (Chiocca et al., 2005; Cho et al., 2005; Eslick & Talley, 2008; Ruth et al., 1991; Watson & Lally, 2009; Ziolkowski et al., 2013)
- Older adults
  - 11-34% of those living independently (Holland et al., 2011; Roy et al., 2007; Bloem et al., 1990; Kawashima et al., 2004; Yang et al., 2013; Barczi & Robbins, 2000)
  - 29-47% of those hospitalized on acute geriatric units (Lee et al., 1999; Cabre et al., 2014)
  - 55-92% of those hospitalized with community acquired pneumonia (Cabre et al., 2014; Almirall et al., 2013)
  - 38-51% of those in institutional settings (Nogueira & Reis, 2013; Lin et al., 2002)

Dysphagia in Not a Disease



Prevalence of dysphagia by Disease Category

- Stroke
  - Up to 56% (Blackwell & Littlejohns, 2010)
  - Not all patients aspirate- 64% with dysphagia; 22% aspirating (Mann et al., 2000)
- Progressive Neurologic Disease
  - Amyotrophic Lateral Sclerosis- Up to 90% (Coates & Bakheit, 1997)
  - Parkinson's Disease- 35% to 82% (Kalf et al., 2011)
  - Dementia- 32 to 75% (Alagiakrishman et al., 2013; Secil et al., 2016)
- Head and Neck Cancer:
  - Up to 40% at initial cancer diagnosis (Stenson et al., 2000);
  - Up to 70% left with permanent swallowing deficits following cancer treatment (Nguyen et al., 2002)
- Traumatic Brain Injury
  - 38% to 65% (Terre & Mearin, 2009)

Why are prevalence estimates so variable?

- Setting
- Age
- Medical Diagnosis
- Timing of evaluation
- Type of evaluation: clinical versus instrumental
- Definition of “dysphagia”

What is Dysphagia?

- A syndrome that can occur across the lifespan.
- May be characterized by:
  - Difficulty swallowing
  - Impaired ability to protect the airway (pen-asp)
  - Impaired ability to transport food (efficiency)

Head and Neck Cancer – Induced Dysphagia

- As high as 40% at initial cancer diagnosis (Stenson et al., 2000).
- As many as 70% of HNC patients are left with permanent swallowing deficits following cancer treatment (Nguyen et al., 2002).
- Silent aspiration can be as high as 18.5% at time of cancer diagnosis and range from 22-65% after cancer treatment (Denaro et al., 2013).
- Discrepancies between patient perceived impairment and pathophysiology (Rogus-Pulia et al. 2014; Arrese, et al., 2017).

How do we assess for dysphagia?

- Patient report
- Clinical swallow
- Videofluoroscopy
- Flexible Endoscopy Evaluation of Swallowing

Validity of Diagnostic Tests

- Refers to the ability to distinguish diseased from non-diseased
- 2 components
  - Sensitivity – correctly identify those with disease
  - Specificity – correctly identify those without disease
- Must have ‘standard’ to compare with

What's Your Protocol

Standardize Your Approach

Creating standardized approach to tracking outcomes

- Why a standardized approach or protocol?
  - Ensure you are tracking the same outcomes across patients
  - Ensure comprehensiveness of outcomes (cross-systems)
  - Reduces variability in clinical practice
  - Allow for comparison from pre- to post-treatment
- Important to demonstrate the efficacy of treatments for each patient
  - Value-based care

Outcome Measures

- HNC represents a population with a high incidence of dysphagia.
- Impacting younger individuals thus requiring long-term monitoring of swallowing function.
- The use of outcome measures are ‘highly recommended’ for documentation of the need for skilled intervention (Medicare Claims-Based Outcome Reporting 2013).

Outcome Measures

May be used to:

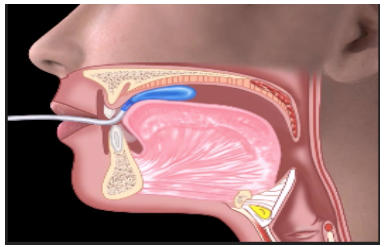
- quantify dysfunction (strength and ROM)
- determine airway invasion
- assess patient perception
- assess prognosis
- measure change in swallow function over time?

Lingual Strength

The Iowa Oral Performance Instrument (IOPI) objectively measures:
1) Tongue strength and endurance 2) Lip strength and endurance

How to Measure Lingual Strength Using the IOPI:

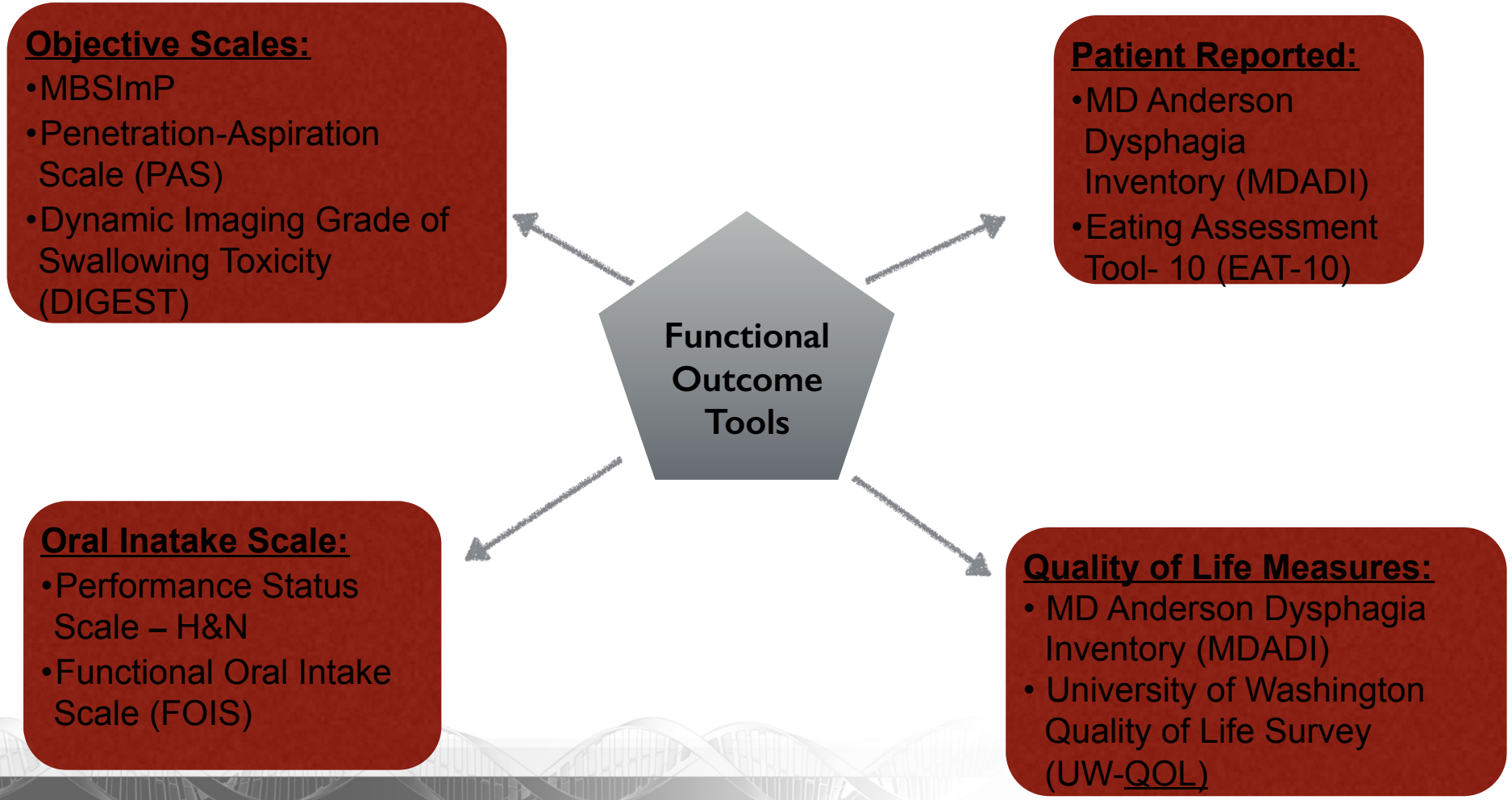
- ✓ Instruct the patient “Using your entire tongue, push the bulb against the roof of your mouth as hard as you can.”
- ✓ Have the patient open their mouth and place the bulb on top of the tongue in the “anterior” position – the hard palate just behind the alveolar ridge
- ✓ Have the patient gently close their mouth around the tubing with the bulb in place
- ✓ Instruct and encourage the patient to push



TheraBite Range of Motion Scale

How to Measure MMO Using the TheraBite®:

- Instruct the patient “I will place this opening on your bottom tooth or gum, you will open as wide as you can, and I will read the number that contacts your top tooth or gum”
- Place the notch on the patients lower central incisor
- Verbally instruct and encourage the patient to stretch their jaw open as wide as they can
- Read the number that contacts the bottom edge of the top incisor or gum


Objective Scales:
•MBSImP
•Penetration-Aspiration Scale (PAS)
•Dynamic Imaging Grade of Swallowing Toxicity (DIGEST)
Patient Reported:
•MD Anderson Dysphagia Inventory (MDADI)
•Eating Assessment Tool- 10 (EAT-10)
Functional Outcome Tools
Oral Inatake Scale:
•Performance Status Scale – H&N
•Functional Oral Intake Scale (FOIS)
Quality of Life Measures:
• MD Anderson Dysphagia Inventory (MDADI)
• University of Washington Quality of Life Survey (UW-QOL)

Patient Report

TABLE 3. Patient-reported Outcome (PRO) Questionnaires

Perceived Swallowing	MD Anderson Dysphagia Inventory (MDADI)[84]
Impairment	The Eating Assessment Tool (EAT-10)[85]
Reported Oral Intake	The Performance Status Scale – Head and Neck (PSS-HN)[86]
	The Functional Oral Intake Scale (FOIS)[87]
Speech and Voice	The Voice Handicap Index (VHI)[88]
	Speech Handicap Index (SHI)[89]
Dry Mouth	Xerostomia Questionnaire (XQ)[90]
Symptom Burden	MD Anderson Symptom Inventory Head and Neck Cancer Module (MDASI-HN)[91]
	Vanderbilt Head and Neck Symptom Survey (VHNSS)[92]

Arrese,L.C. & Hutcheson, K.A. 2018

MD Anderson Dysphagia Inventory (MDADI)

My swallowing ability limits my day-to-day activities.
Strongly Agree Agree No Opinion Disagree Strongly Disagree

E2. I am embarrassed by my eating habits.
Strongly Agree Agree No Opinion Disagree Strongly Disagree

F1. People have difficulty cooking for me.
Strongly Agree Agree No Opinion Disagree Strongly Disagree

P2. Swallowing is more difficult at the end of the day.
Strongly Agree Agree No Opinion Disagree Strongly Disagree

*E7. I do not feel self-conscious when I eat.
Strongly Agree Agree No Opinion Disagree Strongly Disagree

E4. I am upset by my swallowing problem.
Strongly Agree Agree No Opinion Disagree Strongly Disagree

P6. Swallowing takes great effort.
Strongly Agree Agree No Opinion Disagree Strongly Disagree

E5. I do not go out because of my swallowing problem.
Strongly Agree Agree No Opinion Disagree Strongly Disagree

Eating Assessment Tool (EAT-10):

No Problem

Severe Problem

To what extent are the following scenarios problematic to you?	0	1	2	3	4
1. My swallowing problem has caused me to loose weight					
2. My swallowing problem interferes with my ability to go out for meals					
3. Swallowing liquids takes extra effort					
4. Swallowing solids takes extra effort					
5. Swallowing pills takes extra effort					
6. Swallowing is painful					
7. The pleasure of eating is affected by my swallowing					
8. When I swallow food sticks in my throat					
9. I cough when I eat					
10. Swallowing is stressful					

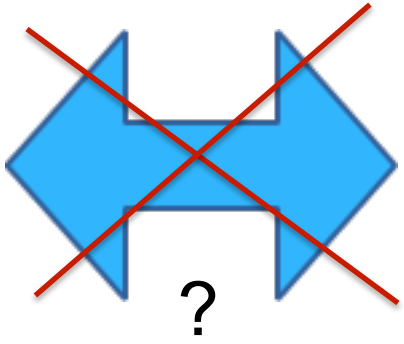
Total Score: 0-40

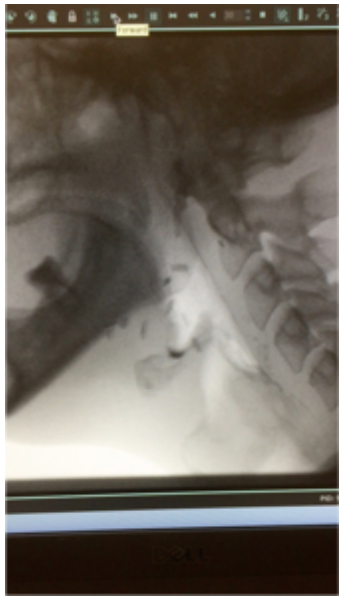
normal - severe impairment

Patient Report and Pathophysiology

Eating Assessment Tool-10

(EAT-10)





Dysphagia. 2016 Aug 18.

Relationship Between the Eating Assessment Tool-10 and Objective Clinical Ratings of Swallowing Function in Individuals with Head and Neck Cancer.

Arrese LC, Carrau R, Plowman EK.

Dysphagia. 2017 Feb;32(1):83-89. doi: 10.1007/s00455-016-9741-7. Epub 2016 Aug 18.

Relationship Between the Eating Assessment Tool-10 and Objective Clinical Ratings of Swallowing Function in Individuals with Head and Neck Cancer.

Arrese LC[1], Carrau R[2], Plowman EK[3].

Table 4 Correlations between outcome measures for each group

Group	EAT-10 and summed MBSImP composite scores (oral and pharyngeal)	EAT-10 and MBSImP pharyngeal composite score	EAT-10 and PAS
1 ($n = 19$)	$r = 0.66$, $p = 0.002$*	$r = 0.70$, $p < 0.001$*	$r = 0.66$, $p = 0.002$*
2 ($n = 8$)	$r = 0.25$, $p = 0.557$	$r = 0.27$, $p = 0.514$	$r = -0.06$, $p = 0.891$
3 ($n = 17$)	$r = 0.17$, $p = 0.505$	$r = 0.30$, $p = 0.237$	$r = 0.07$, $p = 0.775$

* Denotes statistical significance at $p < 0.01$

Performance Status Scale

Eating in Public

100 No restriction of place, food, or companion (eats out at any opportunity)
75 No restriction of place, but restricts diet when in public (eats anywhere, but may limit intake to less "messy" foods, eg, liquids)
50 Eats only in presence of selected persons in selected places
25 Eats only at home in presence of selected persons
0 Always eats alone

Understandability of Speech

100 Always understandable
75 Understandable most of the time; occasional repetition necessary
50 Usually understandable; face-to-face contact necessary
25 Difficult to understand
0 Never understandable; may use written communication

Normalcy of Diet

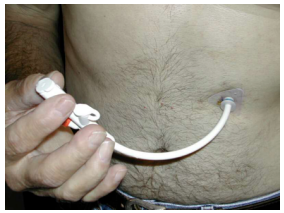
100 Full diet (no restrictions)
90 Peanuts
80 All meat
70 Carrots, celery
60 Dry bread and crackers
50 Soft, chewable foods (eg, macaroni, canned/soft fruits, cooked vegetables, fish, hamburger, small pieces of meat)
40 Soft foods requiring no chewing (eg, mashed potatoes, apple sauce, pudding)
30 Pureed foods (in blender)
20 Warm liquids
10 Cold liquids
0 Nonoral feeding (tube fed)

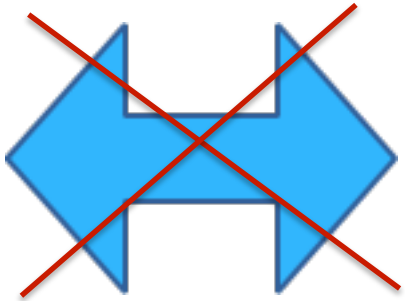
Functional Oral Intake Scale (FOIS):

