

# VFSS: The Road to Standardization

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# Disclosure

- I have no financial or professional relationship with the creators or distributors of the MBSImP and Varibar Products (Bracco Diagnostics).
- I have permission from Northern Speech Services to discuss the MBSImP as a Registered MBSImP Clinician, however, participation in this presentation does not qualify participants to use the MBSImP.



# Eating & Drinking: A Way of Living



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# Dysphagia Impacts Entire Age Spectrum

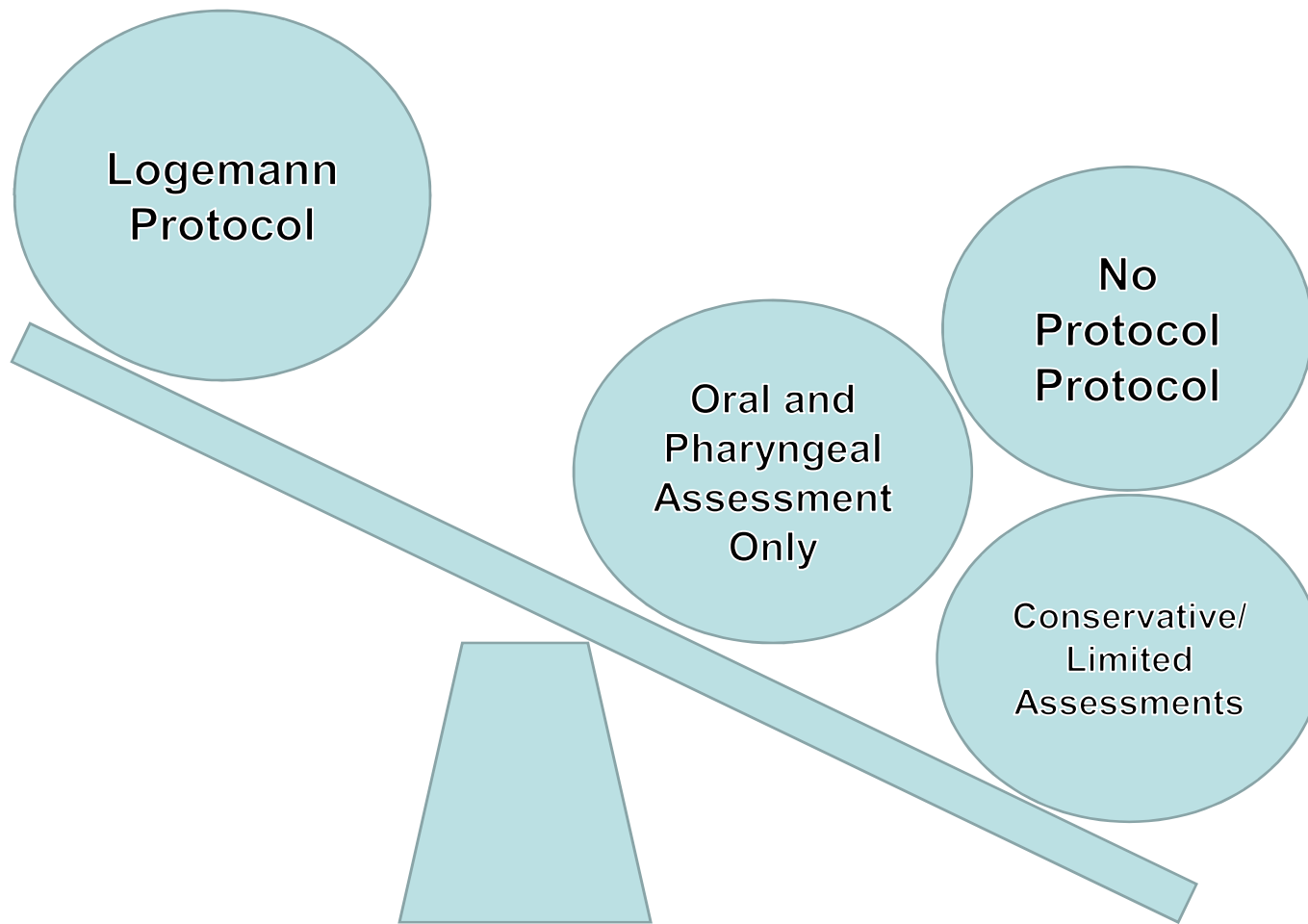
## Frail Elderly



## Fragile Young



# Historical MBSS Practice Patterns



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# Standardization of the Modified Barium Swallow Study

