

Table of Contents

*MBSS PROCEDURAL GOVERNANCE* ..... 2

    American College of Radiology:.....2

    American Speech-Language Hearing Association: .....2

*SUPPORT FOR MBSIMP STANDARDIZATION*..... 3

    Speaking points for standardization.....3

    Standardization of barium volumes & consistencies .....4

*SUPPORT FOR ESOPHAGEAL FOLLOW THROUGH*..... 5

    Localization of esophageal problems .....5

    Esophageal follow-through and its association with esophageal dysfunction .....5

    Effect of oropharyngeal swallow strategies on esophageal function .....6

    Protocol/standardization of the esophageal follow-through .....6

    Reporting the esophageal follow-through .....7

*RADIATION EXPOSURE* ..... 8

*SLP AND RADIOLOGIST COLLABORATION* ..... 8

## MBSS PROCEDURAL GOVERNANCE

### American College of Radiology:

- 2017 ACR-SPR PRACTICE PARAMETER FOR THE PERFORMANCE OF THE MODIFIED BARIUM SWALLOW – Section D.1.a (<https://www.acr.org/-/media/ACR/Files/Practice-Parameters/Modified-Ba-Swallow.pdf>. Accessed April 20, 2018):
  - *Assessment includes all phases of swallowing from the preparatory oral phase through the oral transfer phase and pharyngeal phase. The esophageal phase may be assessed on other swallows.*

### American Speech-Language Hearing Association:

- SLP must possess the ability to recognize characteristic patient complaints and obtain a clinical history, which assists in identifying primary or related esophageal phase problems
- The role of the SLP includes identifying disorders of the upper aerodigestive tract relative to swallowing, which includes oral, pharyngeal, and cervical esophageal anatomic regions
- Clinicians should be aware that oropharyngeal swallowing function is often altered in patients with esophageal motility disorders and dysphagia
- Knowledge and Skills Needed by Speech-Language Pathologists Performing Videofluoroscopic Swallowing Studies (<https://www.asha.org/policy/KS2004-00076/>)
  - *The implementation of the videofluoroscopic swallowing study requires advanced and specific skills in order to determine an appropriate test protocol, make online decisions regarding management options during the examination, assess oral, pharyngeal, and esophageal swallowing physiology, make specific functional diagnoses and dietary recommendations, and understand issues relative to radiation equipment and safety.*
  - *The videofluoroscopic swallowing study is a dynamic radiographic study. The examination images oral, pharyngeal, and cervical-esophageal bolus flow during swallowing*
  - *Knowledge is required in: The interrelationships of the oral, pharyngeal, and esophageal phases of swallowing; The range of symptoms that may be reported by individuals, caretakers, or parents that reflect possible oral, pharyngeal, and/or esophageal dysphagia; If esophageal screening is completed, describe any suspected anatomic and/or physiologic abnormalities of the esophagus which might impact the pharyngeal swallow, deferring to radiology for diagnostic statements.*
- ASHA Practice Portal, Adult Dysphagia (<https://www.asha.org/Practice-Portal/Clinical-Topics/Adult-Dysphagia/>. Accessed April 20, 2018):
  - SLPs with appropriate training and competence are involved in the diagnosis and management of oral and pharyngeal dysphagia. *SLPs also recognize causes and signs/symptoms of esophageal dysphagia and make appropriate referrals for its diagnosis and management.*
  - At minimum, a VFSS includes...Obtaining **lateral and anterior–posterior** views of oral cavity, pharynx, and upper esophagus, as needed, for each of the bolus types

## SUPPORT FOR MBSIMP STANDARDIZATION

### Speaking points for standardization

I would strongly recommend reviewing the standardization presentation that is part of MBSImP training: <https://youtu.be/zYl1g7ujZ4E>. This is a great resource for standardization as part of practice and gives a thorough background of how and why the MBSImP was standardized. You'll also find the 2017 Perspectives article by Martin-Harris et al. helpful. It is a summary of the MBSImP in practice. Some main talking points:

