EBP Edge: Instrumental Swallow Evaluation—Is It Necessary?

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Introduction

Anecdotally, there seems to be a considerable debate in our profession regarding the use of instrumental swallowing evaluations. On one end of the spectrum, we have speech-language pathologists (SLPs) who believe every patient requires an instrumental evaluation. On the other end, we have seasoned and new clinicians who are confident in their clinical bedside evaluations to fully address dysphagia. We also have everything in between.

The authors want to note that implementation or use of instrumental assessments may be tied to ease of access. We understand that an instrumental swallowing evaluation is likely more easily completed in an acute care setting as compared to a patient receiving home health or one who is in a skilled nursing facility. There may be situations in which access to an instrumental evaluation is limited. In those instances, completing a non-instrumental swallowing assessment to develop an initial treatment plan may be better than not addressing patients with suspected dysphagia. However, the authors are here to provide evidence-based information to assist clinicians in determining if instrumental swallowing evaluations are necessary, which may support more effective advocacy for the use of instrumentation to address dysphagia appropriately.

Non-Instrumental Swallowing Assessment (Clinical Swallowing Evaluation)

To begin, let us briefly review non-instrumental swallowing assessments, often referred to as a clinical swallowing evaluation (CSE) or a bedside swallowing evaluation. Per the American Speech-Language-Hearing Association (ASHA), “The purpose of a non-instrumental swallowing assessment is to observe patient behaviors associated with swallow function—that is, to observe the presence (or absence) of signs and symptoms of dysphagia, with consideration for factors such as fatigue during a meal, posture, positioning, and environmental conditions. A non-instrumental assessment may provide sufficient information for a clinician to diagnose oral dysphagia; however, aspiration and other physiologic problems in the pharyngeal phase can be directly observed only via instrumental assessments” (ASHA Adult Dysphagia: Assessment, Non-Instrumental Swallowing Assessment section, para. 1).

A non-instrumental swallowing assessment may incorporate several components including the following:

- Case history
- Oral mechanism examination
- Assessment of overall physical, social, behavioral, and cognitive/communicative status
- Speech and vocal quality prior to and following bolus presentations
- Monitoring physiological status (e.g., heart rate, oxygen saturation, respiratory rate, respiratory/swallowing pattern)
- Bolus delivery and rates of presentation and/or use of techniques to facilitate PO intake
- Secretion management skills

- Assessment of labial seal and anterior spillage, and evidence of oral control, including mastication and transit, manipulation of the bolus, presence of hyolaryngeal excursion as observed externally or to palpation, and time required to complete the swallow sequence
- Identification of signs and symptoms of penetration and/or aspiration

The CSE serves as a vital first step in the diagnostic process, forming the groundwork for identifying signs and symptoms of dysphagia, determining necessity for instrumental evaluations, and establishing specific questions to be answered during an instrumental evaluation (ASHA Adult Dysphagia: Assessment, Non-Instrumental Swallowing Assessment section, para. 4).

In the authors' opinions, a comprehensive case history is crucial for a clinical swallowing evaluation. When available, clinicians gain key information from reviewing imaging and lab findings (e.g., head CT and/or MRI, CXR, white blood cell count, arterial blood gas, etc.) or previous swallowing assessment/treatments. Obtaining the patient's and caregiver's perspectives regarding the patient's swallowing abilities and difficulties also offers valuable information. Additionally, determining the patient's ability to participate in an instrumental assessment and if he/she can follow directions and/or implement strategies provides substantial data that can support a clinician's recommendations and proposed plan of care.

With the clinical swallowing evaluation, clinicians make predictions regarding a patient's swallowing physiology. A swallowing evaluation can identify if there are any overt clinical signs associated with aspiration, yet that is just an observation that supports the prediction. Even the most skilled clinicians cannot truly confirm or deny the presence of aspiration, determine pharyngeal weakness, or identify the presence of pharyngeal residue. In fact, if a patient eats with his/her mouth closed (as is the most commonly accepted practice in the United States), our judgment is considerably limited in the oral phase as we cannot view bolus formation, lingual coordination, lingual pumping, anterior-posterior transit, etc.

Some clinicians may be confident in their CSE findings to effectively address dysphagia. However,"The subcommittee on the CSE (McCullough et al., 2003) reported, based on over 150 articles, that while data supported, with some dissent, the use of CSE measures to detect aspiration post-stroke, no data existed to support the use of the CSE to evaluate any of the physiologic measures deemed necessary for complete examination of swallowing function" (p. 7). Without information regarding the physiologic swallowing abilities of a patient, it is difficult to treat dysphagia appropriately, as clinicians would be treating the disorder blindly. Many patients would be shocked to have a physician treat a broken bone or try to excise a tumor without having visualized the anatomy and physiology of the structures involved.

