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## Back to Basics: Swallow Screening: How, when, and who Recorded September 3, 2019

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- [Amy] Once again, welcome to our webinar today, Back to Basics: Swallow Screening: How, when, and who. Our presenter today is Angela Mansolillo. She is a speech-language pathologist and board-certified specialist in swallowing disorders with over 30 years of experience. She is currently a senior speech-language pathologist at Cooley Dickinson Hospital in Northampton, Massachusetts, where she provides evaluation and treatment of adults and children with dysphagia and is also involved in program planning and development, including quality improvement initiatives, patient education, and clinical policies and protocols. In addition, she is an adjunct faculty member at Elms College Department of Communication Sciences and Disorders. And we're always happy to have her here today. So welcome back, Angela. I'm gonna turn over the floor to you.

- [Angela] Thank you, Amy. It's very nice to be back. Always enjoy spending time here on SpeechPathology.com. Hope you're all having a lovely afternoon. It's lovely here in Massachusetts. We should start by talking a bit about our objectives for today, our learning outcomes. You can see them there on the screen. We have three learning outcomes for today. Participants will be able to assess available screening tools for validity, sensitivity, and specificity. Secondly, you'll be able to choose an appropriate screening tool or tools given your particular setting and client population. And finally, you'll be able to identify potential road blocks to comprehensive screening and discuss strategies to facilitate implementation that hopefully you will then be able to incorporate into your own settings. So that's what we're going to accomplish today. But we're going to start with some definitions, just to kind of make sure that we're all on the same page in terms of the terminology that we're using and the terminology that is critical to understanding screening tools. So let's start by defining an assessment. We want, typically, our assessment to be consistent with the WHO framework, which talks about three levels of assessment. You're probably familiar with this structure, with this framework, I should say. The first level of the framework, the first level of

assessment, is to identify and describe structures and functions. And so certainly we look at those structures and functions that might be affecting swallowing in terms of pharyngeal weakness or a lingual weakness, or vocal fold paralysis, or whatever those particular functional or structural issues might be. Then we take our assessment to the next level by looking at the impact that those specific impairments might have on the individual's activities. So in other words, that lingual weakness might mean that he's unable to chew and therefore needs a modified diet.

But we're not done yet with our assessment process. We then wanna take it to the third level, which is where we really look at those barriers to or facilitators of, so strengths and weaknesses, in other words, of successful swallowing and participation. And here's where we start to think about quality of life issues and what this swallow impairment means in terms of this person's ability to fulfill their roles and social responsibilities. So if we say that the structural impairment is lingual weakness, and then the functional impairment is difficulty chewing and need for a modified diet, then the final level of that would be, this is someone who no longer is able to socialize with his friends at their weekly breakfasts, 'cause he can't go to the restaurant. The WHO encourages us to use our assessment process to look at all three levels as we think about moving through the process.

So for us, that means clinical or a bedside evaluation and/or an instrumental assessment, fluoroscopic evaluation of swallowing, or endoscopic evaluation of swallowing. And a piece of that overall assessment process is a swallow screening. And that's what we're going to focus on today. Swallow screening is not a full assessment, as I'm sure you know. It's much quicker, easier to do. And it is essentially a pass/fail procedure. There's no nuance here. You pass the screen or you don't pass the screen. And we use it as a tool to identify those individuals who then need to move on for a more full, complete evaluation, or perhaps identify those folks who need to be referred to other professionals for other services. This is part of the

preferred practice pattern. And you can find a lot of information about policies around swallow screening on the ASHA website. And you have the link there in the slide. So very different from a full assessment. We're talking about a pass/fail procedure that is generally done pretty quickly to help us or the people around us, other healthcare practitioners, as we'll see, identify those clients who need a more thorough assessment. So why do we do that? Why do we bother with that piece of it? Why not just move on to a full assessment? Well, we'll look at some of the research around this why question in a little bit. But the studies have told us that the earlier we identify people who are potentially struggling with dysphagia, specifically the aspiration component, the better they do. The earlier we get interventions going, the earlier we identify the risk, the better these folks do over the long run.