**M**odified

**B**arium

**S**wallow

**I**mpairment

**P**rofile

**(MBSImP™©)**

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# Purpose & Rationale for Standardizing the MBSS

- Evidence not opinion should guide clinical decision making
- The MBSImP is a research-based standardization of the MBSS
- The MBSImP provides the means for speech-language pathologists to interpret and communicate results of MBSS in a manner that is
  - *Evidence-based, consistent, specific, and accurate*



# Critical Necessity of Standardization in Healthcare

*Agency for Healthcare Research and Quality* indicated in AHRQ Publication 01-017 that a *lack of standardization*

- Impedes understanding of true functional results
- Produces ambiguous reporting of outcomes
- Hinders understanding of restorative, rehabilitative targets





- The AHRQ also defines what should be standardized
  - Instrument's contents and format
  - Data collection protocol's approach and method
  - Analyses, minimizing variation in scoring and interpretation
  - Reporting of results

**\*The MBSImP satisfies these requirements\***



# Development of the MBSImP

- Developed by Dr. Bonnie Martin-Harris
- Consensus validation from expert panel of 12 interdisciplinary dysphagia specialists
- Developed & validated during a 5-year NIH-funded study
- Used factor analysis to determine 17 distinct physiological components involved in the swallowing process
- Details of the study described in Martin-Harris, B., Brodsky, M.B., Michel, Y., Castell, D.O., Schleicher, M., Sandidge, J., Maxwell, R., & Blair, J. (2008). MBS measurement tool for swallow impairment – MBSImP: establishing a standard. *Dysphagia*, 23(4), 392-405.



# Overview of the MBSImP

- Uses a standardized approach for assessment of swallowing physiology
  - Reliability training
  - Assessment protocol
  - Scoring and interpretation
  - Terminology
  - Reporting
- Observation of impairment in 17 distinct components of physiology involved in the swallowing process are used to systematically identify target(s) for therapeutic intervention



# MBSImP Reliability Training

- Required online (web-based) training of 21 hours (2.1 CEUs): MBSImP™© Standardized Training and Reliability Testing
  1. Learning Zone – 72 adult videofluorosocopy segments
  2. Training Zone – single swallows/full study
  3. Reliability Zone – minimum of 80% accuracy for each of the 17 components tested
  4. Patient Data & Reports – access only to Registered MBSImp Clinicians

<http://www.northernspeech.com/MBSImP/>



# MBSImP™© Standardized Protocol (Viscosity, Volume, Method of Administration)

## LATERAL VIEW

1. Thin – 5 ml via teaspoon
2. Thin – 5 ml via teaspoon
3. Thin – Controlled cup drink
4. Thin – Sequential cup drink
5. Nectar – 5 ml via teaspoon
6. Nectar – Controlled cup drink
7. Nectar – Sequential cup drink
8. Honey – 5 ml via teaspoon
9. Pudding – 5 ml via teaspoon
10. Lorna Doone cookie – ½ cookie with 3 ml pudding

## A-P VIEW

1. Nectar – 5 ml via teaspoon
2. Pudding – 5 ml via teaspoon



\*Varibar®, a product line available in the United States, is made specifically for oropharyngeal swallow examinations. It comes in different consistencies, all containing the same concentration of barium (40% weight/volume). Indicated for adult use only.



# Performing VFSS with Radiology

- Lateral views include the lips anteriorly, nasal cavity superiorly, PE segment inferiorly, and cervical spine posteriorly.
- AP views include observation of bolus passage from mouth to LES during bolus transit. *Attempts to raise patient's chin to neutral position should be encouraged for complete viewing of pharynx.*
- Fluoroscope set at Pulse Rate 29.97/30 *pulses* per second or Continuous mode.
- Video capture also set to 29.97/30 *frames* per second.