Instrumental Swallowing Assessment

Let us briefly review an instrumental swallowing assessment. Per ASHA, "SLPs use instrumental techniques to evaluate oral, pharyngeal, laryngeal, upper esophageal, and respiratory function as they apply to normal and abnormal swallowing. In addition, instrumental procedures are used to determine the appropriateness and the effectiveness of a variety of treatment strategies" (ASHA Adult Dysphagia: Assessment, Instrumental Swallowing Assessment section, para. 1).

The most common instrumental swallowing assessments include the videofluoroscopic swallowing study (VFSS) often referred to as a modified barium swallow study (MBSS) and fiberoptic endoscopic evaluation of swallowing (FEES). Following the completion of an instrumental evaluation, the role of the speech-language pathologist is to interpret the objective testing measures to form a treatment plan and determine a patient's safety for oral intake (ASHA Adult Dysphagia: Assessment, Instrumental Swallowing Assessment section, para. 2).

Instrumental swallowing evaluations are indicated when establishing a diagnosis or developing an effective treatment and management plan in patients with suspected oropharyngeal dysphagia based on the clinical examination. An instrumental swallowing evaluation also may be indicated for

patients that are at a high risk for oropharyngeal dysphagia but who do not demonstrate dysphagia on the CSE. Indications for an instrumental exam include the following:

- Concerns regarding the safety and efficiency of swallow function that may contribute to nutritional compromise, pulmonary compromise, or airway safety risks
- The need to identify disordered swallowing physiology to guide management and treatment
- Inconsistent signs and symptoms in the findings of a non-instrumental examination
- The need to assist in the determination of a differential medical diagnosis related to the presence of pathological swallowing
- The presence of a medical condition or diagnosis associated with a high risk of dysphagia (e.g., neurologic, pulmonary/cardiopulmonary, gastrointestinal problems, immune system compromise, surgery and/or radiotherapy to the head/neck, and craniofacial abnormalities)
- A previously identified dysphagia with a suspected change in swallow function that may change recommendations
- The presence of a chronic degenerative condition with a known progression or the recovery from a condition that may require further information for the management of oropharyngeal function (ASHA Adult Dysphagia: Assessment, Instrumental Swallowing Assessment section, para. 3)

Instrumental swallowing evaluations may not be indicated when a clinical swallowing evaluation does not demonstrate signs or symptoms of dysphagia and the patient is not at high risk for dysphagia based on their medical condition/diagnosis. Contraindications for an instrumental swallowing evaluation also may be evident, which may include:

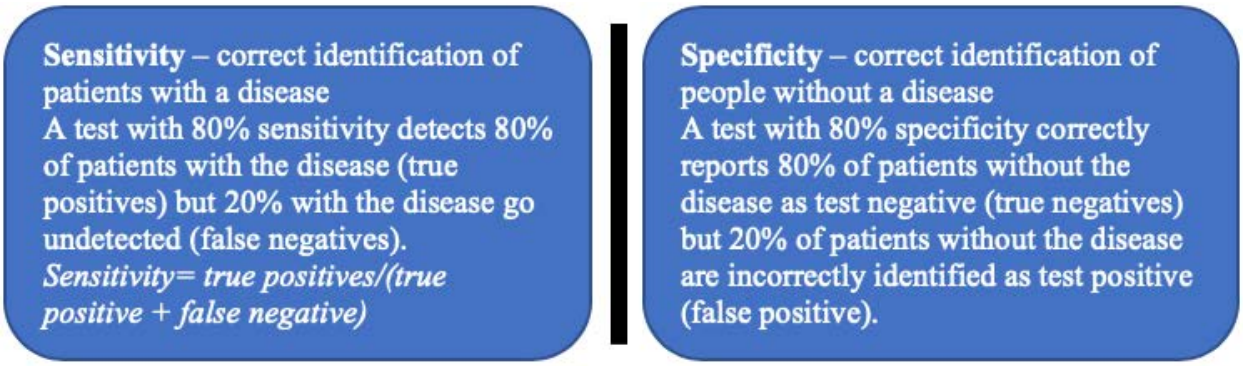
- The patient is not medically stable enough to tolerate the procedure.
- The patient is not able to participate in an instrumental examination (e.g., cognitive difficulties, inability to maintain an appropriate level of alertness).
- The SLP's clinical judgment indicates that the instrumental assessment would not change the clinical management of the patient (ASHA Adult Dysphagia: Assessment, Instrumental Swallowing Assessment section, para. 4).