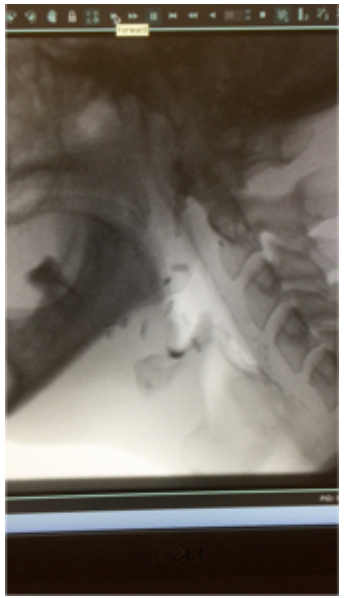
LEVEL	DIET LEVEL:
Tube Dependent	1. No oral intake
	2. Tube dependent with minimal oral intake
	3. Tube dependent with consistent oral intake of liquid or food
Total Oral Intake	4. Total oral intake of a single consistency
	5. Total oral intake with multiple consistencies - special preparation
	6. Total oral intake - no special preparation, must avoid specific foods
	7. Total oral intake with no restrictions

Patient Oral Intake

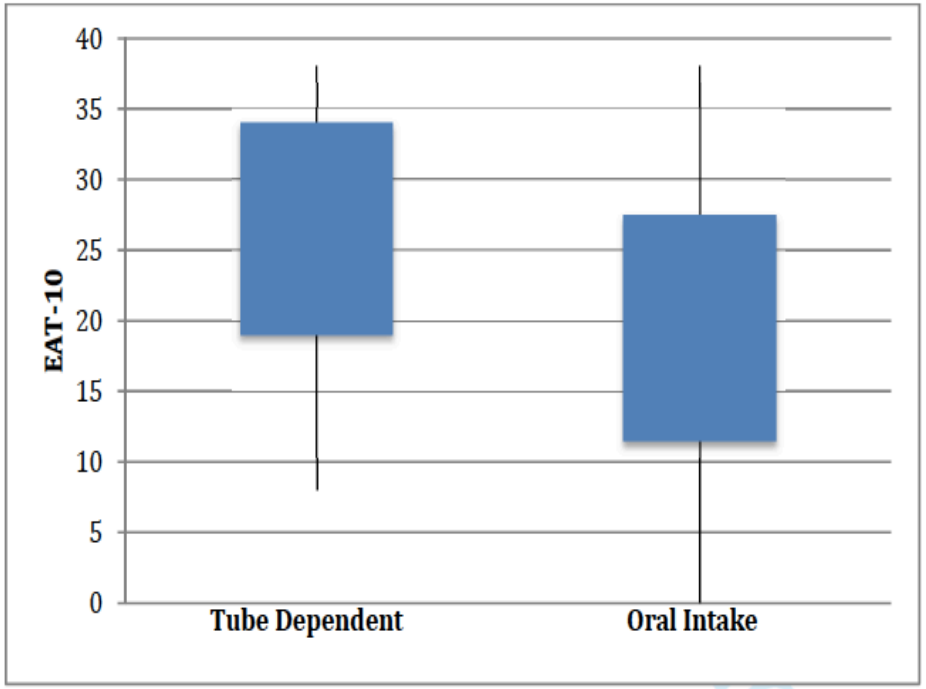
FIOS

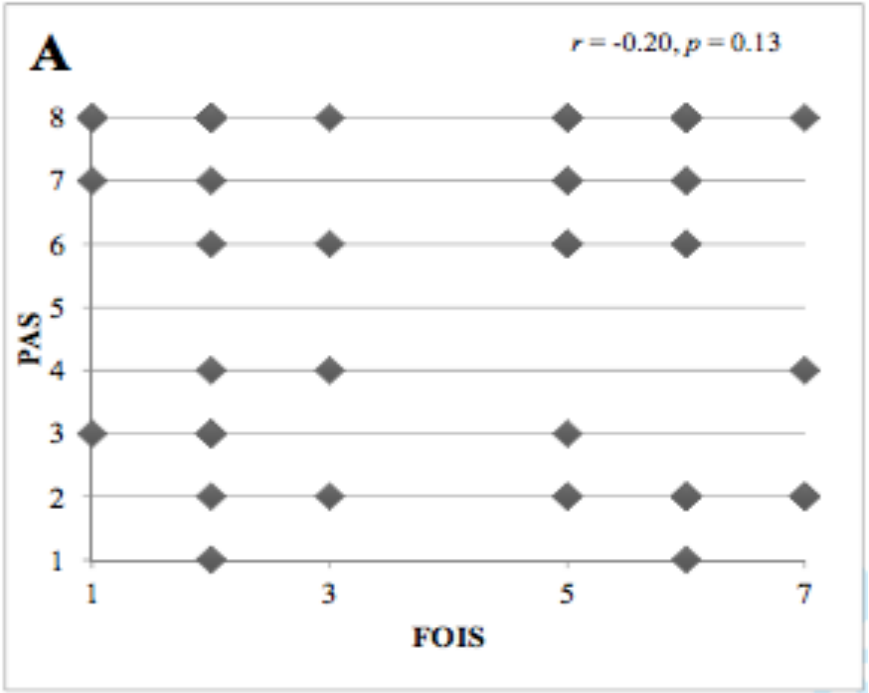






Relationship between oral intake, patient perceived swallowing impairment, and objective videofluoroscopic measures of swallowing in head and neck cancer patients.
Arrese et al.





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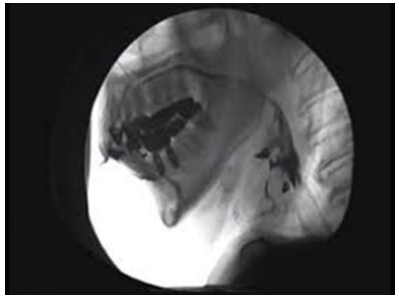
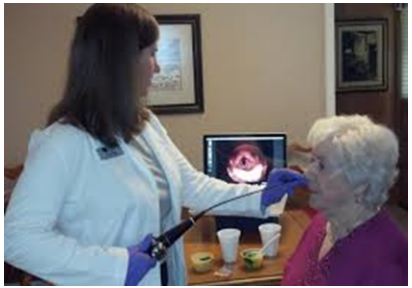
Patient Reported Quality of Life

Pathophysiology

- Why necessary to use instrumental exam when planning treatment?
  - Videofluoroscopy



  - Flexible Endoscopic Evaluation of Swallowing (FEES)



Clinical Swallow and Pathophysiology?

- Silent aspiration can be as high as 18.5% at time of cancer diagnosis and range from 22-65% after cancer treatment (Denaro et al., 2013).
- Laryngeal palpation? On VFSS no differences were found between swallows judged to have reduced or normal hyoid elevation (Brates et al., 2018)

Instrumental Assessments

*Videofluoroscopy
  -Penetration Aspiration Scale (PAS)
  -Dynamic Imaging Grade of Swallowing Toxicity (DIGEST)
  -Modified Barium Swallow Impairment Profile (MBSImP)
*Flexible Endoscopic Evaluation of Swallowing (FEES)
  -Yale Pharyngeal Residue Severity Rating Scale
*High Resolution Manometry (HRM)

Tests of Swallowing Function: *Which, When and Why?*

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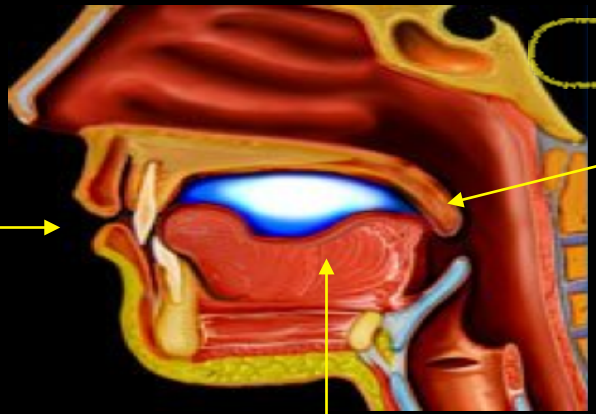
Oral Preparatory Phases



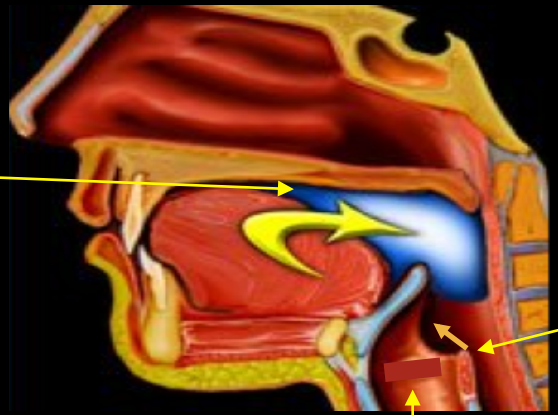
Tongue to velum contact

Labial Seal

Bolus Formation

Oral Transport Phase

Posterior tongue depression; bolus squeezes against the palate



Arytenoid cartilages rock forward

Respiration Stops

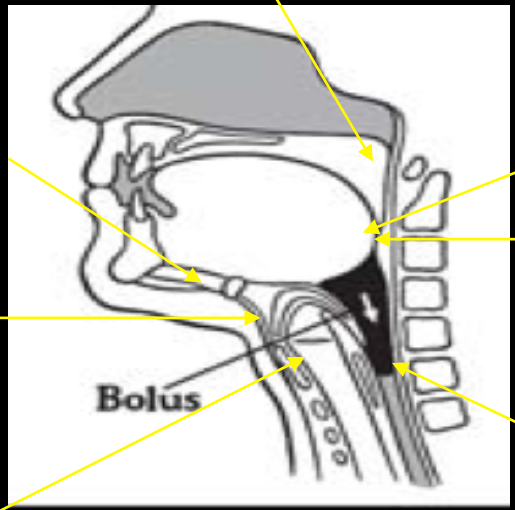
Pharyngeal Phase

(shortest and most complex phase)

Velopharyngeal Closure

Hyo-laryngeal elevation/ excursion

Base of tongue retraction

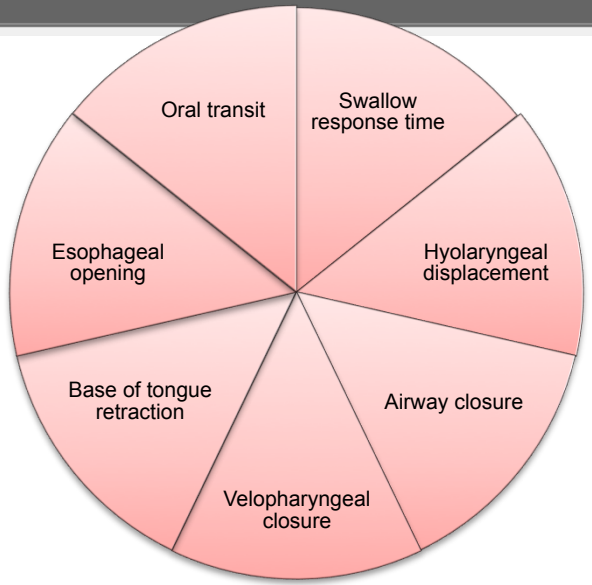


Epiglottic inversion

Posterior pharyngeal wall contraction

Airway closure

UES opening



- Timely initiation
- Adequate coordination
- No airway invasion or penetration that clears
- Minimal residue
- Majority of bolus entering esophagus

Functional Swallow

Sex

Age

Bolus Characteristics

Normal

Grey Street

Abnormal

Courtesy of Nicole Rogus-Pulia, PhD

Penetration-aspiration scale

- Can draw inferences regarding sensory and motor integrity of different regions of the pharynx and larynx
- Inferences should not be made on the basis of a single bolus, volume or consistency

Increasing severity?

Score	Description of Events
1.	Material does not enter airway
2.	Material enters the airway, remains above the vocal folds, and is ejected from the airway.
3.	Material enters the airway, remains above the vocal folds, and is not ejected from the airway.
4	Material enters the airway, contacts the vocal folds, and is ejected from the airway.
5.	Material enters the airway, contacts the vocal folds, and is not ejected from the airway.
6.	Material enters the ariway, passes below the vocal folds, and is ejected into the larynx or out of the airway.
7.	Material enters the airway, passes below the vocal folds, and is not ejected from the trachea despite effort.
8.	Material enters the airway, passes below the vocal folds, and no effort is made to eject.

RSITY

Rosenbek et al., 1996; Steele & Grace-Martin, 2017

Penetration-aspiration scale reorganization

1	Material does not enter the airway	No material remaining in the airway after the swallow
2	Material enters the supraglottic space but is ejected	
4*	Material contacts the true vocal folds but is ejected	
3*	Material enters the supraglottic space and is NOT ejected	Concern regarding timeliness of supraglottic closure (ISLN integrity) and failure to clear residue from the supraglottic space at the end of the swallow
5	Material contacts the true folds and is NOT ejected	
6	Material passes below the true folds but is ejected to the supraglottic space	
7	Material passes below the true folds and is NOT ejected despite attempt(s)	Failure of airway protection mechanism despite RLN sensory integrity
8	Material passes below the true folds – no patient response	Failure of sensory integrity AND effective airway protection mechanisms

Adopted from Catriona Steele, PhD *OSU presentation 2018*

Modified barium swallow impairment profile (MBSImP)

- 17 components representing various aspects of swallowing biomechanics
- Use in conjunction with the Penetration-Aspiration scale
- Standard interpretation of images
- Protocol for use during evaluation- includes nectar- and honey-thick liquids

ORAL Impairment

Component 1—Lip Closure
- 0 = No labial escape
- 1 = Interlabial escape; no progression to anterior lip
- 2 = Escape from interlabial space or lateral juncture; no extension beyond vermilion border
- 3 = Escape progressing to mid-chin
- 4 = Escape beyond mid-chin

Component 2—Tongue Control During Bolus Hold
- 0 = Cohesive bolus between tongue to palatal seal
- 1 = Escape to lateral buccal cavity/floor of mouth (FOM)
- 2 = Posterior escape of less than half of bolus
- 3 = Posterior escape of greater than half of bolus

Component 3—Bolus Preparation/Mastication
- 0 = Timely and efficient chewing and mashing
- 1 = Slow prolonged chewing/mashing with complete re-collection
- 2 = Disorganized chewing/mashing with solid pieces of bolus unchewed
- 3 = Minimal chewing/mashing with majority of bolus unchewed

Component 4—Bolus Transport/Lingual Motion
- 0 = Brisk tongue motion
- 1 = Delayed initiation of tongue motion
- 2 = Slowed tongue motion
- 3 = Repetitive/disorganized tongue motion
- 4 = Minimal to no tongue motion

PHARYNGEAL Impairment

Component 7—Soft Palate Elevation
- 0 = No bolus between soft palate (SP)/pharyngeal wall (PW)
- 1 = Trace column of contrast or air between SP and PW
- 2 = Escape to nasopharynx
- 3 = Escape to nasal cavity
- 4 = Escape to nostril with/without emission

Component 5 – Oral Residue
- 0 = Complete oral clearance
- 1 = Trace residue lining oral structures
- 2 = Residue collection on oral structures
- 3 = Majority of bolus remaining
- 4 = Minimal to no clearance

Location
- A = Floor of mouth (FOM)
- B = Palate
- C = Tongue
- D = Lateral sulci

Component 6—Initiation of Pharyngeal Swallow
- 0 = Bolus head at posterior angle of ramus (first hyoid excursion)
- 1 = Bolus head in valleculae
- 2 = Bolus head at posterior laryngeal surface of epiglottis
- 3 = Bolus head in pyriforms
- 4 = No visible initiation at any location

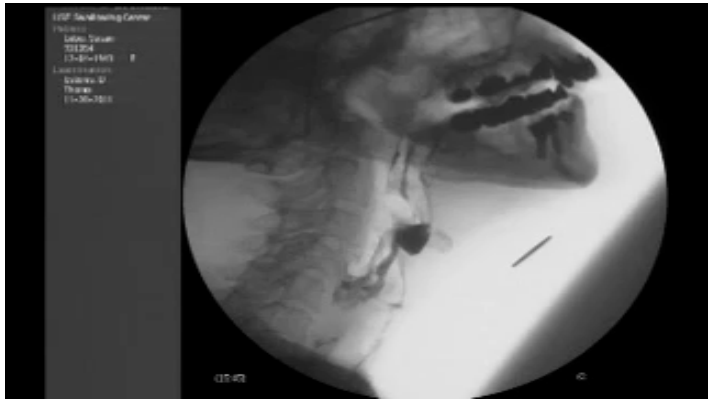
Component 13—Pharyngeal Contraction (*A/P VIEW ONLY*)
- 0 = Complete
- 1 = Incomplete (Pseudodiverticulae)
- 2 = Unilateral Bulging
- 3 = Bilateral Bulging