- *TRANSLATING RESEARCH INTO PRACTICE (TRIP)-II. FACT SHEET, AGENCY FOR HEALTHCARE RESEARCH AND QUALITY, PUBLICATION No. 01-P017:*
  - Lack of standardization impedes understanding of true functional results, produces ambiguous reporting of outcomes, and hinders our understanding of restorative surgical & rehabilitation targets.
  - The following should be standardized: the instrument (contents and format), the data collection protocol (approach and method), the analyses (to minimize variation in scoring and interpretation) and reporting (well-tested approaches to presenting results)
  - Standardized reporting improves financial performance, improves quality of care, reduces malpractice risk, complies with HIPAA and other government regulations, and improves job satisfaction for providers and staff.
- Standardization involves implementing and developing technical standards based on the consensus of different parties. It should maximize compatibility, interoperability, safety, reproducibility, transparency and quality of the exam across clinics and laboratories. In addition to standardization of fluoroscopy settings, analysis of the exam and reporting, the protocol approach and method should also be standardized.
- The modified barium swallow study is not a feeding test. It provides information about swallowing physiology and response to interventions.
- Penetration/aspiration are outcomes of impaired swallowing physiology. They are neither necessary nor sufficient measures of impairment. (Data included in 2008 MBSImP paper attached)
- The MBSImP standardizes the method of training, administration protocol, assessment tool, vernacular, analysis and reporting methods. It also enhances reproducibility across clinics and laboratories.
- The MBSImP is a standardized tool with proven content, construct and external validity. It is physiologic vs. symptoms based, clinically practical and linked to clinical action.
- Martin-Harris, B., Brodsky, M. B., Michel, Y., Castell, D. O., Schleicher, M., Sandidge, J., ... & Blair, J. (2008). MBS measurement tool for swallow impairment-MBSImP: establishing a standard. *Dysphagia*, 23(4), 392-405.
  - Aim of the study was to test the reliability, content, construct and external validity of a MBSS tool (MBSImP) used to quantify oropharyngeal *and esophageal* swallowing impairment. Delphi method was used to reach consensus among a panel of experts regarding the literature-based physiologic components of oropharyngeal and esophageal swallowing that should be included in the tool. The multidisciplinary panel included SLPs, otolaryngologists, *radiologists, gastroenterologists*, and psychiatrists. Content validation was achieved for 17 physiologic components of oropharyngeal and pharyngoesophageal swallowing and their operational definitions representing unique observation of bolus flow. Following standardized training and reliability testing, inter- and intrarater concordance were 80% or greater for blinded scoring of MBSS. The standardized MBSImP tool *and protocol* demonstrated clinical practicality, favorable inter- and intrarater reliability following standardized training, and content and external validity.

## Standardization of barium volumes & consistencies

The literature provides evidence that swallowing physiology varies based on bolus textures and volumes and the use of multiple bolus types is certainly warranted<sup>1</sup>. That said, presenting excessive amounts of non-inert materials to a dysphagic patient during MBS is dangerous and unnecessarily increases the risk for aspiration pneumonia. Furthermore, the absence of a succinct protocol in the radiology suite increases radiation exposure time for our patients, violating the ALARA principle which states that clinicians should make every reasonable effort to maintain exposures to ionizing radiation as far below the dose limits as practical<sup>2</sup>. The MBS is not a *feeding test*! The MBS should be used for identification and assessment of *physiologic* swallowing impairment. If the presence and nature of swallowing impairment can be identified with a small but varied, standardized sample of bolus volumes and consistencies (the primary goal of MBS), the use of excessive trials of multiple, non-sterile food items during MBS is unnecessary<sup>3</sup>. The MBSImP uses standardized, commercial preparation of barium (Varibar E-Z-EM, Inc.) including thin liquid, nectar thick liquid, honey thick liquid, puree consistency and solid (short bread cookie) in graduated volumes<sup>4</sup>. When presented, these standardized consistencies allow clinicians to capture physiologic impairment in an efficient and timely manner (even when using compensatory strategies and maneuvers), predict how patients will perform with multiple consistencies at the bedside, and allows for comparison between and within patients across multiple facilities. Keep in mind; the clinician should still observe the patient's performance with MBS recommendations at the bedside. We as a professional organization should be working towards standardization in all aspects of our field. If we ever want to be taken seriously as expert clinicians/researchers in the diagnosis and management of swallowing and swallowing disorders, we must move away from unsafe, non-standardized and unvalidated practices in the radiology suite

