

# The Clinical Evaluation: A Necessary Tool for the Dysphagia Sleuth

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## Abstract

There is **controversy** about the **necessity of clinical (bedside) swallowing examinations**. Some argue that screening provides **enough information to thoroughly manage** a case. In instances in which the risk of an adverse event is very high, screening legitimizes short-term intervention to temporarily mitigate that risk. But comprehensive treatment based on screening is **always** an **unguided** and **imprecise** strategy because screening cannot identify the nature of the problem or the method that best treats the problem. As physicians and public health experts know, the diagnostic process begins with case-finding procedures that predict the presence of risk, and progresses through increasingly precise methods until the clinical problem is resolved. Sometimes the more costly gold standard examination is unnecessary. And sometimes the gold standard test is unavailable because the patient is seen in a system in which the infrastructure and expertise for conducting diagnostic instrumental testing are inaccessible, or because of wait lists, or funding issues. Such situations require the speech-language-pathologist (SLP) to determine how to gather the most and best information available under these constraints. This article will discuss the clinical examinations' role in the diagnostic process and refute the claim that it is unnecessary.

## Why Perform a Clinical Evaluation?

"I like to inquire into everything. . . The good dog follows the scent, and if, regrettably, there is no scent to follow, he noses around — seeking always something that is not very nice." Agatha Christie's Hercule Poirot, master sleuth, in *Peril at End House* (Christie, 1932).

The **purpose** of **diagnostic** tests is **twofold**. It should assist the clinician in **identifying** and **describing** the characteristics of a **disease** that a patient is suspected of having, and it should contribute to the **formulation** of logical **treatment** options for those conditions. Typically, diagnostic tests are performed after a screening procedure. By definition, screens are designed to predict which asymptomatic persons are at high risk of having the disease of interest (Lewis, Sheringham, Kalim, & Crayford, 2009; Sackett, Haynes, Guyatt, & Tugwell, 1991). "Patients" are already at risk, so the proper term for the "screening" performed with potentially dysphagic patients is case-finding (Grimes & Schulz, 2002; Sackett et al., 1991). Case-finding is screening performed with persons who already are identified at increased risk, and when systematically deployed, has been found to reduce pneumonia incidence in patient with stroke, regardless of the method used (Hinchey et al., 2005). Neither screening nor case-finding can diagnose or define a condition or develop focused plan of intervention. Rather they determine whether the condition of interest is likely present and in need of additional testing. Screening and case-finding tools need to be carefully defined and designed (Niezgoda, Keller, Steele, & Chambers, 2014).

## **Screening Is an Important First Step but Not a Clinical Evaluation**

“The temptation to form premature theories upon insufficient data is the bane of our profession.” Sherlock Holmes, *The Valley of Fear* by Arthur Conan Doyle (Doyle, 1915).

Every sleuth evaluates all of the evidence. The dysphagia diagnostic process has three components: **screening**, clinical swallowing evaluation (**CSE**), and **instrumental** assessment. Some cases do not need all three steps, and others need all three but one or more are omitted for one reason or another: they are not needed, their value is unrecognized, they are unavailable or not feasible, or they are ignored despite being necessary. Screening and case-finding require relatively little examiner expertise or interpretation, they simply alert the screener that something may be amiss. They are limited processes by design. Diagnosis progresses sequentially through increasingly complex and definitive tests requiring rising levels of examiner expertise to perform, analyze, and interpret (Sackett, Straus, Richardson, Rosenberg, & Haynes, 2000). Patients are often **referred for a CSE** after **failing** a formal swallowing **screen** at the time of admission, but they are also **referred for evaluation without** a formal swallow **screen** because they **failed a historical screen** by having a history of conditions known to cause dysphagia. The fact that the CSE is frequently used without a formal swallow screen legitimizes its place as the second step in the diagnostic process.

Simple dysphagia screening observes for suspicious observations when drinking or eating, and more complex dysphagia testing observes for abnormal sensorimotor function, general cognitive status, and comprehension of spoken language. They may go on to observe the patient’s awareness of impairments, motor speech production, and other signs which, though not directly responsible for dysphagia, are predictors of impaired swallowing function (Cohen, 2009; Daniels, Ballo, Mahoney, & Foundas, 2000; Leder, Suiter, Warner, Acton, & Swainson, 2012; Martino et al., 2009). When the SLP makes all of these observations, they are performing a CSE.