Martin-Harris et al., 2008

Modified Barium Swallow Impairment Profile

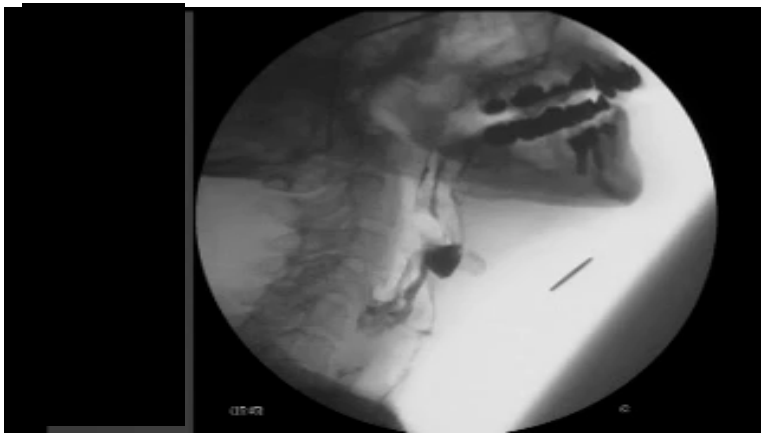
Oral

- Lip Closure
- Tongue Control
- Bolus Prep/mastication
- Bolus Transport/Lingual motion
- Oral residue
- Initiation of the Pharyngeal Swallow



Martin-Harris et al., 2008

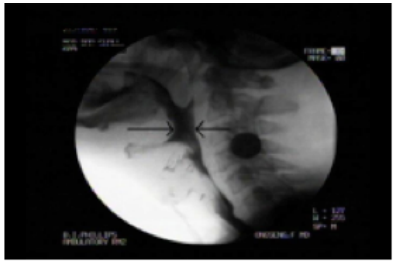
Modified Barium Swallow Impairment Profile



Pharyngeal

- Soft palate Elevation
- Laryngeal Elevation
- Anterior Hyoid Excursion
- Epiglottic Movement
- Pharyngeal Contraction (AP)
- Pharyngoesophageal Segment Opening
- Tongue Base Retraction
- Pharyngeal Residue

MBSImP: Possible H&N-specific components



Component 6 - Initial of Swallow

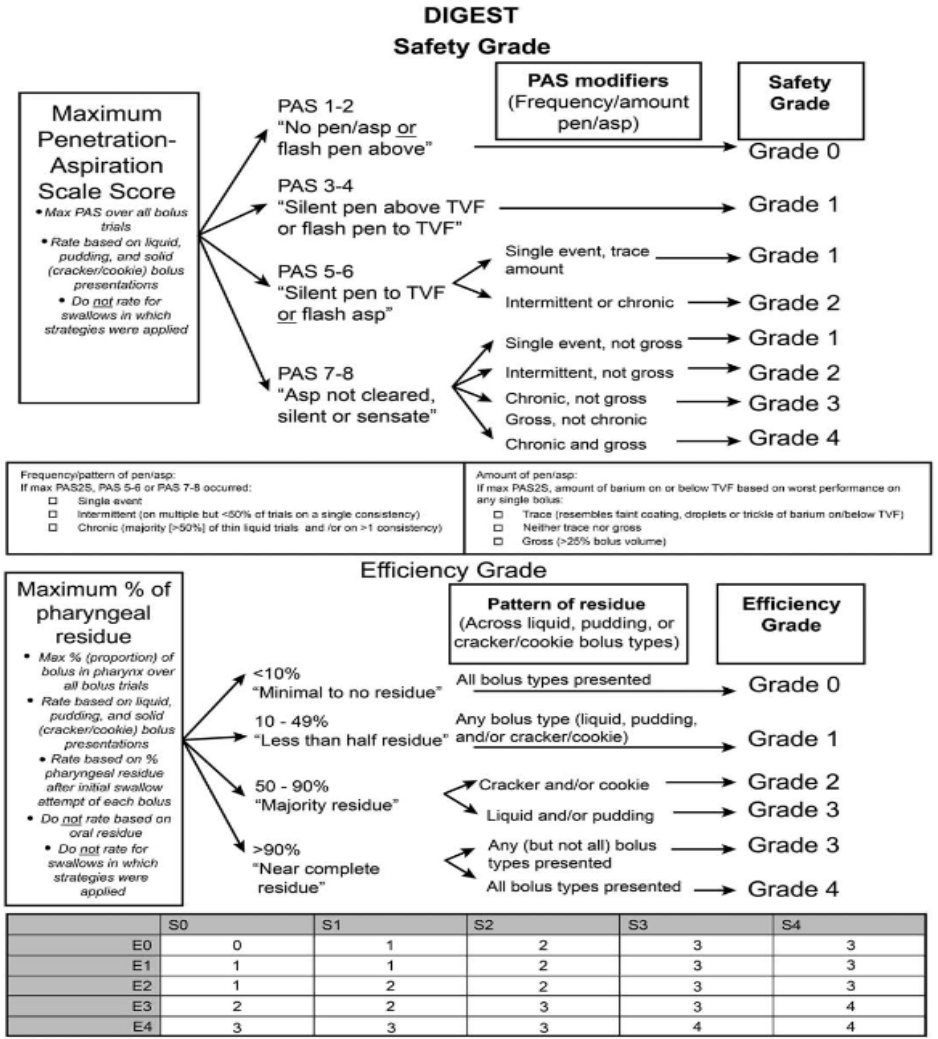
Component 9 - Anterior Hyoid Excursion

Component 14 - PES Opening

Component 15 - Tongue Base Retraction

Component 16 - Pharyngeal Residue

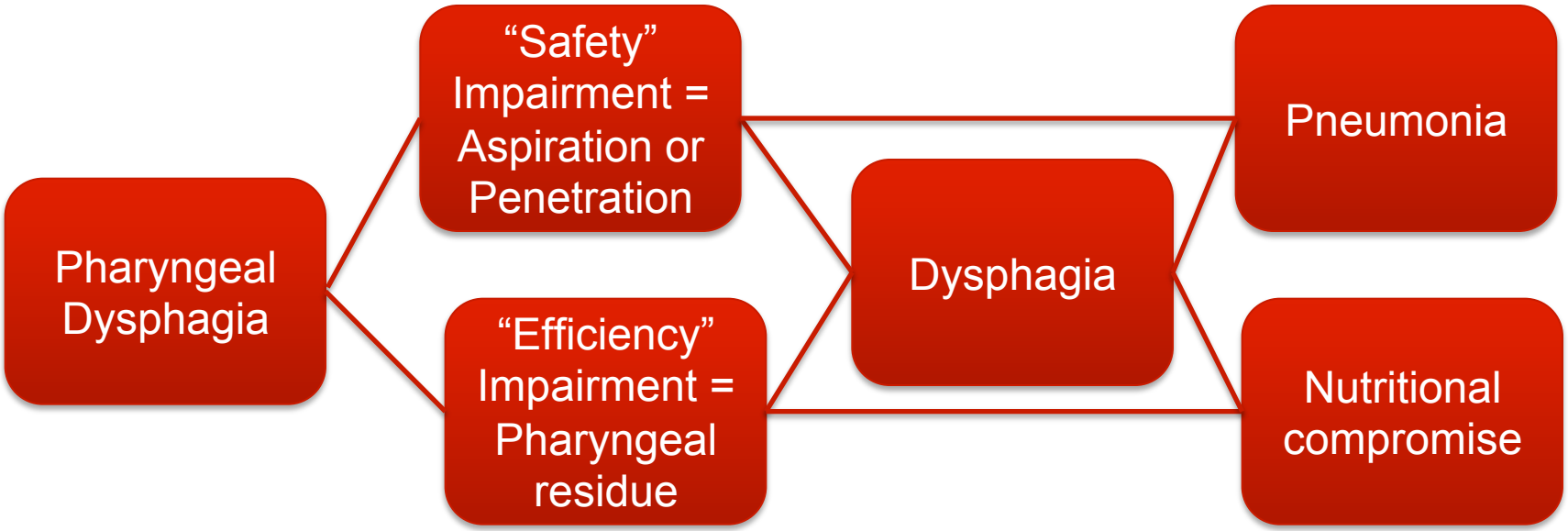
Dynamic imaging grade of swallowing toxicity (DIGEST)



	S0	S1	S2	S3	S4
E0	0	1	2	3	3
E1	1	1	2	3	3
E2	1	2	2	3	3
E3	2	2	3	3	4
E4	3	3	3	4	4

Hutcheson et al., 2017

Dynamic Imaging Grade of Swallowing Toxicity (DIGEST)



Adopted from Hutcheson et al. 2017

Primary Components of Dysphagia

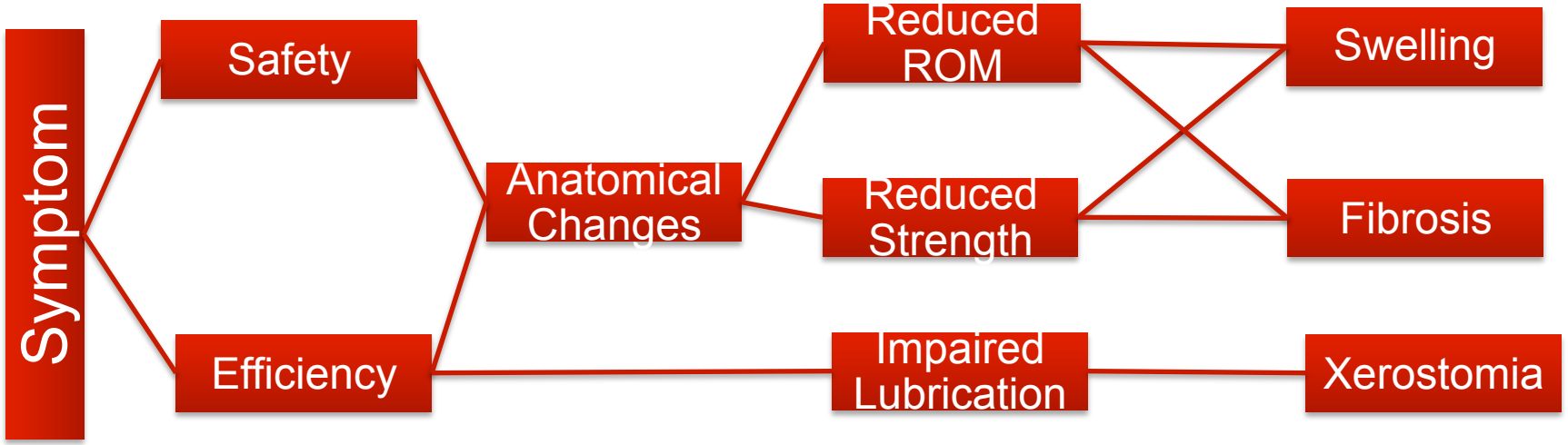
Airway Protection

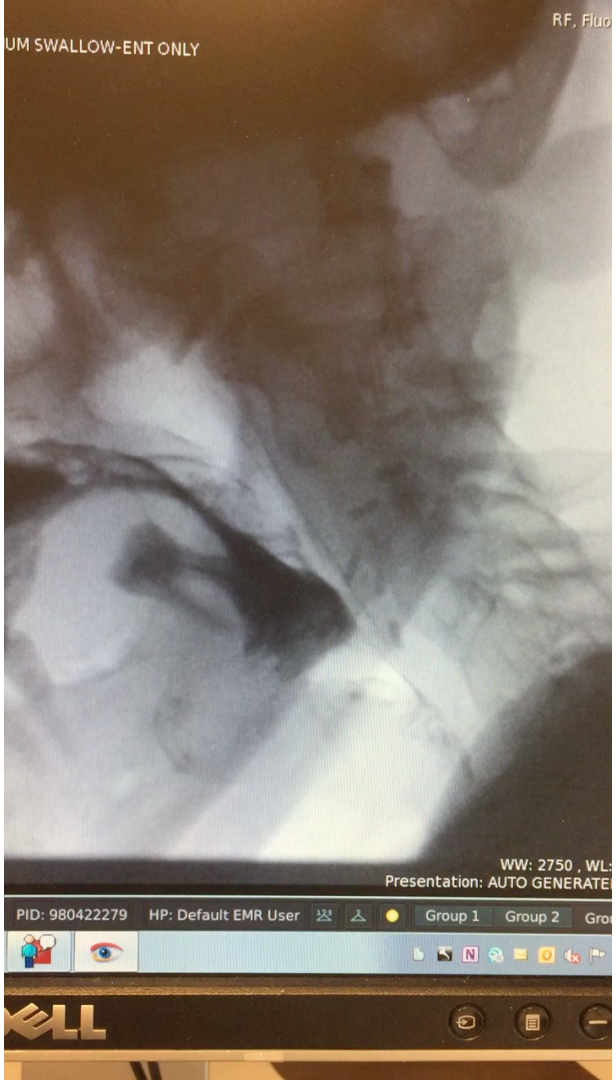
- Hyo-laryngeal elevation and excursion
- Epiglottic Inversion
- Arytenoid Adduction/TVF closure
- Pharyngeal squeeze

Bolus Efficiency

- Lingual propulsion
- Epiglottic Inversion
- Pharyngeal squeeze
- UES opening

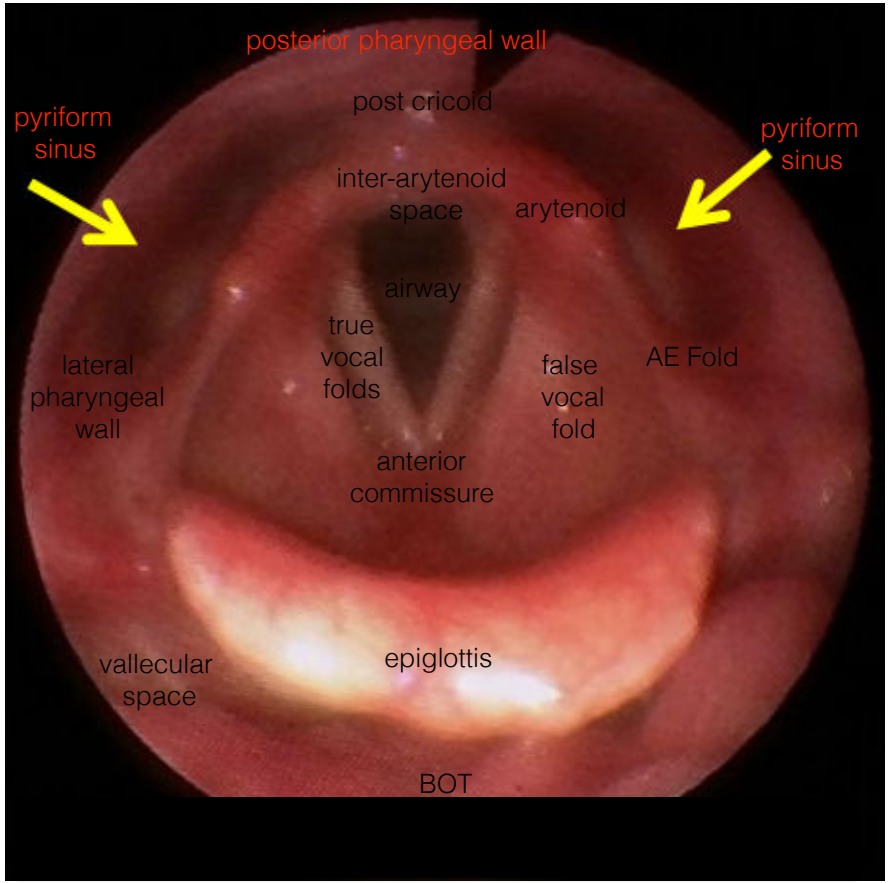
Head and Neck Specific Consideration



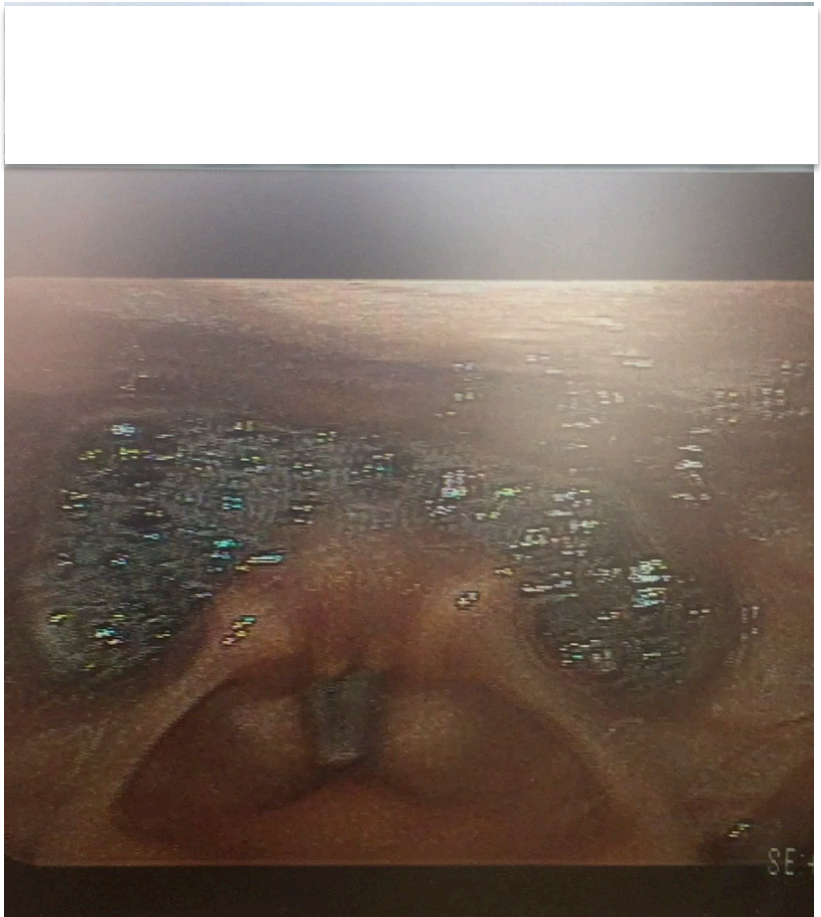

UM SWALLOW-ENT ONLY
RF, Fluo
WW: 2750 , WL:
Presentation: AUTO GENERATE
PID: 980422279
HP: Default EMR User
Group 1
Group 2
Gro