1. Logemann JA. Behavioral management for oropharyngeal dysphagia. *Folia Phoniatr Logop.* 1999;51(4-5):199-212. doi: 10.1159/000021497.
2. Bonilha, H. S., Humphries, K., Blair, J., Hill, E. G., McGrattan, K., Carnes, B., ... & Martin-Harris, B. (2013). Radiation exposure time during MBSS: influence of swallowing impairment severity, medical diagnosis, clinician experience, and standardized protocol use. *Dysphagia*, 28(1), 77-85.
3. Martin-Harris B, Logemann JA, McMahan S, Schleicher M, Sandidge J. Clinical utility of the modified barium swallow. *Dysphagia.* 2000;15(3):136-41.
4. Martin-Harris, B., Brodsky, M. B., Michel, Y., Castell, D. O., Schleicher, M., Sandidge, J., ... & Blair, J. (2008). MBS measurement tool for swallow impairment—MBSImP: establishing a standard. *Dysphagia*, 23(4), 392-405.

There is good evidence to support that no one consistency is sufficient enough to capture all types of physiologic impairment and that the nectar or honey consistency may illicit the worst score (overall impression score) where thin, pudding or solid may not (Hazelwood, 2017). The MBSImP tool was validated using standardized barium consistencies and tasks. Deviations from the protocol poses infection control and aspiration risks and interferes with the validity and reproducibility of the exam results. Further, this practice deviates from the primary purposes of the MBS which are to diagnose the nature and severity of the swallowing impairment and cause(s) of aspiration when present, assess the appropriateness of oral intake and effects of compensatory strategies, and identify physiologic targets for swallowing treatment.

1. Hazelwood, R. J., Armeson, K. E., Hill, E. G., Bonilha, H. S., & Martin-Harris, B. (2017). Identification of Swallowing Tasks From a Modified Barium Swallow Study That Optimize the Detection of Physiological Impairment. *Journal of Speech, Language, and Hearing Research*, 60(7), 1855-1863.

## SUPPORT FOR ESOPHAGEAL FOLLOW THROUGH

### Localization of esophageal problems

There are several studies demonstrating how poorly patients are at accurately identifying where their problem is occurring:

- Roeder, B. E., Murray, J. A., & Dierkhising, R. A. (2004). Patient localization of esophageal dysphagia. *Digestive diseases and sciences, 49*(4), 697-701.
  - EGD and manometry in 100 patients, with 55% localizing problem to proximal esophagus but 42% had distal structural lesions and 56% had diffuse dysfunction (e.g., dysmotility)
- Smith, D.F., Ott, D. J., Gelfand, D. W., & Chen, M. Y. (1998). Lower esophageal mucosal ring: correlation of referred symptoms with radiographic findings using a marshmallow bolus. *American Journal of Roentgenology, 147*,261-265.
  - ½ patients with known distal obstructive lesions localized to suprasternal notch and above.
- Wilcox, C. M., Alexander, L. N., & Clark, W. S. (1995). Localization of an obstructing esophageal lesion. *Digestive diseases and sciences, 40*(10), 2192-2196.
  - Proximal referral of symptoms was common in patients with lower esophageal mucosal rings, including neck, sternal angle, mid and lower chest