## **Sleuthing for Suspicious Signs of Dysphagia: More is Better**

“Mark my words, François, sinister forces are at work.” Inspector Jacques Clouseau, in “The Pink Panther Strikes Again” (Edwards, 1976).

In isolation, most of these individual dysphagia signs provide limited ability to predict dysphagia or aspiration. Combined, they can more strongly predict a lurking swallowing disorder (Bours, Speyer, Lemmens, Limburg, & de Wit, 2009; Daniels et al., 2000; Martino, 2012; Martino, Pron, & Diamant, 2000). The following research example illustrates this point:

Steele et al. (2011) investigated the predictive value of several signs of dysphagia by simultaneously video recording patients undergoing several dysphagia clinical test components and a videofluoroscopic swallowing study (VFS). They then played the clinical testing videos to a panel of trained judges (SLP’s and nurses). Each judge rated each individual clinical sign as either normal, abnormal, or uncertain: baseline **tongue lateralization**, baseline **voluntary cough**, baseline **voice** quality, and **post-swallow cough**, throat **clear**, or **voice change**. The judges then made a fifth judgment: whether all four signs together predicted dysphagia or aspiration. Their results showed that **none** of the judges’ ratings of the **individual signs** acceptably **predicted** aspiration or **dysphagia**, but when **all of the observations** were combined to form a summary clinical judgment, the judges **more accurately** predicted aspiration and dysphagia than they did using any single failed screening test. This example indicates that more thorough assessment can render more information about swallowing impairments than less testing.

## **What is a Clinical Swallowing Examination?**

“A secret door!” Joe said. “We haven’t seen one of these in, oh, several months” Frank said. The Hardy Boys in “No Mercy” (Dixon, 1992).

Verghese, Brady, Kapur, and Horwitz (2011) described how the physician’s clinical examination adds to the clinical process by enabling establishment of a **relationship** with the **patient**, and includes testing procedures, some of which are somewhat ritualistic, but are expected by patients. They define the physician’s bedside examination as the history and physical examination as the history and physical examination, which are essentially the same procedures performed by the SLP’s during a CSE. Some observations in the CSE produce results that can be quickly sorted because there is no indication of impairment, while others require a more detailed probe. Like the physician, decisions regarding possible intervention or additional testing can be made on the basis of the overall results and not by single observations.

In some settings, the clinical evaluation is the only available diagnostic procedure to assess swallowing function. In **acute care** settings, it is an **essential precursor to the instrumental** evaluation: it helps the clinician predict possible impairments, and is sometimes the clinician’s only chance to form **hypotheses** about the probable nature of impairments and develop logical **trial** interventions for the instrumental test. Omission of a thorough clinical evaluation before instrumental **testing** of swallowing reduces the value of the diagnostic imaging test to that of an expensive pass-fail screen.

The CSE contains several discrete components that the examiner rates, and then weaves together to produce a diagnostic impression. Table 1 summarizes categories of procedures included in the CSE, each component’s ingredients, and the information each provides in the diagnostic process. The CSE is multidimensional and its results are combined by the examiner throughout each level of the assessment process (Martino, Pron, & Diamant, 2004). CSE components have been thoroughly summarized by others whose work should be used as references (Hixon & Hoit, 1998, 1999, 2000; Langmore & Logemann, 1991; Leder, Suiter, Murray, & Rademaker, 2013; Martino et al., 2004; Murray, 1999; Rosenbek, McCullough, & Wertz, 2004).