FEES

- **Pharyngeal exam - anatomy & physiology**
- **Secretion management**
- **PO trials**
- **Therapeutic interventions**
- **Biofeedback**

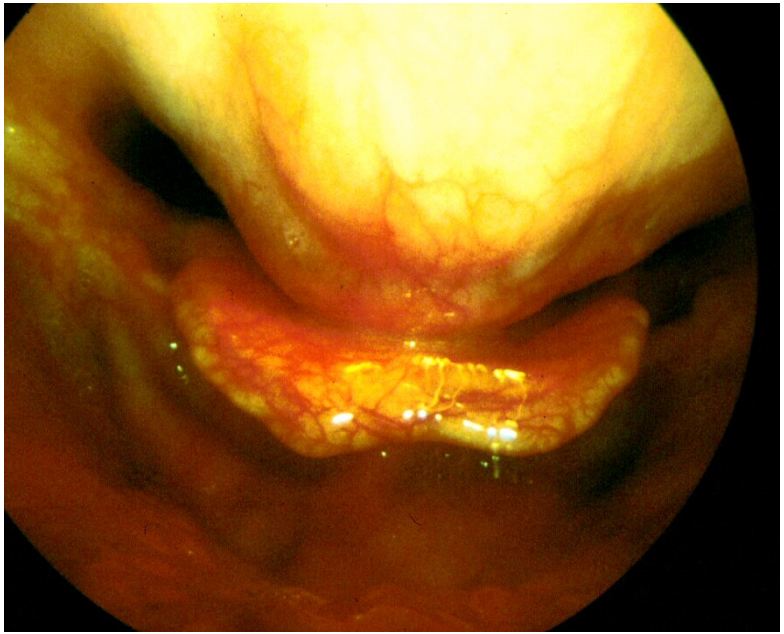

posterior pharyngeal wall
post cricoid
pyriform sinus
pyriform sinus
inter-arytenoid space
arytenoid
airway
true vocal folds
lateral pharyngeal wall
false vocal fold
AE Fold
anterior commissure
vallecular space
epiglottis
BOT

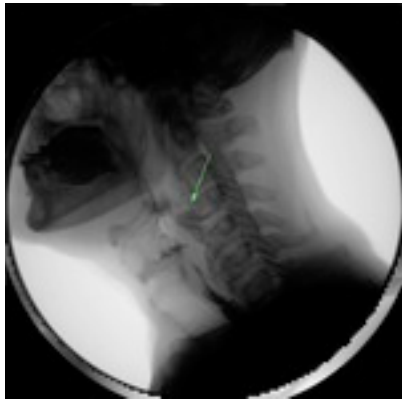
Secretion Management



Anatomy

ames





Residue - Yale Pharyngeal Residue Severity Rating Scale

Definitions for severity of **vallecula** residue

I	None	0 %	No residue
II	Trace	1–5 %	Trace coating of the mucosa
III	Mild	5–25 %	Epiglottic ligament visible
IV	Mod	25–50 %	Epiglottic ligament covered
V	Severe	>50 %	Filled to epiglottic rim

Definitions for severity of **pyriform sinus** residue

I	None	0 %	No residue
II	Trace	1–5 %	Trace coating of mucosa
III	Mild	5–25 %	Up wall to quarter full
IV	Mod	25–50 %	Up wall to half full
V	Severe	>50 %	Filled to aryepiglottic fold

P. D. Neubauer et al. (2015) The Yale Pharyngeal Residue Severity Rating Scale

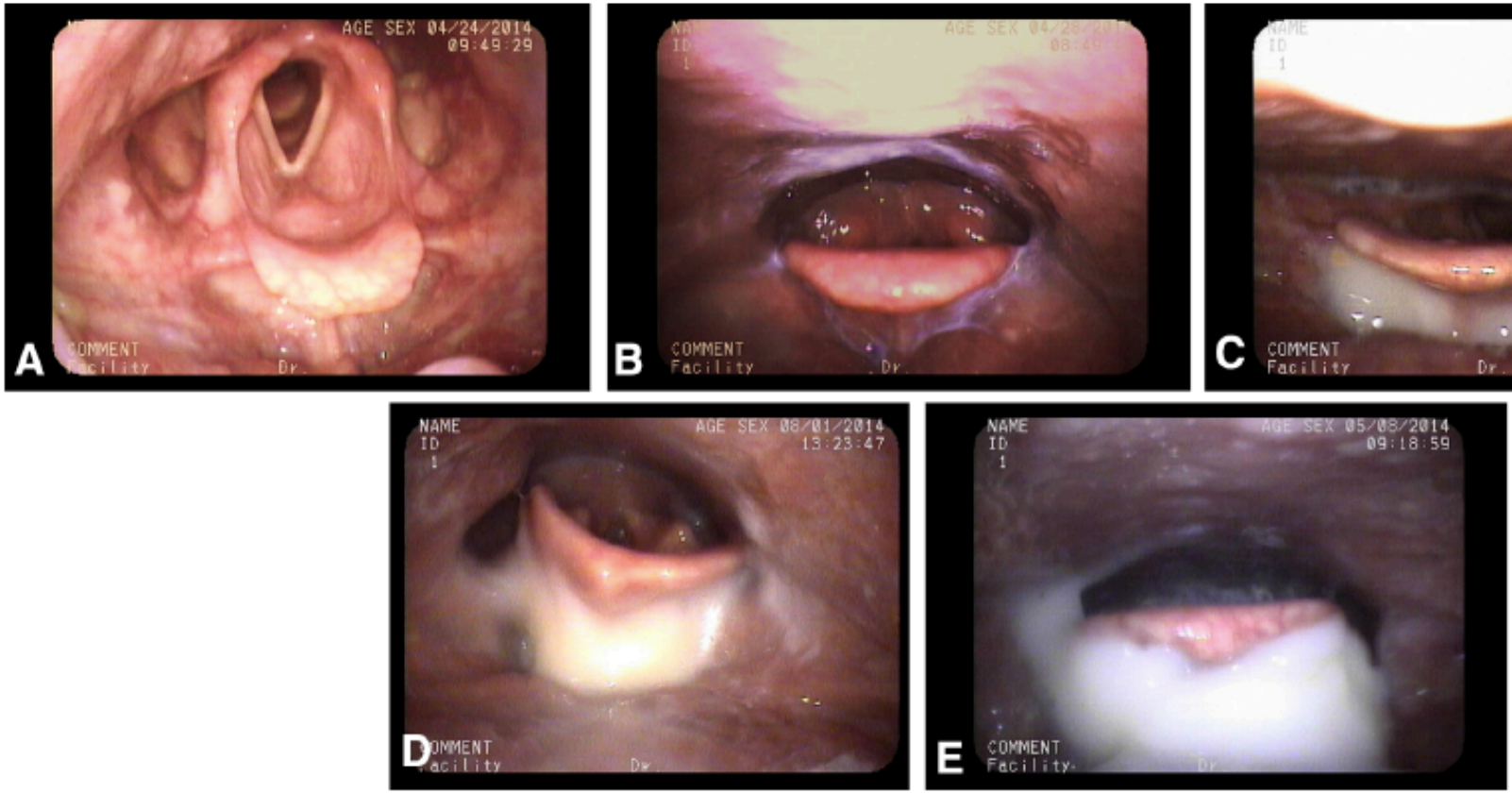


Fig. 1 The vallecula images with the greatest inter-rater agreement for each residue level: **a** none; **b** trace; **c** mild; **d** moderate; and **e** severe

P. D. Neubauer et al. (2015) The Yale Pharyngeal Residue Severity Rating Scale

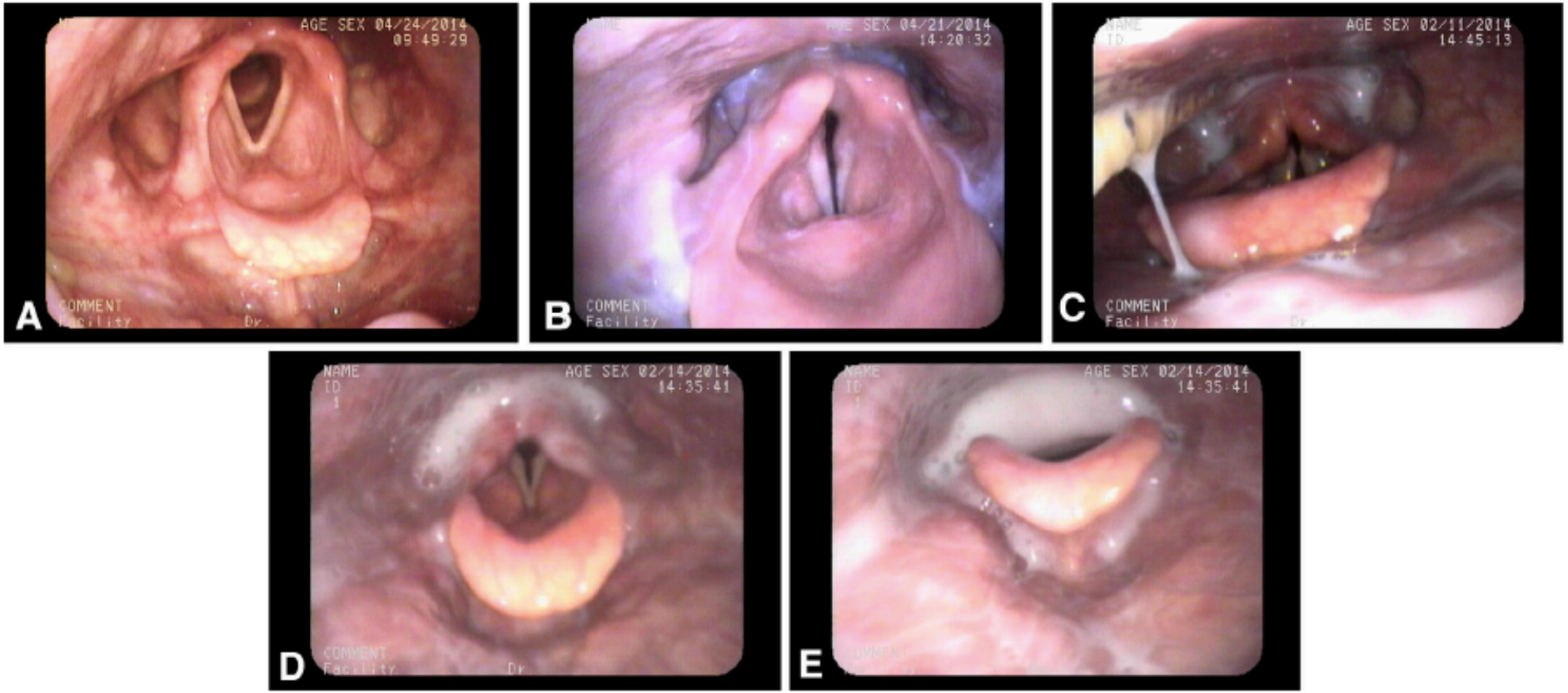
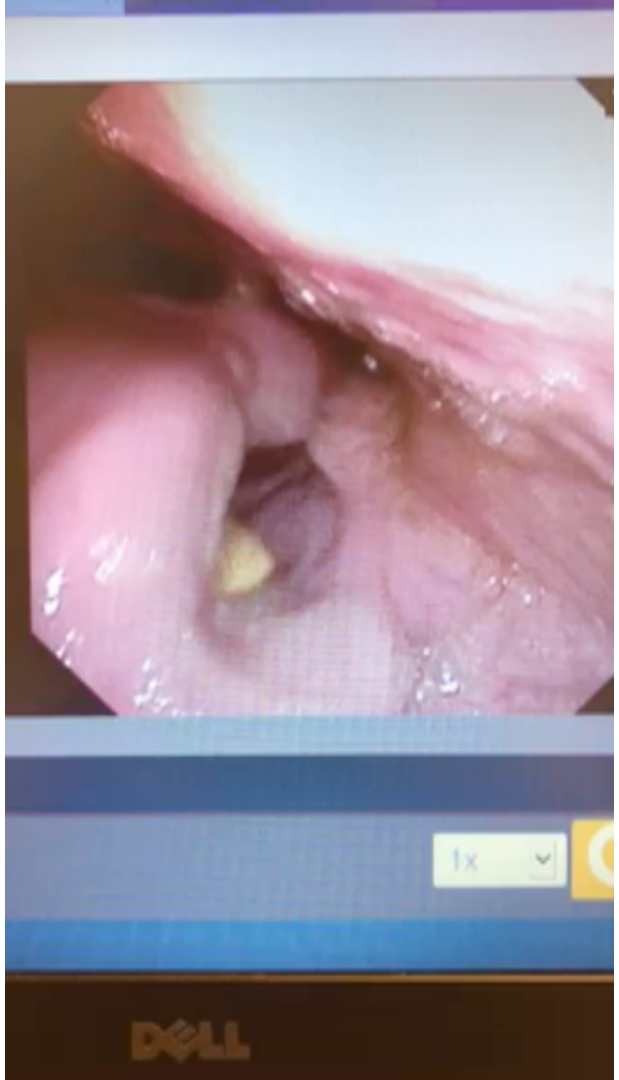
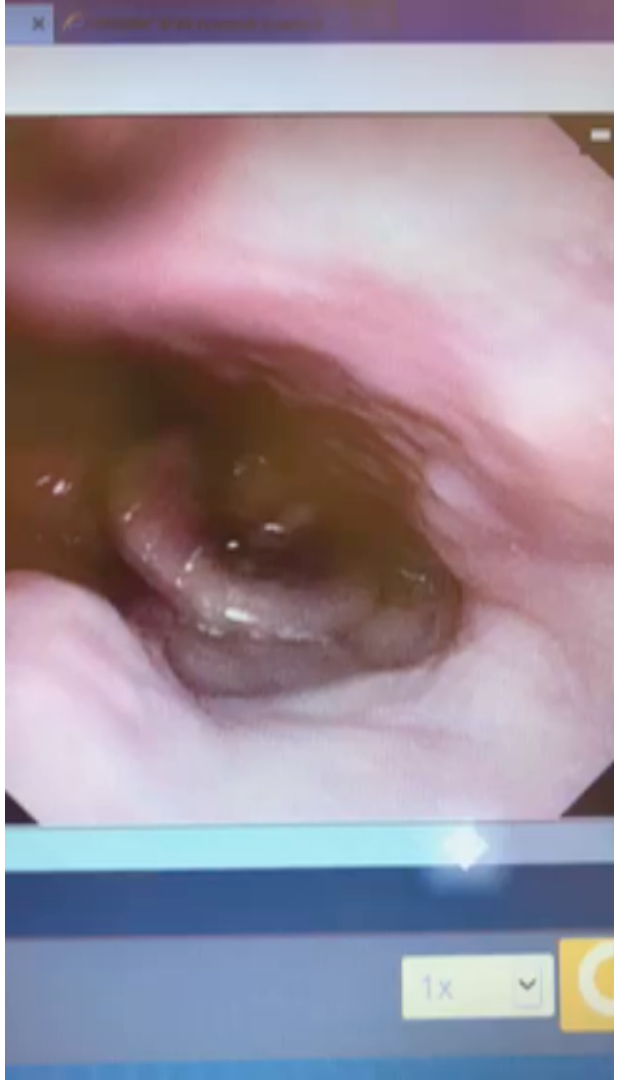


Fig. 2 The pyriform sinus images with the greatest inter-rater agreement for each residue level: **a** none; **b** trace; **c** mild; **d** moderate; and **e** severe

P. D. Neubauer et al. (2015) The Yale Pharyngeal Residue Severity Rating Scale


1x
DELL


1x

MBS or FEES?