### Esophageal follow-through and its association with esophageal dysfunction

- Gullung, J. L., Hill, E. G., Castell, D. O., & Martin-Harris, B. (2012) Oropharyngeal and Esophageal Swallowing Impairments: Their Association and the Predictive Value of the Modified Barium Swallow Impairment Profile and Combined Multichannel Intraluminal Impedance-Esophageal Manometry. *Annals of Otology, Rhinology & Laryngology, 121*(11), 738-745.
  - Significant association between MBSImP Component 17 scores and abnormal findings on esophageal manometry; delay in initiation of the pharyngeal swallow was significantly associated with abnormal esophageal function (thus, importance to assess pharynx through esophagus because of the interrelationship)
- Allen, J. E., White, C., Leonard, R., & Belafsky, P. C. (2012). Comparison of esophageal screen findings on videofluoroscopy with full esophagram results. *Head & neck, 34*(2), 264-269.
  - Compared results of esophageal screening during MBSS with findings from esophagram. Sensitivity: 63%; Specificity: 100%; Positive predictive value: 100%; Negative predictive value: 13%. The take home point is that esophageal screening can help lead to appropriate referral for GI evaluation for accurate diagnosis of esophageal dysfunction.
- Miles, A., McMillan, J., Ward, K., & Allen, J. (2015). Esophageal Visualization as an Adjunct to the Videofluoroscopic Study of Swallowing. *Otolaryngology–Head and Neck Surgery, 152*(3), 488-493.
  - 111 consecutive mixed etiology patients underwent VFSS including esophageal follow-through. 68% of patients had abnormal esophageal transit, 1/3 had both oropharyngeal and esophageal abnormalities. Oral abnormalities, reduced PES maximum opening, and increasing age were significantly associated with esophageal abnormalities. Concluded that fluoroscopic evaluation of the pharynx alone, without esophageal view, risks incomplete diagnosis of patients with esophageal disorders.
- Also, recognition of a potential esophageal dysfunction may lead to appropriate diagnosis of a systemic disease that may have further implications for oropharyngeal dysfunction.

## Effect of oropharyngeal swallow strategies on esophageal function

The modified barium swallow study not only assesses swallowing physiology but also can be used to assess the effectiveness of strategies and maneuvers to improve swallowing function. The literature shows that the strategies and maneuvers can have an impact on esophageal physiology. The use of an esophageal follow-through can provide additional insight on how oropharyngeal swallowing maneuvers are impacting the entire mechanism and direct targeted intervention planning.

- O'Rourke, A., Morgan, L. B., Coss-Adame, E., Morrison, M., Weinberger, P., & Postma, G. (2014). The effect of voluntary pharyngeal swallowing maneuvers on esophageal swallowing physiology. *Dysphagia*, 29(2), 262-268.
  - Healthy volunteers underwent high-resolution pharyngeal manometry while performing 3 randomized swallow maneuvers. Overall number of nonperistaltic swallows was 53% during normal swallows, 66% during Mendelsohn maneuver and 33% during effortful swallow. Mendelsohn maneuver may result in decreased esophageal peristalsis while effortful swallow may improve esophageal peristalsis.

## Protocol/standardization of the esophageal follow-through

Standardization involves implementing and developing technical standards based on the consensus of different parties. It should maximize compatibility, interoperability, safety, reproducibility, transparency and quality of the exam across clinics and laboratories. In addition to standardization of fluoroscopy settings, analysis of the exam and reporting, the protocol approach and method should also be standardized. Recent work has established a standardized protocol for evaluation of bolus flow through the esophagus in the upright position during videofluoroscopy. Additionally, normative values for esophageal transit times in the upright position during videofluoroscopy have been published.

- Martin-Harris, B., Brodsky, M. B., Michel, Y., Castell, D. O., Schleicher, M., Sandidge, J., ... & Blair, J. (2008). MBS measurement tool for swallow impairment-MBSImp: establishing a standard. *Dysphagia*, 23(4), 392-405.
  - Aim of the study was to test the reliability, content, construct and external validity of a MBSS tool (MBSImp) used to quantify oropharyngeal and esophageal swallowing impairment. Delphi method was used to reach consensus among a panel of experts regarding the literature-based physiologic components of oropharyngeal and esophageal swallowing that should be included in the tool. The multidisciplinary panel included SLPs, otolaryngologists, radiologists, gastroenterologists, and physiatrists. In addition to 16 physiologic components of oropharyngeal swallowing, content validation was achieved for *esophageal clearance* and its operational definitions representing unique observation of bolus flow. Following standardized training and reliability testing, inter- and intrarater concordance were 80% or greater for blinded scoring of MBSS. The standardized MBSImp tool and protocol demonstrated clinical practicality, favorable inter- and intrarater reliability following standardized training, and content and external validity.
- Modified Barium Swallow Impairment Profile (MBSImp™) Guide, v.092517, p.11 ([mbsimp.com](http://mbsimp.com)). Accessed April 20<sup>th</sup>, 2017.
  - Esophageal clearance... represents bolus clearance through the esophagus in the upright position assisted by gravity. That is, the position in which the patient eats and drinks.
  - The bolus should be followed through the oral cavity and the lower esophageal segment (LES) when possible in order to adequately score esophageal clearance.
  - It must be made clear to the attending radiologist that the speech language pathologist is not attempting to diagnose motility or structural anomalies. Rather, esophageal clearance in the upright position affects the process of eating and drinking and other treatment strategies, and empirical studies have shown to influence oropharyngeal-swallowing function.
- Miles, A., Clark, S., Jardine, M., & Allen, J. (2016). Esophageal swallowing timing measures in healthy adults during videofluoroscopy. *Annals of Otolaryngology, Rhinology & Laryngology*, 125(9), 764-769.