# MBSImP Protocol and Length of Radiation Exposure Time

- No unnecessary radiation exposure to patients.
- Average radiation exposure was **2.9 minutes**, well within the range of exposure times most cited

Bonilha, H.S., Humphries, K., Blair, J., Hill, E., McGrattan, K., Carnes, B., Martin-Harris, B. Radiation exposure time during MBSS: Influence of swallowing impairment severity, medical diagnosis, clinician experience, and standardized protocol use. *Dysphagia*. March 2013, Volume 28(1), pp 77-85



# MBSImP's 17 Components



## **ORAL Impairment**

1. Lip Closure
2. Bolus Hold Position
3. Bolus Preparation/  
Mastication
4. Bolus Transport/  
Lingual Motion
5. Oral Residue
6. Initiation of  
Pharyngeal  
Swallow

## **PHARYNGEAL Impairment**

7. Soft Palate Elevation
8. Laryngeal Elevation
9. Anterior Hyoid Movement
10. Epiglottic Movement
11. Laryngeal Vestibular Closure
12. Pharyngeal Stripping Wave
13. Pharyngeal Contraction
14. Pharyngoesophageal  
Segment Opening
15. Tongue Base Retraction
16. Pharyngeal Residue

## **ESOPHAGEAL Impairment**

17. Esophageal  
Clearance





# MBSImP's Components, Scores, Score Definitions

- Components are scored on a 3-5 Likert scale based upon inter-rater reliability
- Score based on component-specific physiology, not the functionality that is often based on compensation
- No severity indicators associated with impairment scores

**The MODIFIED BARIUM SWALLOW IMPAIRMENT PROFILE: MBSImP™ ©**  
Components, Scores, and Score Definitions

Component	Score	Score Definition
<b>ORAL Impairment</b>		
<b>Component 1—Lip Closure</b>	0-4	0 = No lip closure 1 = Intentional escape; no progression to anterior lip 2 = Escape from intentional escape or lateral structure to anterior lip 3 = Lip edge protruding to seal the 4 = Lip edge beyond end of the
<b>Component 2—Tongue Contact During Swallow</b>	0-4	0 = No tongue contact 1 = Proper placement of tongue dorsum on hard palate (50%) 2 = Proper placement of tongue dorsum on hard palate 3 = Proper placement of tongue dorsum on hard palate
<b>Component 3—Buccal Constriction/Maneuver</b>	0-4	0 = Strong and effective chewing and swallowing 1 = Some prolonged chewing/swallowing with 100% peroral bolus 2 = Two prolonged chewing/swallowing with 100% peroral bolus 3 = Minimal chewing/swallowing with 100% peroral bolus
<b>Component 4—Buccal Transposition/Manual Method</b>	0-4	0 = Oral tongue motion 1 = Cephalic initiation of tongue motion 2 = Cephalic initiation of tongue motion 3 = Cephalic initiation of tongue motion 4 = Manual to manual motion
<b>PHARYNGEAL Impairment</b>		
<b>Component 5—Soft Palate Contraction</b>	0-4	0 = No contraction of soft palate 1 = Weak contraction of soft palate 2 = Moderate contraction of soft palate 3 = Strong contraction of soft palate
<b>Component 6—Laryngeal Elevation</b>	0-4	0 = Complete elevation of larynx with complete approximation of aryepiglottic folds 1 = Partial elevation of larynx with complete approximation of aryepiglottic folds 2 = Minimal elevation of larynx with complete approximation of aryepiglottic folds 3 = No elevation of larynx
<b>Component 7—Aryepiglottic Closure</b>	0-4	0 = Complete closure of aryepiglottic folds 1 = Partial closure of aryepiglottic folds 2 = No closure of aryepiglottic folds
<b>Component 8—Laryngeal Motion</b>	0-4	0 = Complete motion 1 = Partial motion 2 = No motion
<b>Component 9—Pharyngeal Contraction/Maneuver</b>	0-4	0 = Complete contraction of pharynx 1 = Partial contraction of pharynx 2 = Minimal contraction of pharynx 3 = No contraction of pharynx
<b>Component 10—Pharyngeal Residue</b>	0-4	0 = No residue 1 = Small amount of residue 2 = Moderate amount of residue 3 = Large amount of residue 4 = Significant amount of residue
<b>ESOPHAGEAL Impairment</b>		
<b>Component 11—Esophageal Contraction/Maneuver</b>	0-4	0 = Complete contraction of esophagus 1 = Partial contraction of esophagus 2 = Minimal contraction of esophagus 3 = No contraction of esophagus
<b>Component 12—Esophageal Residue</b>	0-4	0 = No residue 1 = Small amount of residue 2 = Moderate amount of residue 3 = Large amount of residue 4 = Significant amount of residue