- Research has investigated:
  - Sensitivity, specificity, standardization, pneumonia rates, quality of life
- The results are:
  - Neither is superior to the other overall
- Experience has taught us to ask: What do I want to see?
  - Oral or esophageal complaints? Secretions? Vocal cord/glottal function?

	MBS	FEES	Either
Oral Phase problem	x		
Unexplained weight loss	x		
Suspect aspiration of secretions		x	
ICU or vent		x	
H/o esophageal issues	x		
Hoarseness		x	
Biofeedback		x	
H&N Ca			**x dependent on complaint**

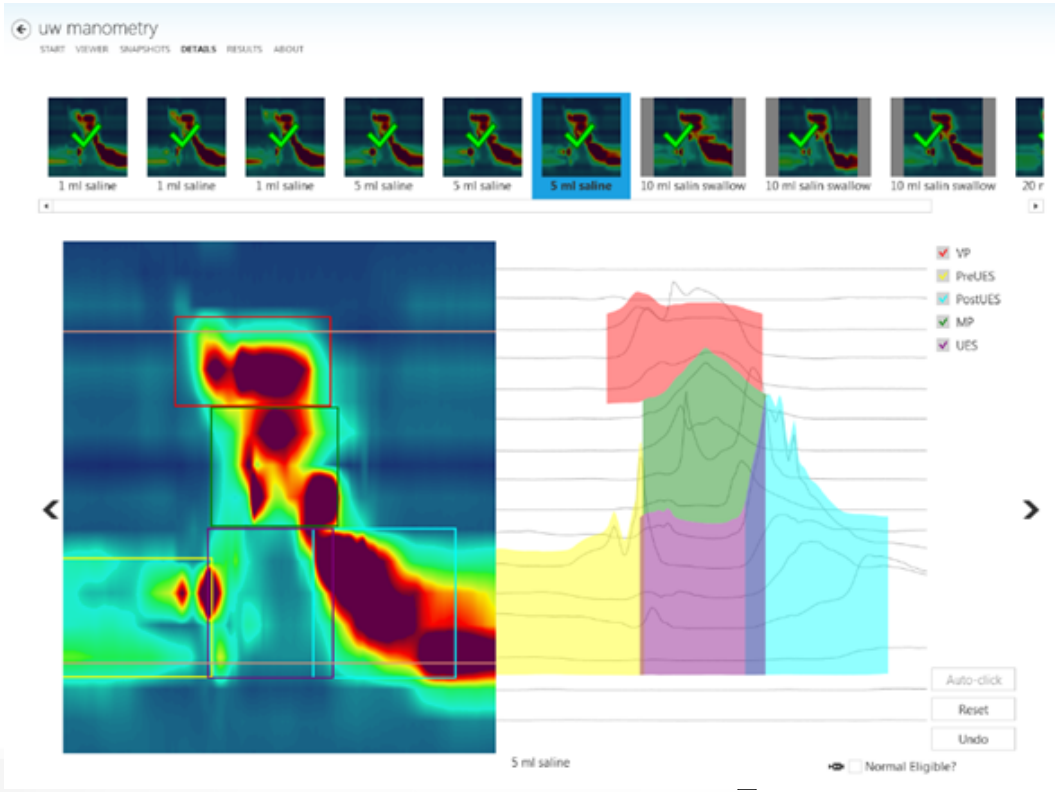
Role for Pharyngeal High Resolution Manometry

-Measure pressures produced during the swallow

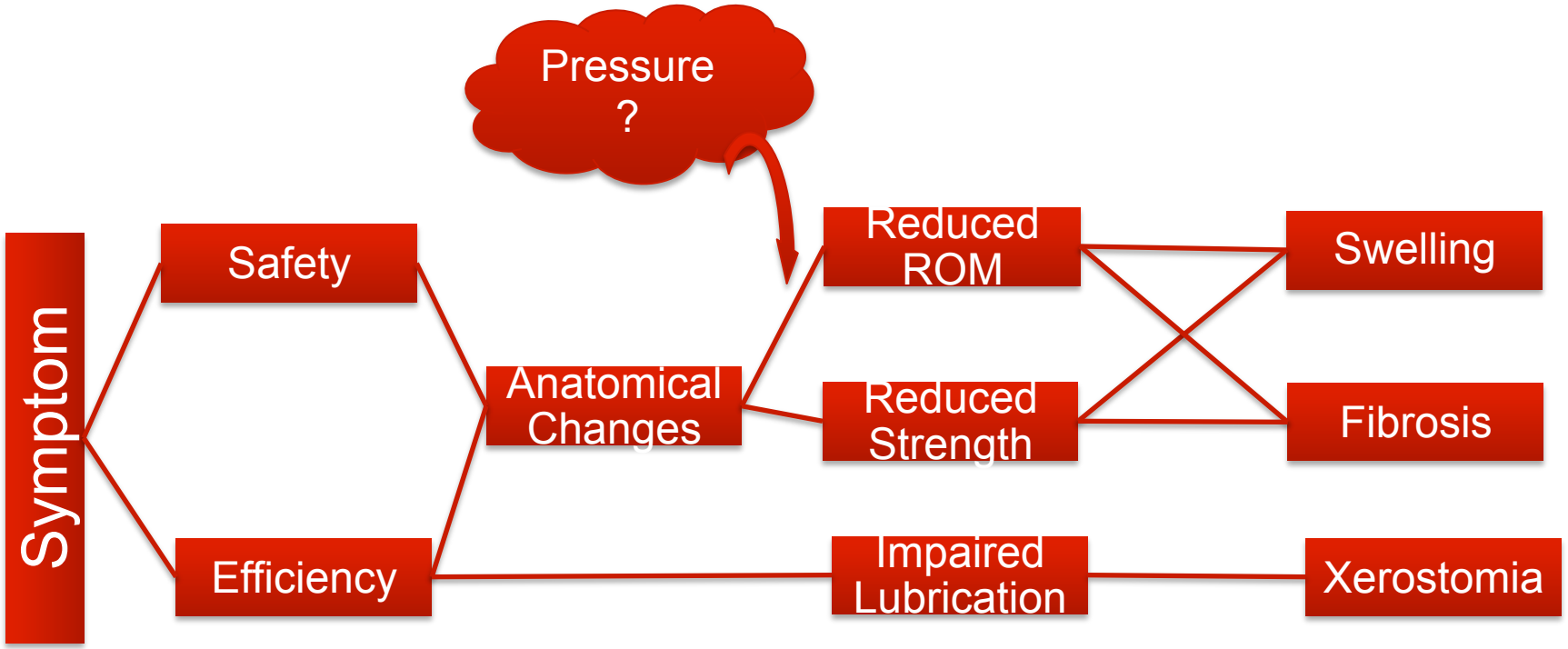
-Areas of abnormal pressures (high or low) can guide treatment decisions

-Reasons for abnormal pressures will need to be inferred

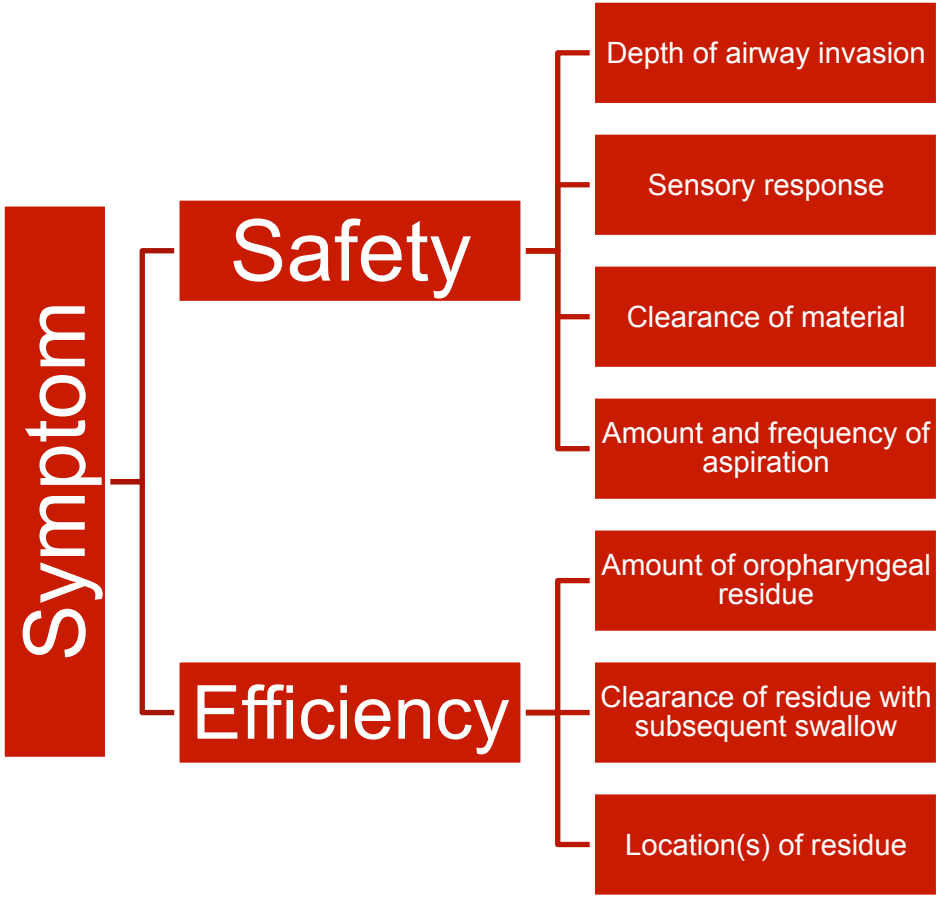
-May also use as form of biofeedback when training certain techniques



Head and Neck Specific Consideration



What do we mean by linking to physiologic impairment?



HULTON/GETTY

Parachutes reduce the risk of injury after gravitational challenge, but their effectiveness has not been proved with randomised controlled trials

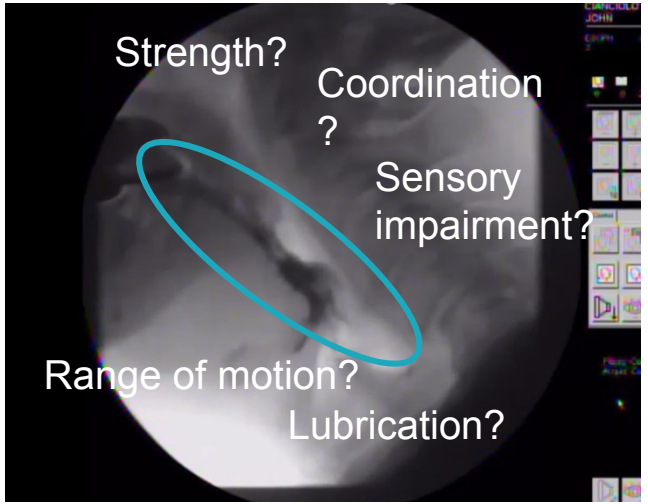
The James

THE OHIO STATE UNIVERSITY
WEXNER MEDICAL CENTER

Symptom (Safety vs Efficiency)

- Why? Swallowing impairments
  - Structural Displacement
    - Hyoid movement
    - Base of tongue retraction
    - Laryngeal elevation
    - Upper esophageal opening
  - Timing deficits
    - Stage response duration
    - Oral phase duration
    - Pharyngeal phase duration
  - Pressure generation
    - Tongue base pressures
    - Velopharyngeal pressures
    - UES pressures

Why?



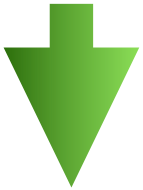
Cannot tell from image- need further testing

Spasticity versus weakness- can look the same

Cranial nerve exam

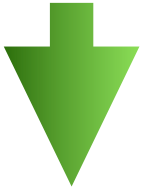
In the moment: Compensatory Techniques

Airway Protection



- Chin Tuck
- Breath Hold
- Supraglottic Swallow
- Super Supraglottic Swallow
- Mendelsohn Maneuver
- Head Turn

Bolus Efficiency

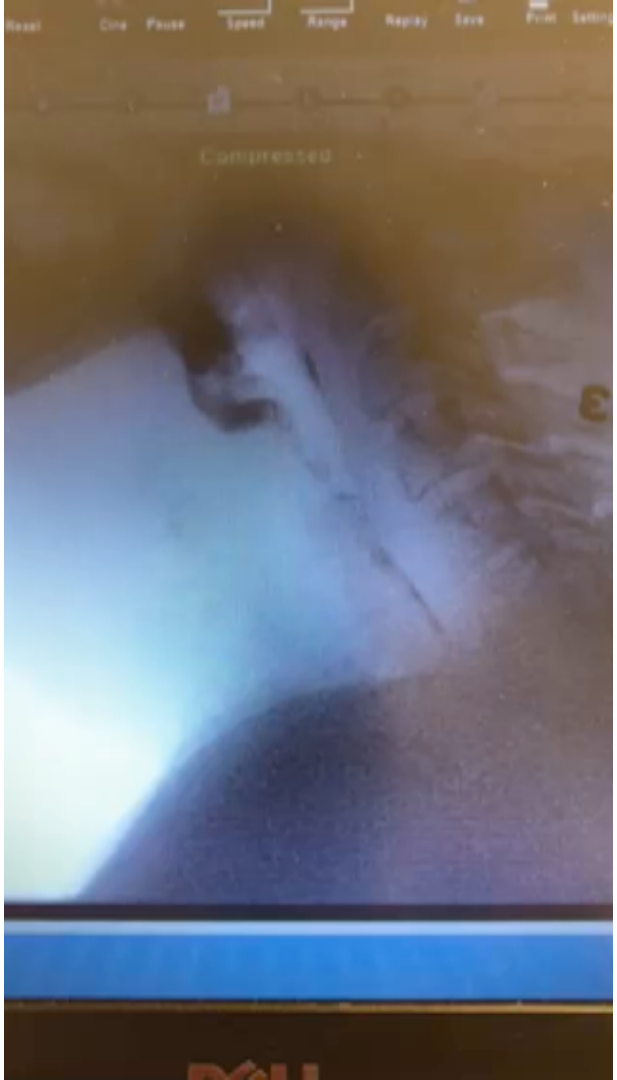


- Double Swallow
- Effortful Swallow
- Head Turn
- Liquid Wash
- Mendelsohn Maneuver
- Head Turn


Compressed
DELL


Titles
Reset
Core
Pause
Speed
Range
Replay
Save
Print
Compressed
DELL


Cine
Pause
Speed
Range
Replay
Save
Print
Settings


Reset
Cins
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Print
Compressed


Cine
Pause
Speed
Range
Replay
Save
Print
Settings


Pause
Speed
Range
Replay
Save
Print
Settings

Behavioral Interventions

- Compensatory methods- indirect strategies to alter bolus flow
  - Postural adjustments
  - Maneuvers: Supraglottic, Super-supraglottic, Mendelsohn
  - Diet modifications
- Eating strategies
  - Eating slowly
  - Alternating liquids and solids
- Rehabilitative- Change swallowing physiology to restore function
  - Exercise regimens

Current practice patterns- Usual care?

- Survey sent to ASHA SIG 13 members
  - 254 responses
  - SLPs working in acute care and rehabilitation settings
  - Treating > 50 dysphagic cases within 6 months
- Treat patients daily for an average of 30 minutes per session
- Infrequent follow-up of treated patients; minimal use of evidence-based measurement tools or exercise-based interventions
- Recommended 47 different treatment techniques and 90 different treatment combinations for the same hypothetical patient
- Common outcome- returning to safe and functional diet (not preinjury status)
- *High level of variability- no "usual care" practice*

Carnaby-Mann et al., 2013

Current practice patterns- challenges

- Variability in practice patterns
- Swallow therapy techniques recommended do not correspond to patient's specific symptoms or physiologic abnormality seen on instrumental exam
- Reliance on clinical bedside versus instrumental exam
- Lack of follow-up
- Much of SLP education is based on a body of knowledge that is inferred and experiential, and on practice, not strong research

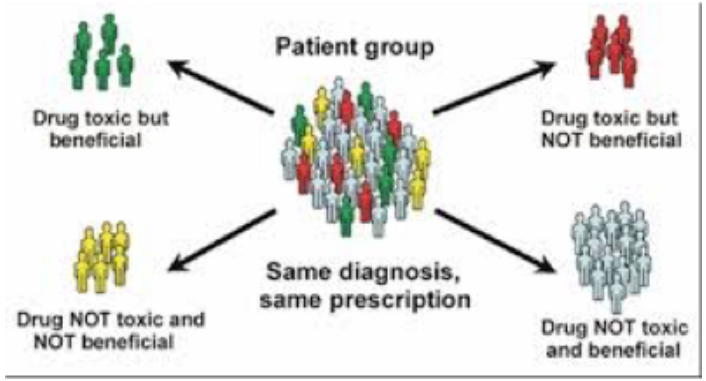
Goal(s) of dysphagia therapy

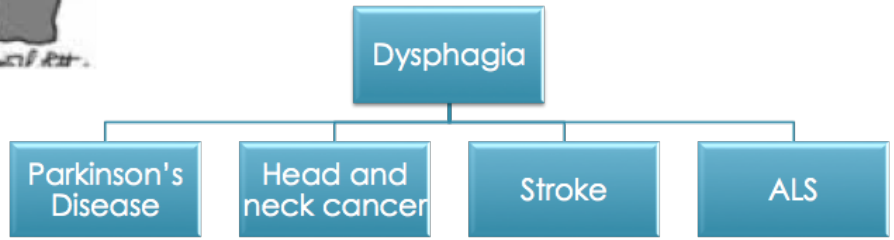
- Improved swallow function
  - How do we define this?