And a screening allows for that early identification. Because a screening can be done whether or not the speech pathologist is there and available. So early identification is certainly one important reason for screening. Another is it allows for more accurate referrals for assessment. In facilities that don't have screenings in place, referrals to speech pathology are done based on what the nurse thinks should be done or what the doctor thinks should be done and whether or not they think we could contribute something useful. We don't necessarily want to be dependent on an individual's practice patterns. A screening allows those referrals to be accomplished in a more objective way.

So that's another really good answer to the why do we need a screening question. It helps us to identify patients who are at high risk of aspiration. And when I say we, I'm not just talking about speech pathologists but we as the healthcare team. It helps the nurse and the doctor on the floor, or the emergency room physician, as we'll see, or the emergency room nurse, identify those folks who are at high risk, again, so that we can get some supports in place, get some plans in place, whether or not the speech pathologist is readily available. Alternately, it helps to facilitate return to oral feeding

and oral medication. If that screen is being done in the emergency room at three o'clock in the morning, and your client, or this client, passes the screen, they can then have that sandwich that they want. Or they can take those medications that the physician feels are so important to get in. Whereas, if they were waiting for the speech pathologist to come, it might be hours before this patient was able to get those medications or return to eating and have that sandwich. So assuming the person passed the screening, in other words, they would be able to return to oral feeding and get their medications earlier.

And so overall, it's just a more efficient way of approaching dysphagia in a healthcare setting. It helps to identify those people more quickly. We don't have to put restrictions in place for longer than they need to be. And it gets us better referrals in the long run so that we can use the time that we do have for assessment more efficiently. There have been a number of studies that have looked at this idea of screening and looked at outcomes, as I said. And those studies have demonstrated that without early identification of people with dysphagia, particularly, most of these studies looked at hospital settings, that folks were, in fact, at higher risk for aspiration, higher risk for choking, higher risk for dehydration and nutritional consequences, and then went on to be less able to participate in rehabilitation, either in that acute care setting, or when they moved on to an inpatient rehab setting or to a SNF-level rehab, they were not doing as well.

Because we hadn't put those safety nets in place underneath them early on in the process. Here's some of the research that I've been referring to. We know that without screenings, without early identification of dysphagia, patients have longer hospital stays. They have higher mortality. They have higher pneumonia rates. It costs the hospital more, again, because mostly related to the pneumonia rates. Higher caregiver burden and lower likelihood of discharge to home. A caveat here is that the majority of these studies have been done with stroke patients. Those of you who work in acute

care know that a few years ago, we had a mandate from the Joint Commission to put a swallow screening in place. That mandate no longer exists. It's gone away. Joint Commission changed their mind about that. But at the time, there was a lot of research activity around not just trying to find a validated screening tool that would for stroke patients, but that's where a lot of this other research came from as well, in terms of, what are the outcomes of when you put a screening process in place? What happens when you don't put a screening process in place? And so the majority of this research, not all of it but certainly the majority of it, has been accomplished with patients who had strokes. There is evidence around swallow screening for other populations. And we will certainly look at that as well. What we don't have a lot of information around is practice patterns. What are people actually doing? This is only one study that I'm aware of that looked at practice patterns as it related to patients in a critical care unit who were post-extubation.

So these were respiratory patients who'd been intubated for vent support and were now extubated. And these researchers looked at those patients across a number of facilities. So they did kind of a survey to see how facilities, how hospitals, specifically critical care units, were managing these post-extubation patients when it came to swallow screening. And you can see that back in 2012, less than half of the facilities were using a screening tool with this population. Those that were, the majority of those were using their nursing staff to administer the screening. About a third were using speech pathologists to administer the screening.

And a small percentage had some combination. We don't have any research that's more recent than this study that you're looking at. I suspect that given all the research that we have now around supporting these patients, these post-extubation patients, there are probably more critical care units that are using a swallow screening tool. But what tool they're using and who's administering it, we simply don't know at this point. Somebody out there should do a study. Here are some of the outcomes that have been

associated with when a screening is in place. Low, no, lower, sorry about that, lower pneumonia rates in stroke patients in a couple of studies. The Sorensen group combined an implementation of a screening tool with a comprehensive oral hygiene program. And they were able to reduce their post-stroke pneumonia rates. Stroke patients are, not only do they make up a lot of this research around swallow screening, but they are at particular risk for pneumonia. There is a type of pneumonia now that you may be hearing this term, stroke-associated pneumonia, which may or may not be an aspiration pneumonia. But there is this whole sort of constellation of things that happens as a patient is having a stroke and in those few days post stroke. And the changes that occur in terms of their immune system make them much more susceptible to pneumonia.