# MBSImP's Components, Scores, Score Definitions (Cont.)

**The MODIFIED BARIUM SWALLOW IMPAIRMENT PROFILE: MBSImP™ ©**  
Components, Scores, and Score Definitions

**ORAL Impairment**

**Component 1—Lip Closure**

- 0 = No lip closure
- 1 = Inadequate lip closure to prevent spill
- 2 = Escape from functional space of lateral incisors to anterior alveolar vestibular space
- 3 = Lip curl protruding to mid line
- 4 = Lip curl beyond mid line

**Component 2—Tongue Correct Jawing (Bolus Hold)**

- 0 = Tongue flat, no contact with hard palate
- 1 = Tongue elevated but not in contact with hard palate (TDP)
- 2 = Posterior wedge of PAAL to 1st half of hard
- 3 = Posterior wedge of tongue into ball of hard

**Component 3—Bolus Transfer to Pharyngeal Wall**

- 0 = Truly and sufficient contact and coating
- 1 = Not positioned enough to contact with the PAAL (no coating)
- 2 = Minimal coating with only copy of bolus contacted

**Component 4—Bolus Transfer to Larynx**

- 0 = Bolus tongue motion
- 1 = Delayed initiation of tongue motion
- 2 = Slowed tongue motion
- 3 = Complete tongue motion to larynx
- 4 = Minimal to no tongue motion

**PHARYNGEAL Impairment**

**Component 5—Soft Palate Elevation (SP)/pharyngeal wall (PW)**

- 0 = No bolus between soft palate and 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 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 7—Soft Palate Elevation (SP)/pharyngeal wall (PW)**

- 0 = No bolus between soft palate and 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 17—Esophageal Clearance (Upright Position)**

- 0 = Complete clearance; esophageal coating
- 1 = Esophageal retention
- 2 = Esophageal retention with retrograde flow below pharyngoesophageal segment (PES)
- 3 = Esophageal retention with retrograde flow through PES
- 4 = Minimal to no esophageal clearance

**ESOPHAGEAL Impairment**

**Component 11—Esophageal Retention (Upright Position)**

- 0 = Complete clearance; esophageal coating
- 1 = Esophageal retention
- 2 = Esophageal retention with retrograde flow below pharyngoesophageal segment (PES)
- 3 = Esophageal retention with retrograde flow through PES
- 4 = Minimal to no esophageal clearance