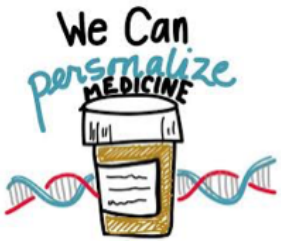
Goal(s) of dysphagia therapy

- Improved swallow function
  - How do we define this?
- Safe and functional oral diet
  - Amount of oral intake
  - Variety of diet- nutritional content
- Improved quality of life
- Patient-reported outcomes- effort/ease of swallowing, meal duration
- Others?

Treatment







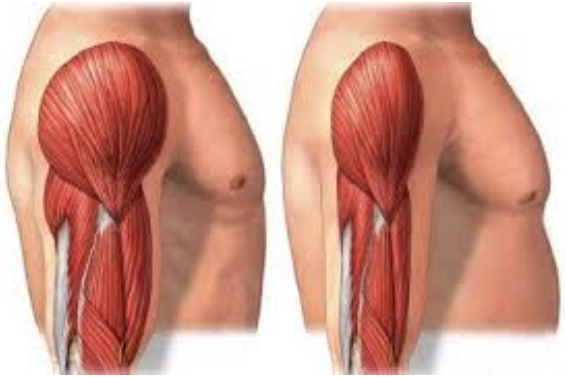
Courtesy of Nicole Rogus-Pulia, PhD

Patient specific factors for consideration in treatment planning

- Age
- Medical Diagnosis
- Cognition
- Patient's goals and preferences
- Caregiver Support
- Prevention / Rehabilitation/ Maintenance

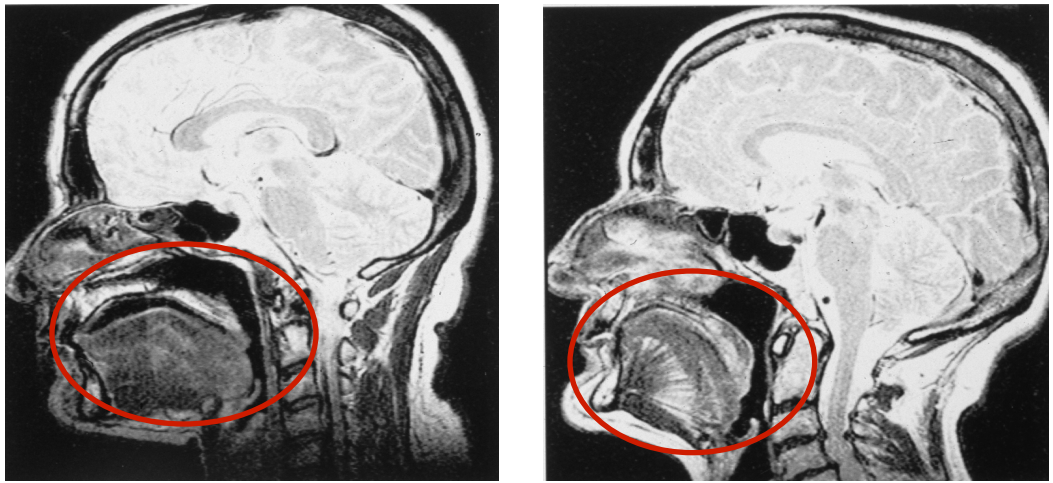
Age: Sarcopenia

Degenerative loss of skeletal muscle mass, quality, and strength with aging (primary sarcopenia)



Sarcopenia- head and neck muscles

Reduction in tongue muscle fiber diameter in the superior longitudinal muscle in 50 human subjects (began at age 40 for men; age 30 for women)- (Nakayama et al., 1991)



38 Yr Old Female

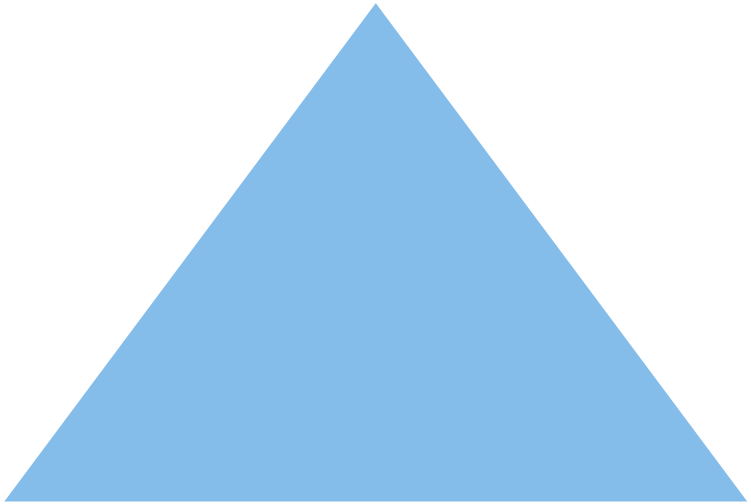
81 Yr Old Female

Medical Diagnosis

- Age
- Tumor site: T-stage
- Treatment (surgery, radiation, chemoradiation)
- Time since treatment
- Comorbidities
- Hx of Dysphagia
- Respiratory Status
- Physical Activity/Function reserve

Clinical Decision Making Paradigm

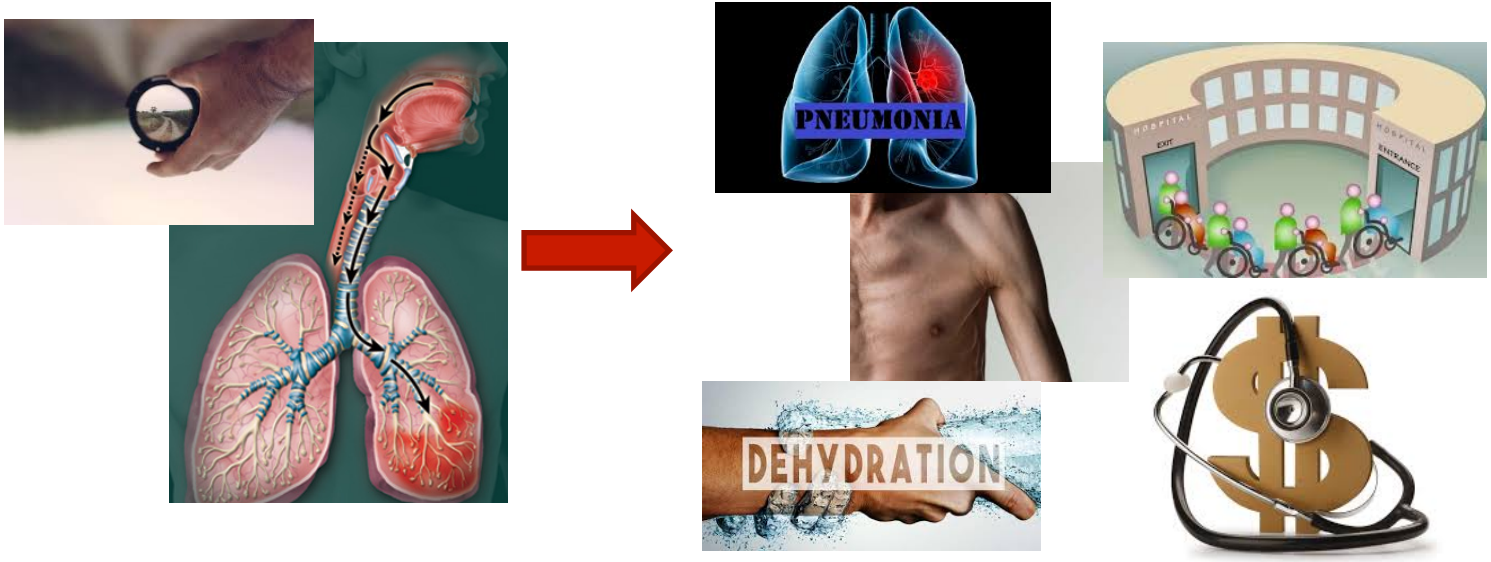
Patient Values and Expectations



Clinical Evidence

Clinical Judgement

Consequences of Dysphagia on Health Status



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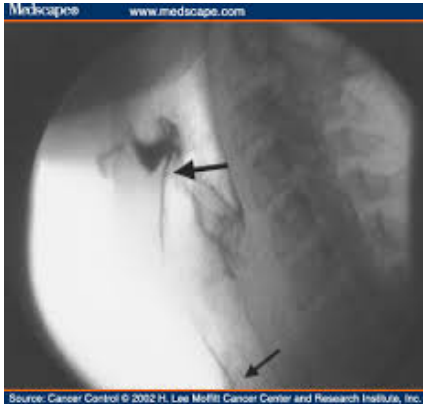
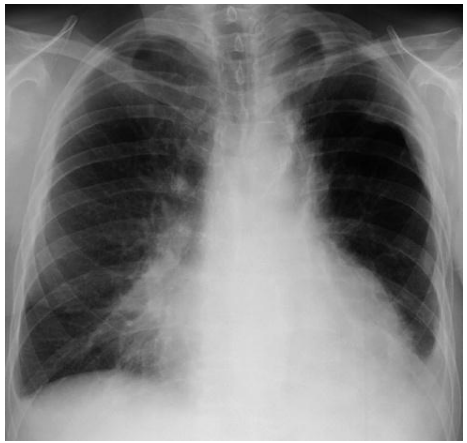
Clinical Decision Making





How much aspiration is too much aspiration?

Dysphagia. 1998 Spring;13(2):69-81.

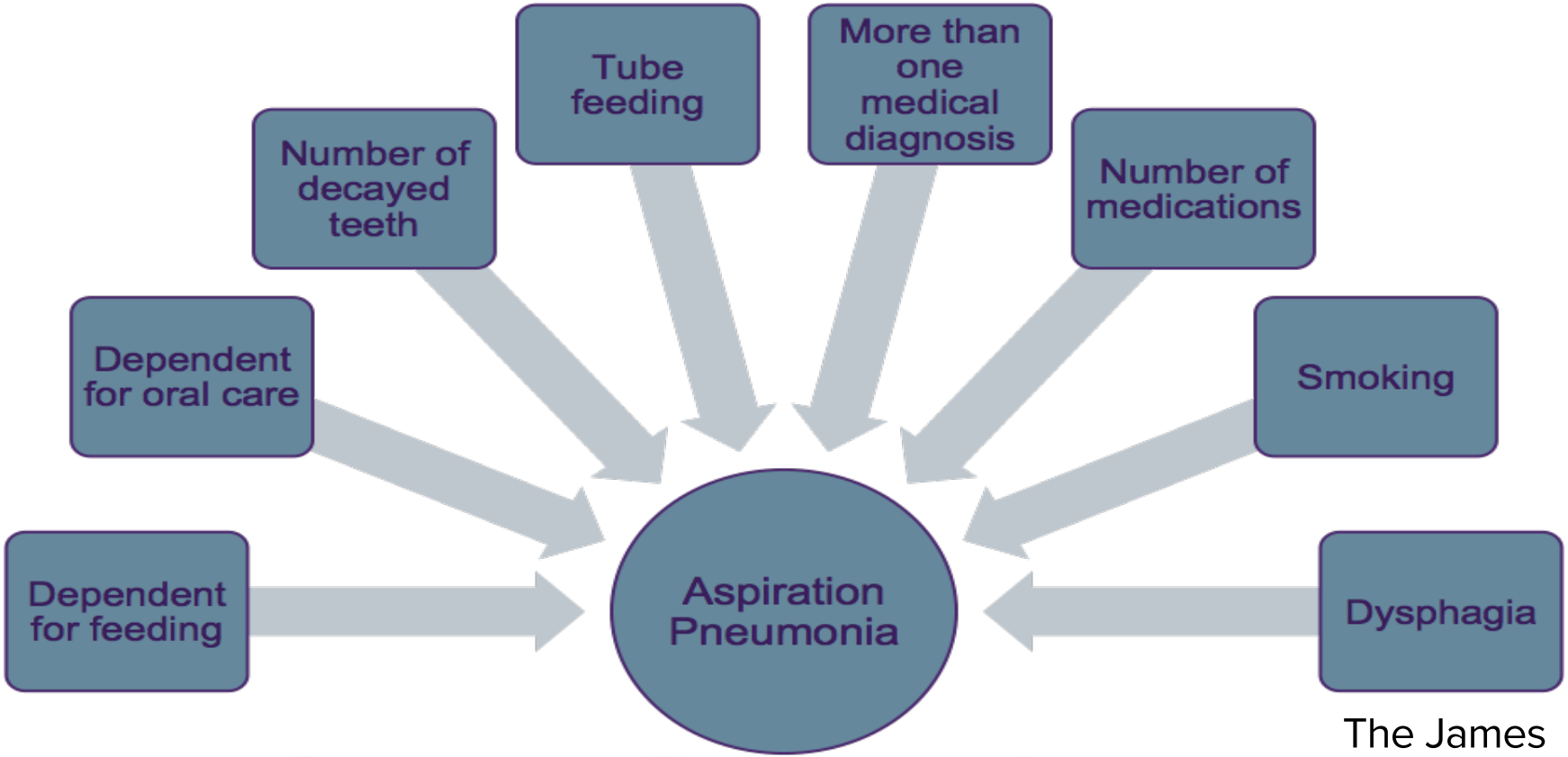
Predictors of aspiration pneumonia: how important is dysphagia?

Langmore SE[1], Terpenning MS, Schork A, Chen Y, Murray JT, Lopatin D, Loesche WJ.

Author information

Abstract

Aspiration pneumonia is a major cause of morbidity and mortality among the elderly who are hospitalized or in nursing homes. Multiple risk factors for pneumonia have been identified, but no study has effectively compared the relative risk of factors in several different categories, including dysphagia. In this prospective outcomes study, 189 elderly subjects were recruited from the outpatient clinics, inpatient acute care wards, and the nursing home care center at the VA Medical Center in Ann Arbor, Michigan. They were given a variety of assessments to determine oropharyngeal and esophageal swallowing and feeding status, functional status, medical status, and oral/dental status. The subjects were followed for up to 4 years for an outcome of verified aspiration pneumonia. Bivariate analyses identified several factors as significantly associated with pneumonia. Logistic regression analyses then identified the significant predictors of aspiration pneumonia. The best predictors, in one or more groups of subjects, were dependent for feeding, dependent for oral care, number of decayed teeth, tube feeding, more than one medical diagnosis, number of medications, and smoking. The role that each of the significant predictors might play was described in relation to the pathogenesis of aspiration pneumonia. Dysphagia was concluded to be an important risk for aspiration pneumonia, but generally not sufficient to cause pneumonia unless other risk factors are present as well. A dependency upon others for feeding emerged as the dominant risk factor, with an odds ratio of 19.98 in a logistic regression model that excluded tube-fed patients.