So those first three to five days, depending on the study that you look at, post stroke are very high risk for pneumonia whether or not the patient has dysphagia. So that's what they're getting at here when you see that term post-stroke pneumonia or stroke-associated pneumonia. These may or may not be aspiration pneumonias. And then finally, in terms of outcomes associated with screening, more efficient identification in patients who need instrumental assessment. And that's related to what we were talking about earlier, where if we can use more objective measures, we can get the right patients to the right place for evaluation.

So I've made the point that we need good screening tools. But how do you identify a good screening tool? So a good screening tool should be easy and quick. Again, we're not talking about a full clinical assessment. We're certainly not talking about instrumental assessment. This needs to be something very easy, something that doesn't take a lot of time, something that someone other than a speech pathologist, in a lot of cases, needs to be able to do. And it can't be very costly, or administrators just won't go for it. That's just a fact. And of course, we want a tool that's also valid and reliable. So if you go back to your statistics class for a moment, without having

post-traumatic stress, you will recall that a test is valid, a tool is valid, when it measures what it says it's going to measure. And so we wanna make sure that whatever screening tool we are choosing actually does rule in and rule out aspiration or rule in and rule out dysphagia, depending on what our goal is. We also want to be sure that any assessment tool is reliable. And reliability is about consistency. We need to be sure that if nurse A gave that screening or nurse B gave that screening, or speech pathologist A gave that screening, or doctor D gave that screening, we would get the same results. The key to reliability in any assessment instrument is good instructions, right. People need to be able to follow the instructions. If the instructions are complicated, then it becomes difficult to ensure that everybody's doing it in the same way every time that they do it.

So reliability is consistency, and good consistency comes from a tool that's easy to do and has easy instructions, and whose results are easy to interpret. Two more terms that we need to think about, I'm gonna kind of keep you in your statistics mode for just a moment or two more. We need to think about whether our screening tool has sensitivity and whether our screening tool has specificity. So these are terms that people sometimes get confused. But sensitivity is the likelihood that a clinical sign will be present given that the dysphagia is present. So in other words, these are actual positives. This is the way that the tool rules in the dysphagia, in our case.

So in other words, if you were administering a screening tool and the patient coughed, and that meant that they failed the screening and that when you then did instrumental assessment, that cough was, in fact, related to aspiration or some degree of dysphagia, that would be an actual positive. And that would allow us to rule in dysphagia. On the other hand, we also have to make sure that any tool we choose has good specificity. And this is the way that we rule out dysphagia. So this is the likelihood that that diagnostic sign will be absent given that the dysphagia is absent. So these are actual negatives. So this would be, if you administered that screening tool and there



was no cough or no change in vocal quality, or whatever your clinical sign was, that that meant, for sure, that there was no aspiration, that meant, for sure, that there was no dysphagia, depending on what your tool was purporting to measure. So in other words, this is the way that we rule out dysphagia and say you have passed the screening and you don't need further assessment. This is really critical as we think about dysphagia management because of the risk of silent aspiration, right. We need to be sure that whatever tool we're using has the ability to truly rule out dysphagia in a way that is accurate. Ideally, a good screening tool has both good sensitivity and good specificity. And you will see a lot of variability as we start to look at specific tools and the research around them. Four different types of screening tools, and we're gonna talk about all four of those today. One is based on symptom identification. Two, questionnaires to patients or self-reports that patients would fill out on their own. The third category are water screening tools that, these are tools that actually ask people the do swallowing as part of the assessment.