*Table 1. Components of the Clinical Swallowing Examination.*

Test category	Ingredients	What does it provide?
General observations	<ul style="list-style-type: none"> <li>■ Posture</li> <li>■ Respiratory rate, rhythm</li> <li>■ Supplemental oxygen dosage, delivery method</li> </ul>	<ul style="list-style-type: none"> <li>■ Baseline for comparison during swallowing trials</li> <li>■ Prediction of respiratory-swallow coordination</li> </ul>
Medical/case history	<ul style="list-style-type: none"> <li>■ Review past medical history</li> <li>■ Review current situation, medications, swallow history</li> <li>■ Interview patient, informants</li> </ul>	<ul style="list-style-type: none"> <li>■ Baseline information</li> <li>■ Predisposing conditions</li> <li>■ Recent/current factors altering baseline</li> <li>■ Swallowing situation before, since illness</li> <li>■ Attitudes, expectations of informants</li> <li>■ Awareness of impairments</li> </ul>
Oral-facial sensorimotor examination	<ul style="list-style-type: none"> <li>■ Sensory function of oral cavity, oropharynx, face, head, neck</li> <li>■ Motor function of oral cavity, oropharynx, face, head, neck</li> <li>■ Dentition, denture, saliva management, oral hydration</li> <li>■ Predisposing oral disease</li> </ul>	<ul style="list-style-type: none"> <li>■ Prediction of pharyngeal abnormalities</li> <li>■ Oral health</li> <li>■ Ability to follow commands</li> <li>■ Ability to perform compensatory postures</li> <li>■ Infection risk factors</li> <li>■ Explanations for sensorimotor impairments</li> </ul>

Speech/Language	<ul style="list-style-type: none"> <li>■ Precision of articulation, resonance</li> <li>■ Phonation</li> <li>■ Auditory comprehension</li> <li>■ Verbal, other expression</li> </ul>	<ul style="list-style-type: none"> <li>■ Function of oral, palatal structures</li> <li>■ Predict laryngeal, pharyngeal function</li> <li>■ Predict pharyngo-laryngeal secretions</li> <li>■ Training capacity</li> <li>■ Ability to express symptoms</li> </ul>
Cognition	<ul style="list-style-type: none"> <li>■ Attention, orientation, memory</li> <li>■ Awareness of impairments</li> <li>■ Self-regulation</li> </ul>	<ul style="list-style-type: none"> <li>■ Ability to participate in testing</li> <li>■ Learning/training capacity</li> <li>■ Cognitive factors interfering with efficacy of interventions</li> </ul>
Swallow Trials	<ul style="list-style-type: none"> <li>■ Variety of conditions of swallowing</li> <li>■ Compare eating and feeding behaviors in controlled, naturalistic environment</li> </ul>	<ul style="list-style-type: none"> <li>■ Overt signs of impaired airway protection</li> <li>■ Evidence of oral impairments</li> <li>■ Predict effects of post-swallow oral residue</li> <li>■ Form hypotheses about clearance of swallowed material, their nature</li> <li>■ Identify potential efficacy of interventions that are logical to assess with instrumentation</li> <li>■ Assess ability to participate in instrumental testing</li> </ul>

## **Testing This and Testing That: Selecting Methods of Dysphagia Sleuthing**

“We balance probabilities and choose the most likely. It is the scientific use of the imagination.”  
 Sherlock Holmes in *The Hound of the Baskervilles* (Doyle, 1902).

The CSE generates data that can be analyzed either qualitatively or quantitatively. For example, deviation of tongue protrusion indicates weakness of one genioglossus muscle and predicts possible oral impairment. This qualitative observation can be combined with all other CSE qualitative data to develop an impression based on a preponderance of evidence. This is what occurred in the study described earlier (Steele et al., 2011): judges used all of their observations to develop a more accurate prediction about who did and did not have dysphagia or aspiration.

The same observation of asymmetrical tongue protrusion could also be classified as a quantitative “failed” tongue protrusion observation. If this tactic is chosen, the clinician must develop valid cutoffs for failing each subtest (what has to happen to fail this subtest or that?) weigh each result based on its importance in predicting dysphagia, and then derive a quantitative impression based on the sum of weighted passes and fails. Whether the clinician reduces CSE observations to qualitative or quantitative data, these two methods of combining the data are legitimate and necessary parts of the diagnostic process, whether the CSE is used because it is the only test available, because it is the only feasible test, or during long waits for instrumental testing.