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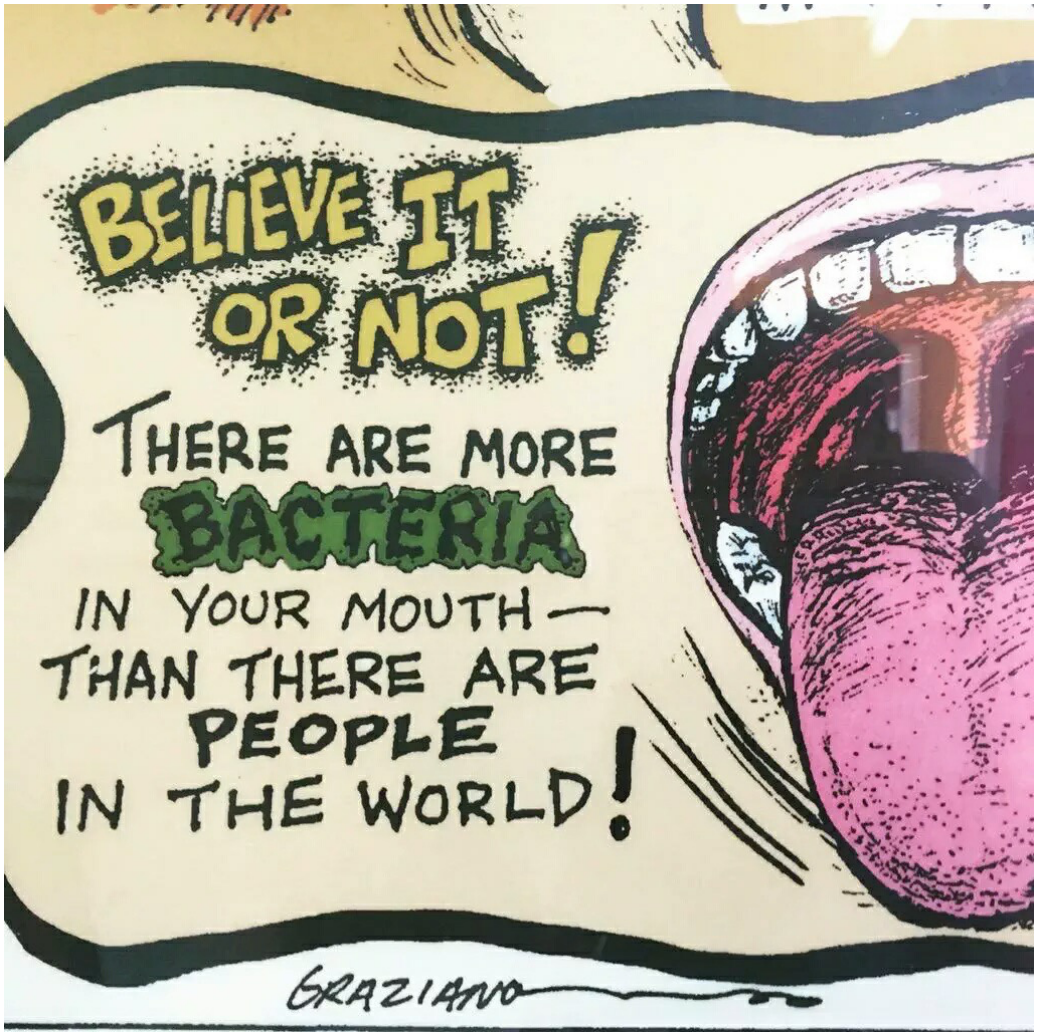
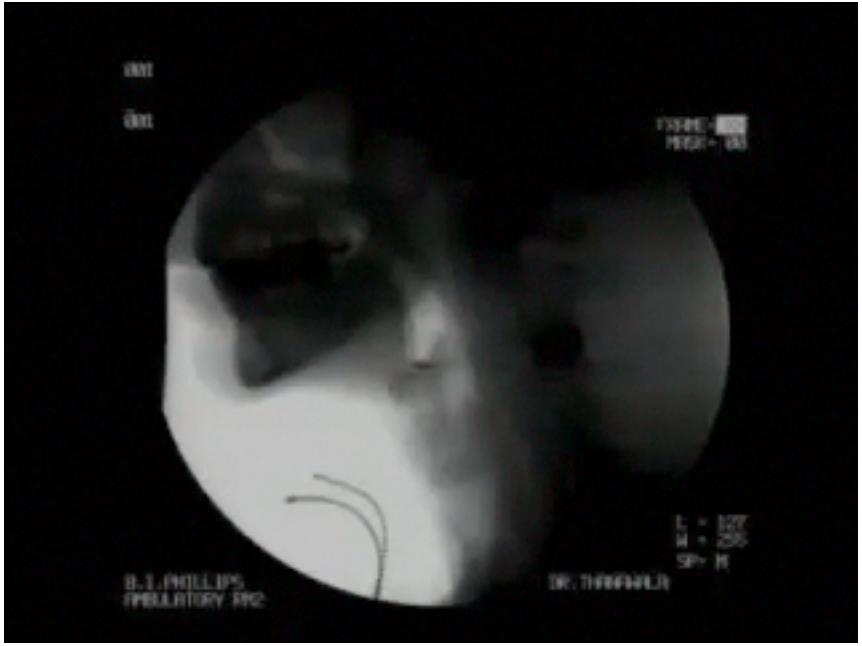
Langmore, S. et al. (1998) Predictors of aspiration pneumonia: how important is dysphagia? *Dysphagia*

Strategies to Maintain Health

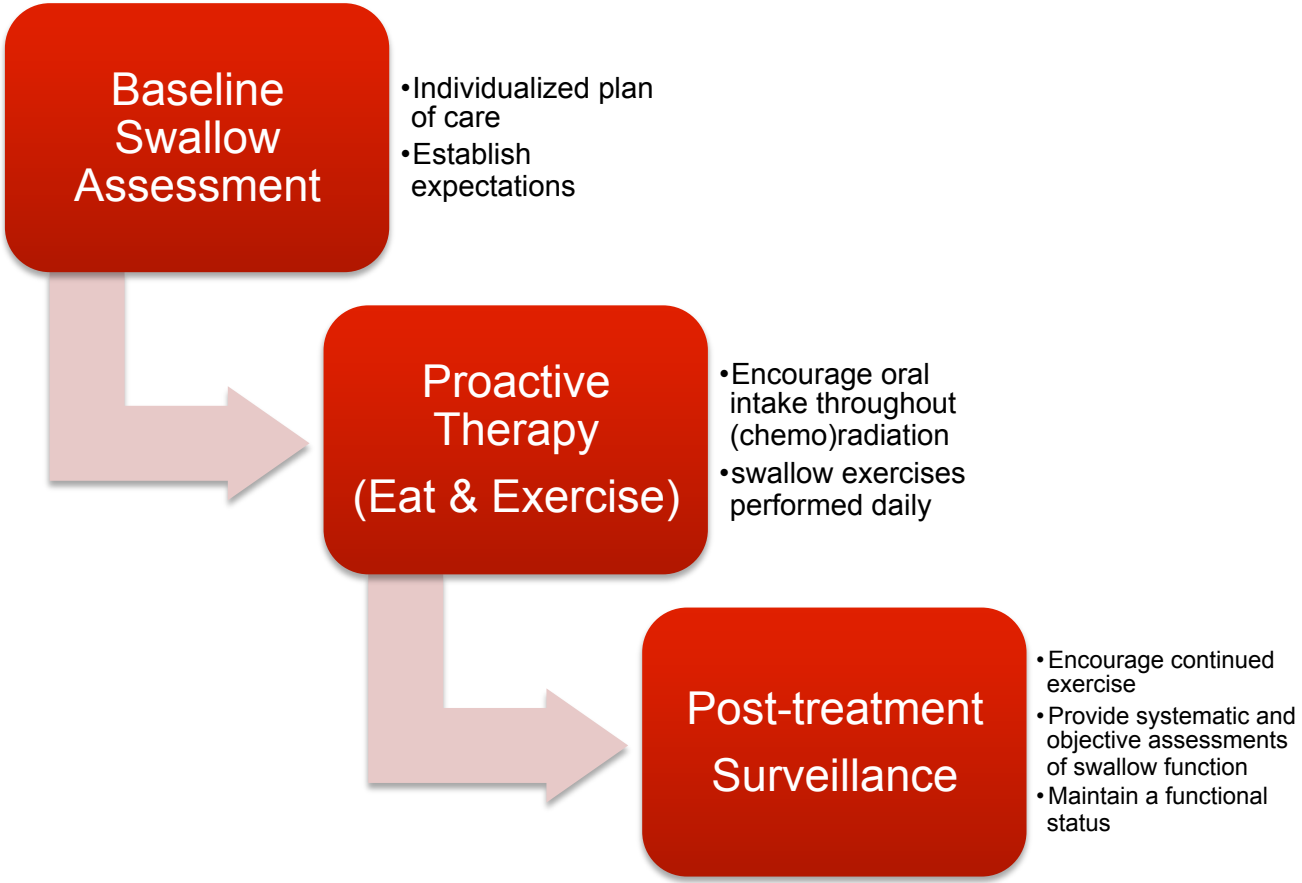

BELIEVE IT OR NOT!
THERE ARE MORE BACTERIA IN YOUR MOUTH — THAN THERE ARE PEOPLE IN THE WORLD!
GRAZIANO

Deeper Dive Into Dysphagia Management

- Starts at the time of Assessment
- Proactive
- Rehabilitative
- Maintenance



Framework


Baseline Swallow Assessment
•Individualized plan of care
•Establish expectations
Proactive Therapy (Eat & Exercise)
•Encourage oral intake throughout (chemo)radiation
•swallow exercises performed daily
Post-treatment Surveillance
•Encourage continued exercise
•Provide systematic and objective assessments of swallow function
•Maintain a functional status

Proactive Therapy

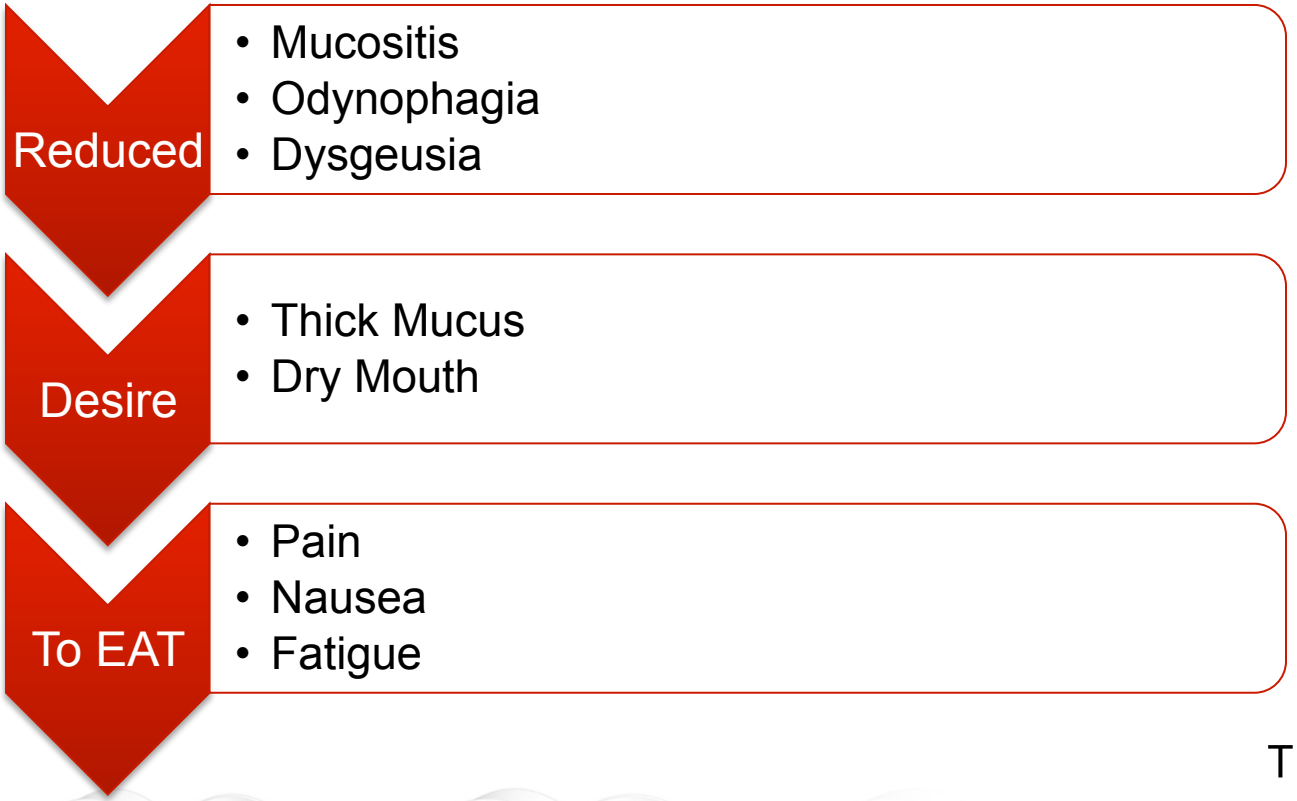
Maintaining Oral Intake '*eat*'

- Superior swallowing-realted QOL Hutcheson 2013
- Reduced duration of G-tube dependency Hutcheson 2013
- Greater return to normal oral diets Hutcheson 2013

Adherence to Therapy '*exercise*'

- Superior swallow physiology Carroll 2008
- Larger muscle mass and T2 signal intensity on MRI Carnaby-Mann 2012
- Reduced duration of G-tube dependency Hutcheson 2013; Van der Molen; Virani
- Greater return to normal oral diets Hutcheson 2013 ; Kotz; Duarte
- Improved QOL measures Kulbersh