Similar to non-instrumental assessment, instrumental exams include many of the same elements of a CSE (e.g., case history; an oral mechanism exam; and assessment of overall physical, social, behavioral, and cognitive/communicative status, etc.) The purpose of the instrumental examination is to enable the SLP to

- Visualize the structures of the upper aerodigestive tract;
- Assess the physiology of the structures involved in swallowing to determine presence, cause, and severity of dysphagia by visualizing bolus control, flow and timing of the bolus, and the individual's response to bolus misdirection and residue;
- Visualize the presence, location, and amount of secretions in the hypopharynx and larynx, the patient's sensitivity to the secretions, and the ability of spontaneous or facilitated efforts to clear the secretions;
- Determine the cause(s) for laryngeal penetration and/or aspiration; and
- Determine with specificity the relative safety and efficiency of various bolus consistencies and volumes (ASHA Adult Dysphagia: Assessment, Instrumental Swallowing Assessment section, para. 5).

An instrumental swallowing evaluation provides more information to support the development of a plan of care (including knowledge of the underlying impairment to drive a rehabilitative plan) and recommendations for the safest yet least restrictive diet with or without the use of compensatory strategies. Implementation of an instrumental evaluation is often warranted as studies have shown a

wide range of sensitivity for correctly identifying dysphagia/aspiration and specificity for correctly identifying those without dysphagia/aspiration than with clinical swallowing evaluation measures alone.



The variability of sensitivity and specificity can be noted in the following systematic reviews:

Title	**Author(s)**
Bedside Diagnosis of Dysphagia: A Systematic Review	Ohoro, Rogus-Pulia, Garcia-Arguello, Robbins, & Safdar, (2015)
"Three studies examined the use of bedside water swallow tests (e.g., 3oz water swallow test, 50ml water swallow trials) to identify patients at risk for aspiration. Overall sensitivity for correctly ruling patients in for aspiration ranged from 79% to 97%. Overall specificity for correctly ruling patients out for aspiration ranged from 30% to 63%."	
Title	**Author(s)**
Bedside Screening to Detect Oropharyngeal Dysphagia in Patients with Neurological Disorders: An Updated Systematic Review	Kertscher, Speyer, Palmieri, & Plant, (2014)
"Four studies with sufficient methodological quality were included in the review; each investigating the use of a different screening method or protocol. Assessments included: · The Volume-Viscosity Swallowing Test (V-VST) · The Toronto Bedside Swallowing Screening Test (TOR-BSST) · The 3-oz Water Swallow Test · Cough Test Only two assessments, the V-VST and the TOR-BSST, were reported with a minimum sensitivity and specificity of >70% and >60%, respectively, for detecting dysphagia."	
Title	**Author(s)**
Bedside Screening Tests vs. Videofluoroscopy or Fiberoptic Endoscopic Evaluation of Swallowing to Detect Dysphagia in Patients with Neurological Disorders: Systematic Review	Bours, Speyer, Lemmens, Limburg, & Wit, (2009)

· Three studies examined the use of standardized forms/protocols to detect dysphagia with sensitivity ranging from 58% to 93% and specificity ranging from 30% to 63%.

· Both sensitivity and specificity ranged from 50% to 76% for report of history components (e.g., medical history, previous aspiration) to detect dysphagia.

· The assessment of clinical features (e.g., abnormal gag reflex, dysphonia, dysarthria, abnormal volitional cough) to detect dysphagia revealed "low sensitivity or low specificity or both" (p. 486). Only one study (Daniels et al., 1997) found satisfactory sensitivity and specificity (>70%) for dysphonia to detect dysphagia.

· Water swallow test combined with oxygen desaturation reported sensitivity ranging from 94% to 98% and specificity ranging from 63% to 70% to detect dysphagia.

· Sensitivity ranged from 41% to 100% and specificity ranged from 75% to 82% on trial swallow tests using different viscosities to detect dysphagia.

Title	**Author(s)**
Utility of Pulse Oximetry to Detect Aspiration: An Evidence-Based Systematic Review	Britton, Roeske, Ennis, Benditt Quinn, & Graville, (2017)

Sensitivity for detecting aspiration with use of pulse oximetry ranged from 10% to 87%, while specificity ranged from 39% to 100%.

Title	**Author(s)**
Diagnostic Accuracy of the Modified Evan's Blue Dye Test in Detecting Aspiration in Patients with Tracheostomy: A Systematic Review of the Evidence	Béchet, Hill, Gilheaney, & Walshe, (2016)

Preliminary evidence suggested the Modified Evan's Blue Dye Test may be better able to exclude oropharyngeal aspiration, with higher specificity (79% to 100%) and lower sensitivity (38% to 95%) estimates found.