The clinician can perform an entire CSE and interpret all results together, or perform a series of tests and have a threshold for terminating the test. The CSE components are typically performed in a single visit using a testing design called parallel testing—several tests performed at once and the observations combined to form an impression (Sheringham, Kalim, & Crayford, 2008). This design tends to have a higher sensitivity at the expense of lower specificity. Multiple CSE subtests can also be deployed using a strategy called serial testing which starts with a single pass/fail test. If it is passed, the test is over and the patient has passed (which is a screen!). If it is failed it is followed by more tests. If both tests are failed, the exam ends and more definitive diagnostic testing or management is performed. But if one test is passed, the patient is considered

to have “passed” the test. This method produces a higher specificity (ruling out those without dysphagia) because even after a single “fail” the patient has another chance to “pass”. The similarity between serial testing and the commonly deployed dysphagia screening tests is obvious but the CSE is not a pass/fail test and it should not be reduced to a single pass/fail result, but it can be designed and interpreted in different ways. It should also be clearly understood that tests with extremely high sensitivity typically overestimate the number of impaired patients, and those with extremely high specificity overestimate the number of unimpaired patients.

Combining multiple test results to form an impression can strengthen the overall test results in one direction or the other. To illustrate this point, consider data from Steele et al. (2011), and from McCullough, Wertz, and Rosenbek (2001). Both studies included two CSE observations: baseline voice quality/dysphonia, and post-swallow/spontaneous cough, throat clear, or voice change. It should be recalled that the first study (Steele et al., 2011) used a concurrent design while the second (McCullough et al., 2001) employed a similar but non-concurrent comparison of CSE and VFS. Table 2 displays the sensitivity and specificity of each single clinical observation in the first two rows, followed in the next row by computation of the sensitivity and specificity of the combination of both observations in a parallel design, and then in the last row by the sensitivity and specificity of the combination of both observations in a serial design (Schoenbach, 2005).

**Table 2.** Comparison of Individual Test Results to Combined Results in Parallel and Serial Designs.

Clinical predictor Steele et al./McCullough et al.	Sensitivity Steele et al. (2011)	Specificity Steele et al. (2011)	Sensitivity McCullough et al. (2001)	Specificity McCullough et al. (2001)
Abnormal baseline voice quality/dysphonia	56%	57%	91%	22%
Post-swallow cough, throat clear, or voice change/spontaneous cough	21%	52%	68%	82%
Both tests combined; <b>parallel design</b>	<b>66%</b>	29%	<b>97%</b>	18%
Both tests combined; <b>serial design</b>	12%	<b>79%</b>	62%	<b>86%</b>

Baseline abnormal voice quality predicted which patients were aspirating or not aspirating in Steele et al. (2011) with coin-toss accuracy (56% and 57% respectively), while post-swallow cough, throat clear, or voice change predicted only 21% (sensitivity) of aspirators, and only half of non-aspirators (specificity = 52%). If both tests were performed at the same time (3rd row—parallel test design), correct prediction of aspirators increased to two-thirds (sensitivity = 66%) though prediction of non-aspirators suffered (specificity = 29%). And if both tests were performed serially (4th row), prediction of non-aspirators rose to almost 80% while prediction of aspirators plummeted to 12%. Similar results (third and fourth columns) are seen for the second study (McCullough et al., 2001). Both studies predicted aspirators (sensitivity) better when subtest results were combined in a parallel design, and non-aspirators (specificity) better when they were combined in a serial design. The choice of serial or parallel designs naturally depends on which is more important: identifying an impairment or its absence. Extending this logic to the CSE, obtaining more information about the various tested functions in the CSE provides more accuracy and detail about each of those impairments or functions. These tactics come into important play when instrumental testing is not available or feasible, because intervention must be developed after the CSE to address the results of the examination.

What is the point? Since each of the many subtests in a CSE essentially provides a discrete result, combining results increases the predictive value of the overall test result, and combining results is what we do, or should do, during a clinical evaluation. The next question to consider is “when is the clinical/bedside swallowing examination a legitimate and necessary procedure?”

## ***Uncertainty When Diagnostic Testing is Not Feasible***

“I have always been so sure — too sure. . . But now I am very humble and I say like a little child: I do not know. . .” Hercule Poirot, in “Curtain – Poirot’s Last Case” (Christie, 1975).

For the dysphagia clinician, there is no more uncertain time than when instrumental testing is needed and not available. There are many reasons that a diagnostic test may not be feasible, and situations in which a complete set of information characterizing the patient’s problems is simply unavailable. In these situations the best clinical evidence available is all that is available. Some of us have every type of diagnostic testing at our disposal. Elsewhere, SLPs lack the luxury of instrumentation that many of us take for granted. Access to instrumental testing may make it difficult to impossible to obtain a VFS or a FEES study in the short-term, since it may take a long time to get an appointment for a VFS study in some settings and regions. It may sound far-fetched, but it is not. At some conferences, after discussing “proper” and timely referral for instrumental testing, I have been asked “what should I do during the 4–6 weeks or more it takes to get a VFS for my patients?” The feasibility of instrumental testing is low in many clinical settings.