Acute Toxicities of Radiation



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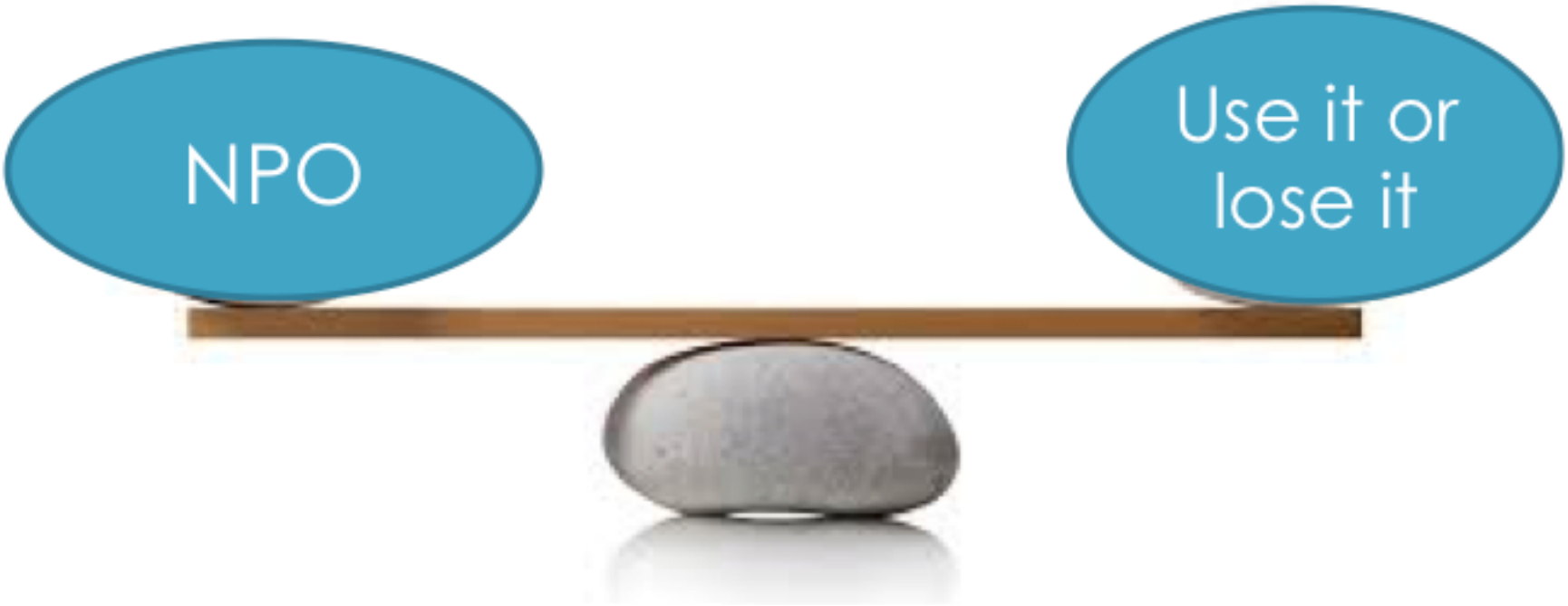
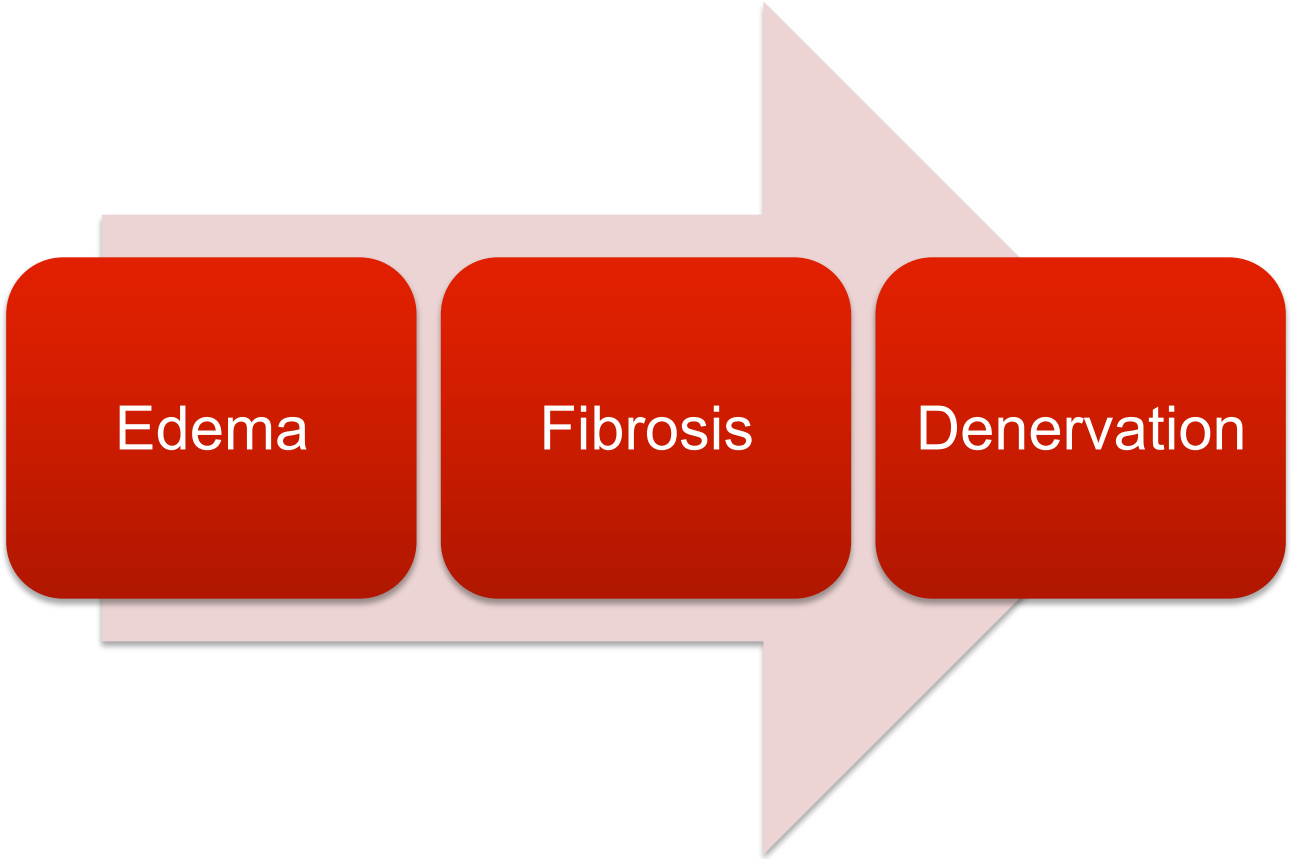
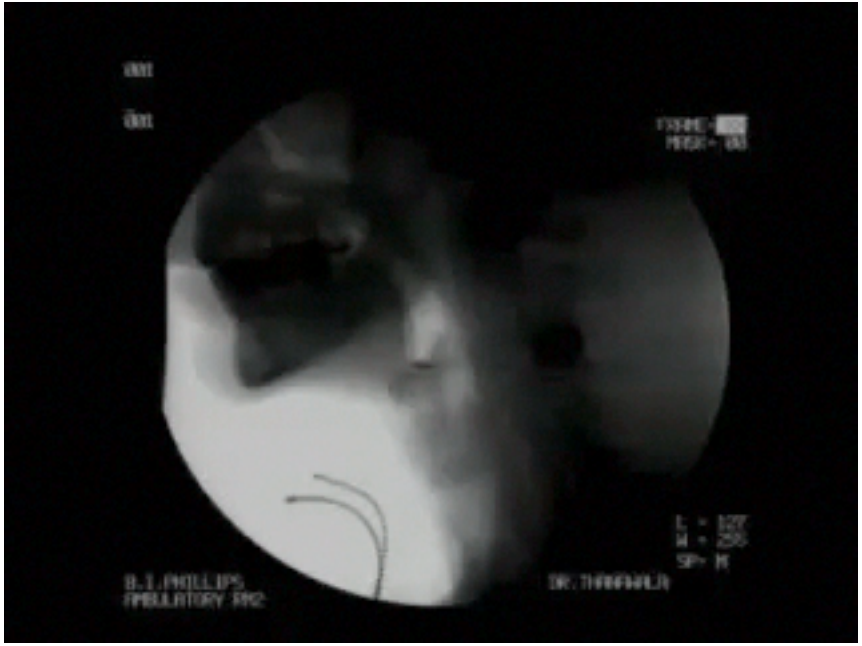
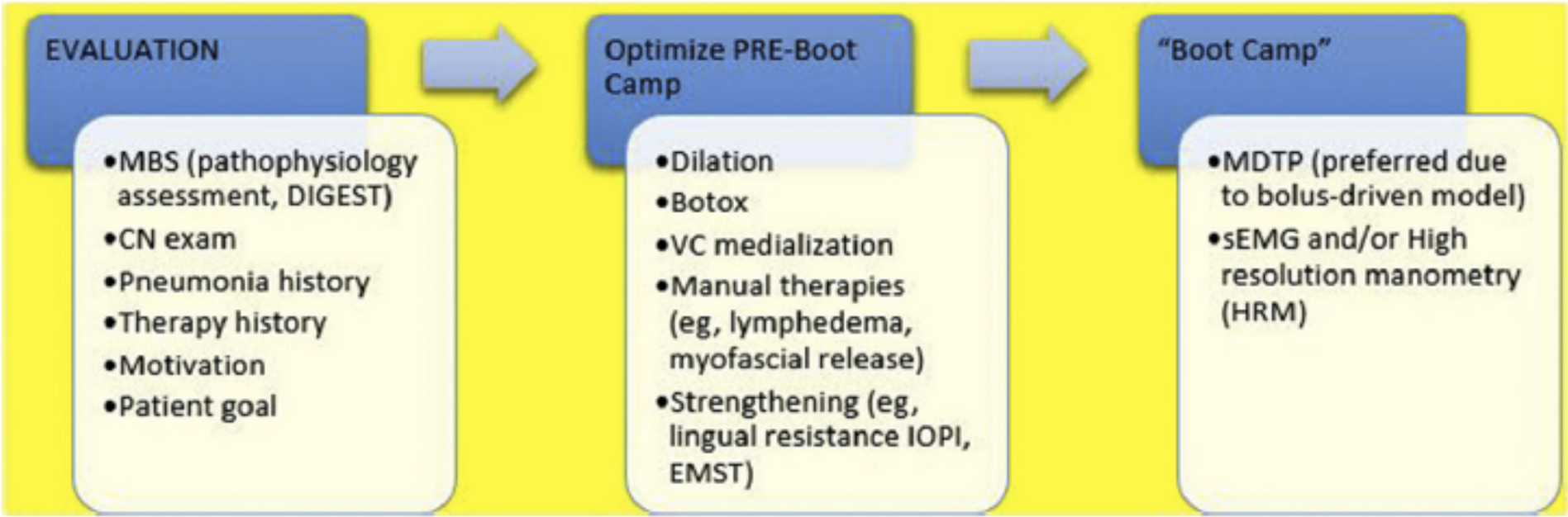

NPO
Use it or lose it

Lose it……

- R – radiation
- A – associated
- D - dysphagia


Edema
Fibrosis
Denervation





Arrese, L.C. and Hutcheson, K. 2018

Surface electromyography

- Biofeedback tool
  - Monitor performance
  - Improved or faster motor learning for novel or impaire
  - Increase swallow effort- gives feedback about intensity
  - Initiate swallow effort in a timely fashion
- Measures intensity of electrical signal generated during muscular contraction, and time of contraction/relaxation
- Used with dysphagia intervention exercise regimen

Device-Driven Therapies

- Lingual Strengthening
- Expiratory Muscle Strength Training
- Motor Control and Coordination
- Bolus-Driven Therapy

Principles of Plasticity

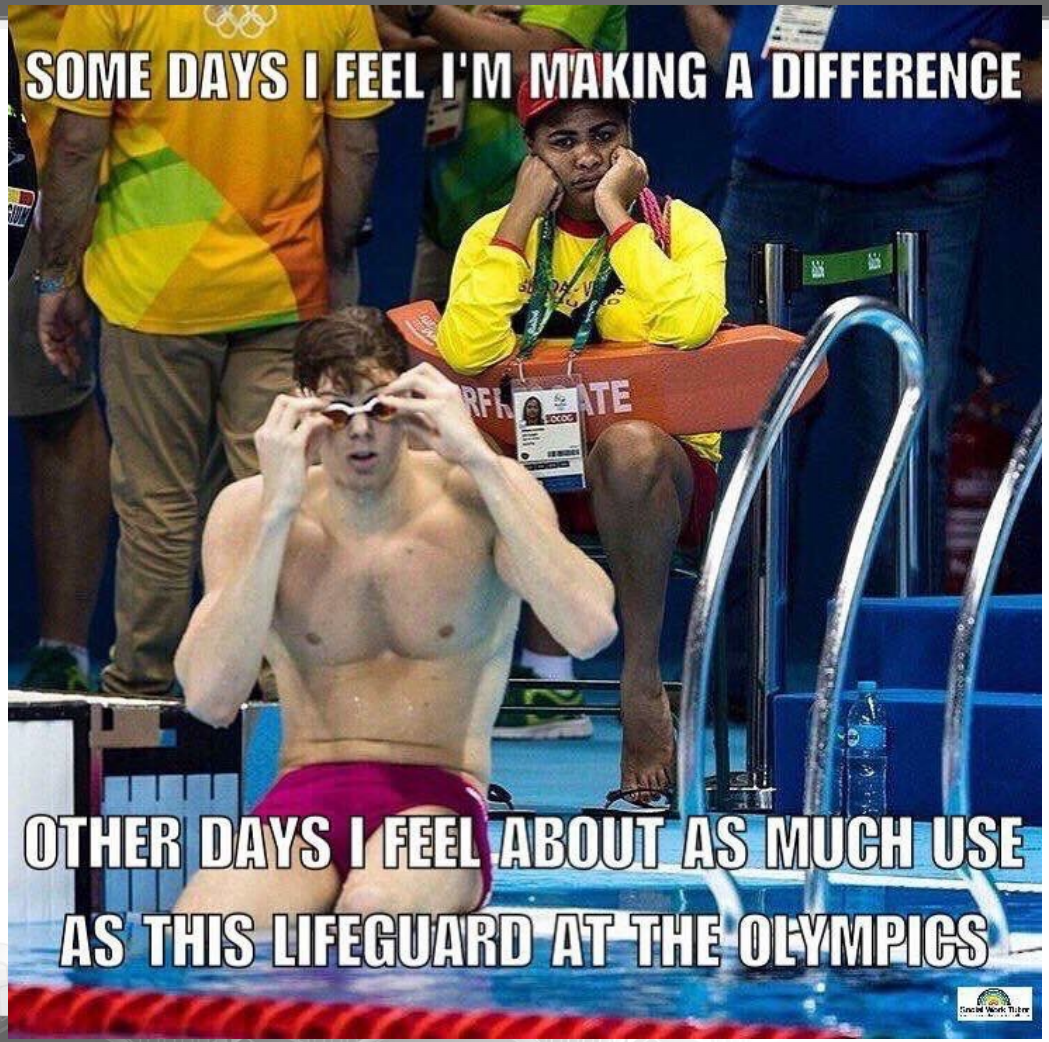
Swallowing and Dysphagia Rehabilitation: Translating Principles of Neural Plasticity Into Clinically Oriented Evidence

- Skeletal muscles have inherent plasticity throughout lifespan
- Use it or Lose it → Use it and Improve it
- *Overload principle:* Physiologic load must exceed the demand for a specific activity in order to challenge the muscle
  - *Progressive:* Load placed must be increased over time
  - *Intense:* Number of repetitions, sets, or days of the week
  - *Task Specificity versus Transference*: Tailoring exercise to specific activity being targeted BUT rote practice of specific movements will transfer to dynamic activities

Rogus-Pulia & Connor; Robbins et al., 2008

Traditional Swallowing Interventions

- Ignore key theoretical principles of neuromuscular plasticity:
  - Do not impose a quantifiable, progressive load on the oropharyngeal musculature.
  - Often do not force the neuromuscular system beyond the level of usual activity thus do not elicit adaptations.
- Objective data to monitor and track performance is limited to number of repetitions performed and the patient's perceived effort.



The James

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Strength

Ability to develop force against an unyielding resistance in a single contraction of unrestricted contraction

Exercise can alter muscle morphology and physiology across the age range

Lingual pressure measurement: IOPI or SwallowSTRONG

Pharyngeal muscular strength- inferred from residue

- Pyriform sinus residue- ? lack of cricopharyngeal muscular compliance
- Pharyngeal area as surrogate for strength

Respiratory Strength

- Maximum Expiratory Pressure

Rogus-Pulia & Connor, 2017

Device-Driven Therapies

- Lingual Strengthening
- Lingual Accuracy
- Expiratory Muscle Strength Training
- Biofeedback utilizing devices
  - sEMG
  - FEES
  - HRM

Lingual Strengthening-Iowa Oral Performance Instrument®

- Isometric Progressive Resistance Training
  - Targets systematically increased
- Treatment Protocol
  - 20 lingual presses (10 front, 10 back)
  - 3 times/day, 3 days/week for 8 weeks

Expiratory Muscle Strength Training

James

STATE UNIVERSITY

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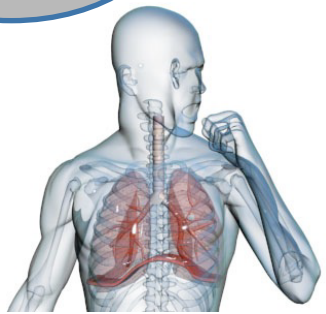
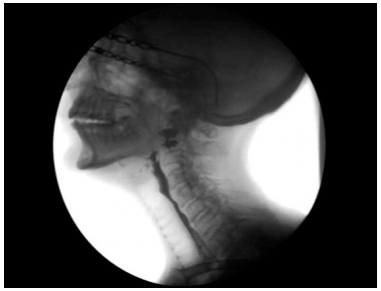
Elderly
Kim et al., 2008

Parkinson's
Troche et al., 2010

Parkinson's
Pitts et al., 2009





HNC
Hutcheson et al. 2017

ALS
Plowman et al., 2016

Professional Voice
Sapienza et al., 2008

Expiratory Muscle Strength Training (EMST)

- Utilizes a calibrated one-way spring-loaded valve that mechanically overloads the expiratory and submental muscles.
- The physiological load on the target muscles can be increased or decreased by varying the device settings (based on MEPs)
- Shown to improve swallow function in individuals with ASL, PD, MS and HNC.

Skill-based training with sEMG (Bisskit)

Goal to improve the precision of swallowing muscle contraction by developing conscious control over timing and strength of swallowing

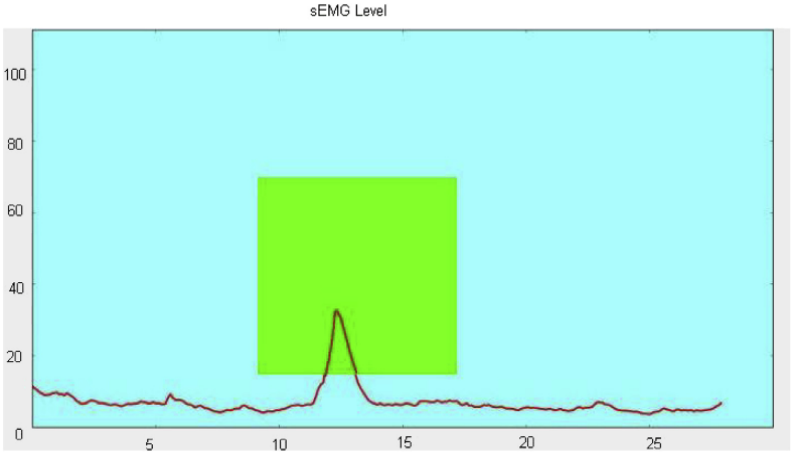
10 participants with Parkinson's disease

5 saliva and 5 10-mL water swallows with task types randomized within and between participants

> Instructions were, "Hold the water/saliva in your mouth and when you hear the go signal, swallow as quickly as possible. Command presented at random intervals

10 sessions over 2 weeks

Durational measurements extracted included premotor time (PMT), preswallow time, and duration of submental muscle contraction



Athukorala et al. 2014

Bolus-Driven Therapy: McNeill dysphagia therapy program (MDTP)

- Progressive strengthening program that incorporates a hard swallow across a hierarchy of progressively more challenging feeding tasks
  - Advancing steps of altered bolus volume, bolus consistency, eating rate, and amount of oral intake
- Greater improvements in clinical dysphagia severity and improved swallowing biomechanics

Case Study

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