- Study aim was to measure esophageal transit times (ETT) of liquid, pill and paste during upright videofluoroscopy to establish normative values. 118 health adults underwent MBS with esophageal follow-through. Mean ETT were: 20mL fluid, 10.7 seconds; pill, 25.3 seconds; paste 28.6 seconds. Age was significantly associated with increasing 20mL fluid ETT ( $p < .001$ ) but not pill ( $p = .58$ ) or paste ETT ( $p = .12$ ). Fluid ETT over 10 seconds occurred in 10% of participants between 20 and 59 years compared to 35% over 60 years old ( $p < .001$ ). These normative values provide a standardized protocol and guidance in interpretation when completing esophageal follow-through as part of videofluoroscopy.

## Reporting the esophageal follow-through

Include the following statement at the beginning of all MBSS reports.

***"NOTE: this study was performed for interpretation only of the oropharyngeal and pharyngoesophageal domains of swallowing. It is not intended to diagnose any other radiologic abnormalities or substitute for a formal esophagram study."***

Only use terminology that describes bolus flow/clearance through the esophagus and be careful not to make statements that attempt to diagnose motility or structural abnormalities. If the radiologist provides a diagnosis during the exam, feel free to note: \_\_\_\_\_ *observed and consistent with a diagnosis of \_\_\_\_\_ per the consulting radiologist. Please reference radiologist's report for formal diagnostic information.*

The MBSImP includes a protocol for assessing esophageal clearance in the AP view (and lateral if necessary) a Likert rating scale and associated operational definitions. The following nomenclature should be used in your reports:

- 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

Again, the goal of the esophageal follow-through is to assess bolus clearance through the esophagus in the upright position assisted by gravity. It must be made clear in your report that the speech language pathologist is not attempting to diagnose motility or structural anomalies.

## RADIATION EXPOSURE

The literature supports that the use of the MBSImP standardized protocol (including an esophageal follow-through) does not increase radiation exposure times:

- Bonilha, H. S., Humphries, K., Blair, J., Hill, E. G., McGrattan, K., Carnes, B., ... & Martin-Harris, B. (2013). Radiation exposure time during MBSS: influence of swallowing impairment severity, medical diagnosis, clinician experience, and standardized protocol use. *Dysphagia*, 28(1), 77-85.
  - When using MBSImP protocol, which includes 2 swallows in A-P view with full scanning of the esophagus to stomach, average radiation exposure was 2.9 minutes (N=739 patients), which is well below the 5 minutes limit. Further, the ~3 minutes included those patients that required further trials with use of maneuvers, compensatory strategies, etc.
- Xinou, Ekaterini, et al. "Longitudinal Evaluation of Swallowing with Videofluoroscopy in Patients with Locally Advanced Head and Neck Cancer After Chemoradiation." *Dysphagia*(2018): 1-16.
  - *In the present study, the use of the MBSImP protocol did not lead to unnecessary radiation exposure. Our mean radiation exposure time (2.2-2.5 min) is well under the reported 3.37–8.2 min encountered in previous studies and is comparable to that reported by Bonilha et al., 2014 (2.9 min) and Zammit-Maempel et al., 2007 (2.85 min). This short exposure time may be mainly due to the use of the MBSImP protocol itself, which permits capturing physiologic swallowing impairment without administration of repeated swallows of varied, non-standardized consistencies.*

## SLP AND RADIOLOGIST COLLABORATION

Article recently released from the American College of Radiology that mentions Dr. Canon (radiologist from UAB) and Dr. Martin-Harris re: the collaboration between the 2 fields during the MBSS (<https://www.acr.org/Practice-Management-Quality-Informatics/Imaging-3/Case-Studies/Quality-and-Safety/Collaboration-Comes-Standard>)