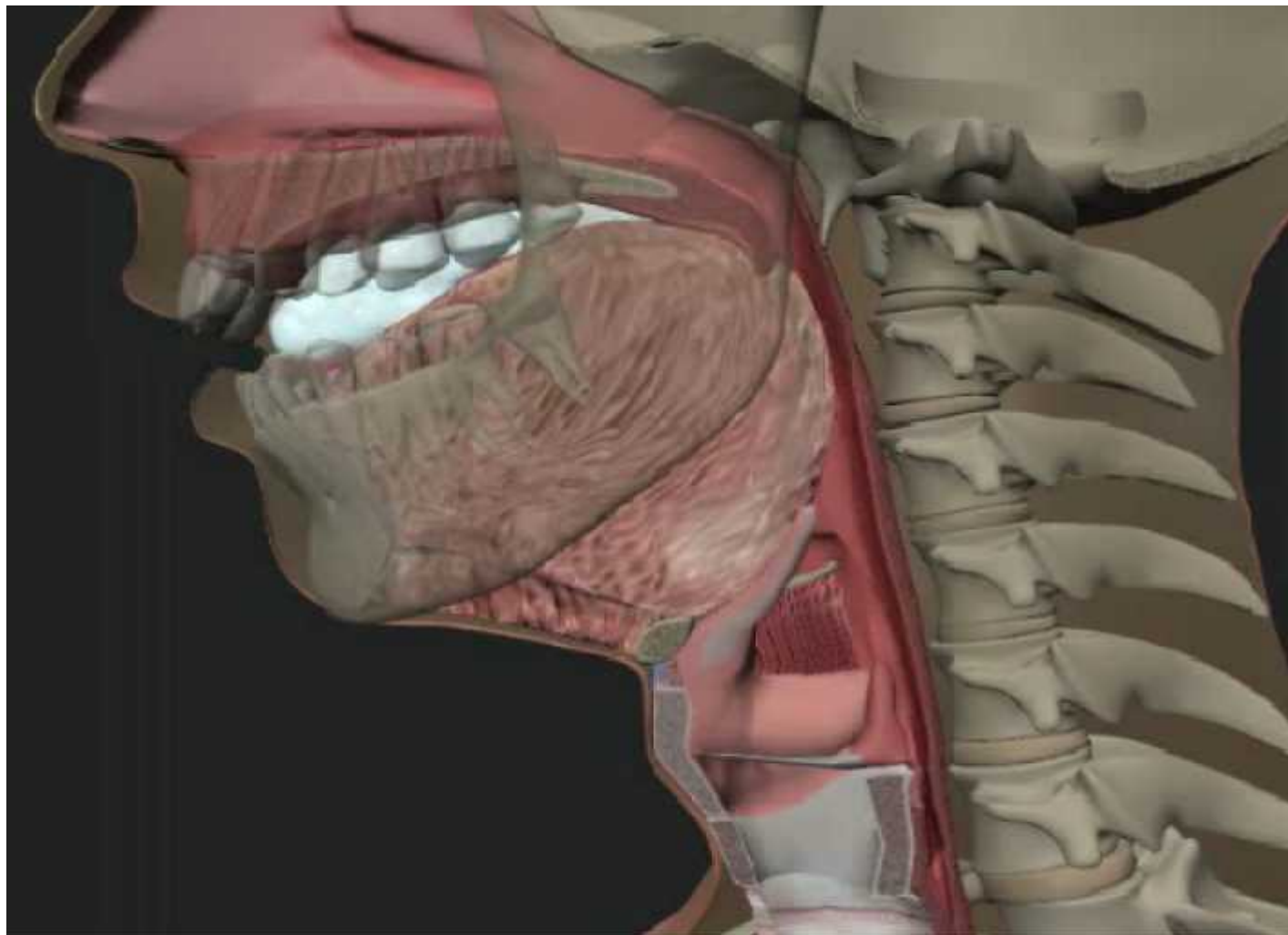


# Overall Impression (OI) Score

- The OI score **represents the “worst” (i.e. most impaired) score observed across all consistencies and volumes.**
- The 1<sup>st</sup> 5ml tsp. administration of thin liquid (trial #1) should not be considered when formulating the OI score.
- The OI score is based on the **initial** swallow of each trial.
- For sequential swallow tasks, each swallow is to be considered in formulating the OI score.
- If a consistency cannot be given due to safety concerns, the related component(s) are automatically assigned the worst (highest) score.