Title	**Author(s)**
The Reliability and Validity of Cervical Auscultation in the Diagnosis of Dysphagia: A Systematic Review	Lagarde, Kamalski, & Engel-Hoek, (2015)

The diagnostic accuracy of cervical auscultation as a standalone assessment varied with sensitivity and specificity ranging from 23% to 95% and 50% to 74% respectively.

Title	**Author(s)**
Swallowing Screens after Acute Stroke: A Systematic Review	Schepp, Tirschwell, Miller, & Longstreth, (2012)

The following screening protocols had high sensitivity (87% to 96%) and mixed specificity (56% to 84%) compared to the gold standard of bedside swallowing evaluation or videofluoroscopy to determine risk for dysphagia:

· Acute Stroke Dysphagia Screen,

· Modified Mann Assessment of Swallowing Ability,

· Emergency Physician Swallowing Screening, and

- Toronto Bedside Swallowing Screening Test.

The authors reported that negative predictive values of screening protocols were 97% or greater. Negative predictive values ranged from 54% to 77% indicating that 23% to 77% of stroke patients were falsely identified at risk for dysphagia using protocol.

The Consequences of Clinical Swallowing Evaluation Limitations

A study by Leder & Espinosa (2002) assessed patients' risk for aspiration 24 hours after an acute stroke, comparing risk utilizing a CSE vs. FEES completed on the same patients. Results showed aspiration was missed in 14% of opportunities. Furthermore, the study had a false positive rate of 70%.

A study by Splaingar, Hutchins, Sulton, & Chaudhuri (1988) revealed as much as 58% of aspiration seen with videofuoroscopy was missed during a CSE in patients with neurologic dysfunction. No correlation was noted between any one site of lesion and occurrences of silent aspiration.

A retrospective study of 2,000 videofluroscopic swallowing evaluations completed by Garon, Sierzant, & Ormiston (2009) revealed that 51% aspirated. Of the patients who aspirated 55% had no protective cough (i.e., the patient presented with silent aspiration).

Although the studies previously mentioned cannot be generalized to all patients and situations, the information gleaned may provide perspective about the limitations of our clinical swallowing evaluations if clinicians over- or under-identify dysphagia.

Both false positive and false negatives can have consequences. Falsely identifying dysphagia for a patient may result in the provision of medically unnecessary treatments, overly restrictive diets, unwarranted use of thickeners, or unnecessary use of enteral feedings. Modified diets (e.g., pureed) may provide fewer nutrients (Durant, 2008), which may contribute to malnutrition. Additionally, a systematic review completed by speech-language pathologists concluded that patients receiving modified food and fluids often correlated to a decreased quality of life (Swan, Speyer, Heijnen, Wagg, & Cordier, 2015). Use of thickeners may result in delayed medication absorption (Cichero, 2013) and inadequate fluid intake (Vivanti, Campbell, Suter, Hannan-Jones, & Hulcombe, 2009), increasing the risk of dehydration (Leibovitz, Baumoehl, Lubart, Yaina, Platinovitz, & Segal, 2007). These diet considerations also may result in increased costs for thickening agents, pre-prepared meals, and feeding supplies.

A false negative that does not identify a patient as having dysphagia may be life-threatening. Nursing home patients who are diagnosed with aspiration pneumonia have a mortality rate three times higher than other residents (Oh, Weintraub, & Dhanani, 2005). Additionally, per Cabre, Serra-Prat, Force, Almirall, Palomera, & Clave (2013), oropharyngeal dysphagia in elderly individuals is a risk factor for hospital readmission for pneumonia as the incidence rate for patients with dysphagia was higher than those without dysphagia.

Summary

In conclusion, utilization of instrumental evaluations in clinical practice provides necessary benefits for accurately identifying those with and without dysphagia. These benefits may include reduced costs of care, adequate nutrition and hydration, appropriate provision of medical services, better health, and improved quality of life. Instrumentation provides the ability to identify aspiration and contributing physiologic impairments of dysphagia. Instrumentation also gives insight into the effectiveness of compensatory strategies. These factors allow for the development of an appropriate, patient-specific plan of care rather than generalized (and potentially ineffective) treatment options. In many cases, requesting and completing an instrumental swallowing evaluation is warranted due to the potential detrimental impacts (e.g., overly restrictive diets, lack of aspiration identification placing

the patient at risk for incurring respiratory complications, pneumonia, and death, etc.) of relying solely on clinical swallowing evaluation results.

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