During a CSE, the absence of clinical signs of aspiration may lead the clinician to conclude “silent aspiration is possible” and lead to a recommendation for an instrumental test. The examiner **needs a logical reason** to suspect the possibility of **silent aspiration** (or silent “other problems”) to justify instrumental tests. The absence of cough is not enough information by itself, to justify the need to “rule out silent aspiration” with an imaging test. **Expensive** gold standard **tests** are necessary when it is important (and not just interesting) to **identify impairments** that are **unobtainable** through a **CSE, and** develop logical **interventions** for them. They should **not** be used to **simply confirm** what can already be known with certainty from a CSE. Yes, it is comforting to know that we were correct in our CSE diagnosis, but if performance of an instrumental examination cannot contribute to or change the diagnosis or treatment plan in any substantive way, then it is not necessary.

Other situations that take the use of **diagnostic testing off the table** include the **terminally ill** patient who does not want any diagnostic testing, and the patient with **advanced dementia** whose legally authorized representatives have declined further testing. These are real situations in which the logic, usefulness, and likelihood of a real benefit from all available testing are uncertain, and often the CSE is the top of the line available, feasible test. Traditionally, the SLP strives to reduce the preventable risk that dysphagia will unnecessarily shorten the lives of patients, and the CSE is often the best and only test available.

## ***Final Words***

“Oh, yes. It is obvious to my trained eye that there is much more going on here than meets the ear.” Inspector Jacques Clouseau, in “The Pink Panther Strikes Again” (Edwards, 1976).

Clinicians’ trained eyes, ears and brains, are our instruments and there is much gray area for them to measure. We use them to offer the best available plan to the patient after using best evidence and clinical judgment, and then we invite the patient to join in a partnership to use the best methods to achieve the patient’s goals. The clinical evaluation of swallowing function is not very good at some things: it lacks the ability to identify the presence or absence of physiological abnormalities of the pharynx, competence and quality of airway protection, how the swallowed food and liquid are flowing, and where they are going beyond the mouth. And CSE is especially bad at identifying aspiration when it is silent.

But the CSE is necessary in two distinct situations. First, when instrumentally diagnosing and managing dysphagia is not available or feasible, the CSE is the closest and best available surrogate for the instrumental examination. If for whatever reason, the competent patient decides that instrumental testing is not what they want, and they understand the advantages and disadvantages, risks and benefits of that plan and its alternatives, then the clinician is obligated to move to the next best plan: one that carries a higher risk of the outcome we are trying to mitigate. Likewise, if it takes weeks to obtain instrumental testing, the CSE enables the best educated guess at interim management.

Secondly, when we have access to instrumentation, the CSE should always precede it because instrumental testing is not only diagnostic, it is an intervention trial. The CSE enables us to form valuable hypotheses that guide our diagnostic procedures, prepares us to test the efficacy of interventions, and prepares us to determine whether the patient can participate in appropriate interventions. The CSE improves communication between the SLP and radiologist by enabling the SLP to explain what is predicted before beginning a VFS and what intervention plans will be deployed to manage abnormal findings (Langmore & Logemann, 1991). It also helps us to communicate to our radiologist colleagues that the instrumental test is not merely a diagnostic test, but that it is also a treatment efficacy trial (Logemann, 1993).

Clinical evaluation is the initial form of testing performed by physicians and contributes to establishment of the patient-clinician relationship and patient-clinician trust (Verghese et al., 2011). The SLP is no different. Clinical evaluations contribute to establishment of rapport with the patient and caregivers (with whom the SLP will be working in the treatment process), enable communication among all involved parties, and provide the clinician with a growing internal database of observations that are later confirmed, refined, or refuted in their future evaluations. In some cases, it can obviate the need for unnecessary, invasive diagnostic testing, and when it is omitted in the interest of clinical expediency, the humanity of the clinical process erodes. There is most definitely an important place for the clinical swallowing evaluation.

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