# Normal Swallow Structures



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# Normal Swallow Structures



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# Sample Full Study



# Scoring – Components 1, 2, 4



# Scoring – Components 4, 6, 7, 8, 11





## Scoring - Components 9, 10, 12, 14, 15, 16



# Scoring – Components 3, 13, 17

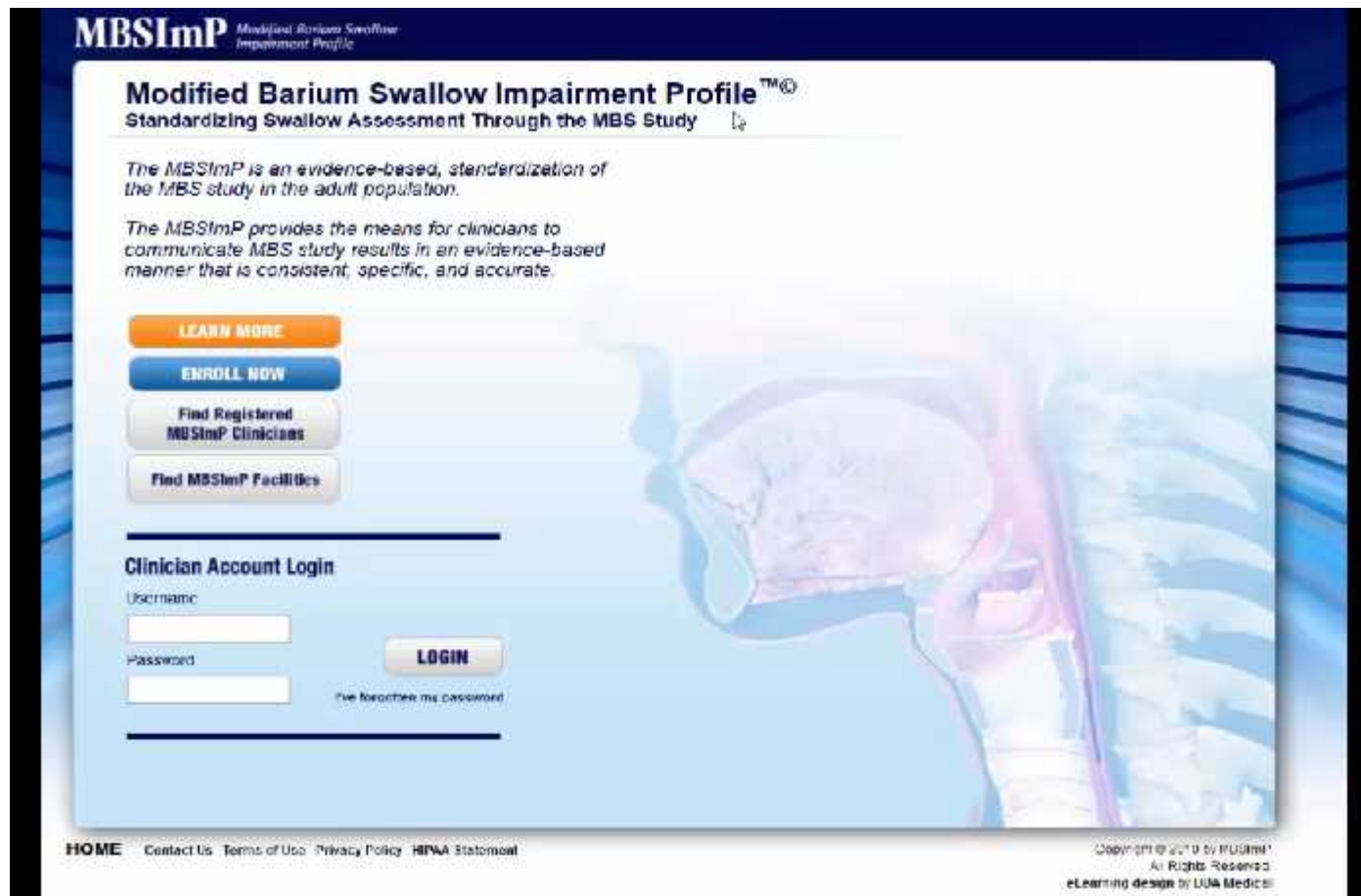


# Patient Data & Reports

- Access to a collection of web-based tools that can be used daily to store and manage individual patient MBSImp assessment and treatment data in a secure HIPAA-compliant database to automatically generate standardized editable MBSImp study reports that can be imported into most electronic medical records
- Compare MBSImp study and treatment results over time
- Generate data for performance Improvement studies
- Track patient progress and outcomes in terms of presentation and recovery patterns across like diagnostic categories
- Demonstrate evidence for targeted treatment



# Patient Data & Reports Demo



The screenshot displays the MBSImP (Modified Barium Swallow Impairment Profile) website. At the top left, the logo reads "MBSImP Modified Barium Swallow Impairment Profile". The main heading is "Modified Barium Swallow Impairment Profile™©" with the subtitle "Standardizing Swallow Assessment Through the MBS Study". Below this, two paragraphs describe the MBSImP as an evidence-based standardization of the MBS study and a tool for clinicians to communicate results. A navigation menu includes buttons for "LEARN MORE", "ENROLL NOW", "Find Registered MBSImP Clinicians", and "Find MBSImP Facilities". A "Clinician Account Login" section contains fields for "Username" and "Password", a "LOGIN" button, and a link to "Forgot your password?". The background features a sagittal anatomical diagram of the human head and neck. At the bottom, a footer contains navigation links (HOME, Contact Us, Terms of Use, Privacy Policy, HIPAA Statement) and copyright information: "Copyright © 2019 by MBSImP. All Rights Reserved. eLearning design by UAA Medical".



# References

- Martin-Harris, B., Brodsky, M.B., Michel, Y., Castell, D.O., Schleicher, M., Sandidge, J., Maxwell, R., & Blair, J. (2008). MBS measurement tool for swallow impairment – MBSImp: establishing a standard. *Dysphagia*, 23(4), 392-405.
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- Bonilha, H.S., Humphries, K., Blair, J., Hill, E., McGrattan, K., Carnes, B., Martin-Harris, B. Preliminary Investigation of the Effect of Pulse Rate on Judgments of Swallowing Impairment and Treatment Recommendations. *Dysphagia*, 28(4), 528-538.
- Agency for Healthcare Research and Quality. Translating Research Into Practice (TRIP)-II: Fact Sheet. AHRQ Publication No. 01-P017. Rockville, MD: 2001.



**THANK YOU FOR LISTENING**



**KEEP  
CALM  
PRESENTATION IS OVER  
ANY  
QUESTIONS?**