And then the final group that we're gonna look at are methods to look at reflexive cough, so cough testing as a screening tool. How do you know which one to choose? Well, some of that will depend on the client population with whom you're working. Some of that will depend on your setting. Some of that will depend on who's going to be administering the screening. Are you looking for a tool that speech pathologists will use? Or are you looking for a tool that's been validated with nurses or physicians? So keep those questions in mind in terms of specifically what you're looking for as we start to look at individual tools. And then you can start to match up the tool with your particular needs. You wanna think about what kind of patient population you're working with. Are you looking for something that can be used in a critical care setting? Are you in a hospital? Are you in a skilled nursing facility? And again, think about the type of patients with whom you're working. And that will help you to think about which of these tools might be, in fact, the best one for you and your setting. So let's start by looking at the Gugging Swallow Screen. This is a tool that includes a number of what the authors

called indirect measures. Whoever is administering the screening makes an assessment about the patient's level of alertness, presence of drooling, changes in vocal quality. The patient is asked to complete some saliva swallows. And then that is also combined with a number of different boluses, food, and then thin and thick liquids. And you can see this has really good sensitivity. So in other words, it's very good at ruling in aspiration. The numbers were not quite as good for specificity, not so accurate at ruling out. They did their measures compared, they did the swallow screen followed by instrumental assessment. In this case, they did FEES, or endoscopic swallow eval. That's always a good thing to look for. You'll see that some of these tools did not compare themselves to instrumental assessment. And so that's something that you always wanna keep in mind. This tool has been validated internationally in a number of different languages, in a number of different countries. It is designed to be administered by a speech pathologist. It has not been validated as an RN tool. And it is somewhat labor-intensive in that there's three different boluses and a number of indirect measures to keep track of.

So it's a little bit more involved than some of the other quicker screening tools that we'll look at. But it has been modified recently to correlate to the new IDDSI diet recommendations. So that is certainly something to consider as well. The next one is the bedside aspiration test. This is a water test. It's 50 milliliters of water in small amounts. So it's not serial swallows. The patient is asked to do 10 mLs at a time, so it's five smallish swallows.

They combined the water swallows with pulse oximetry. And what they found was that when the patient was having some difficulty with water, in other words, coughing, or had some sort of change in vocal quality, and that was combined with a drop in oxygen saturation on the pulse ox, they were able to predict aspiration, rule in aspiration with 100% accuracy. You can see the specificity in terms of their ability to rule out aspiration was down around 70%. This tool has only been validated with stroke patients. And

there is some new research that we'll look at in a few minutes around pulse oximetry accuracy that may call some of this into question. But it is a fairly quick test to do. One of my concerns about it is we never get to larger boluses, and we never get to serial swallows, which I think have a lot of predictive ability, in my experience. This is the VVT, or the Volume Viscosity Test. You can see that they, too, look at a number of different bolus types. They look at water or thin liquid. They look at nectar-thick and pudding-thick boluses. And they do three different volumes, so they do five, 10, and 20 mLs. They validated their tool based on instrumental assessment. They used fluoroscopic swallow study. And they validated the tool in two ways, the ability to rule in and rule out aspiration, but also the ability to rule in and rule out pharyngeal residue, which is something we don't see very commonly on a lot of the other screening tools. So this, the VVT, is unique in that regard. They looked at number of patients with neurologically-based dysphagia.

So there were a lot of stroke patients, but also some other brain-injured patients as well. That was the original work that was done in 2008. A different group of researchers, a little more recently in 2014, combined the Volume Viscosity Test with the EAT 10. And if you're not familiar with the EAT 10, it's a questionnaire that patients, it's 10 questions that people answer. And so when they combined the VVT with the EAT 10, you can see the sensitivity and specificity numbers there, in that second study, they did not look at residue. They only looked, excuse me, they only looked at aspiration. Inter-rater reliability, not so great, 62% in that study.

So that certainly is a little concerning. This is a Toronto Bedside Swallowing Screening Test, or the TOR-BSST. This is a very well-studied tool. It includes water swallows. There's an assessment of vocal quality before and after. There's also an assessment of lingual mobility. This tool has been very well-studied in acute care settings as well as in rehabilitation settings. You can see it has fairly high inter-rater, sorry, test-retest reliability and good sensitivity and specificity numbers, a little bit of a difference

depending on your setting. This tool, however, one caveat here is this is a tool for patients post stroke. The nice thing about this is there's a training program that is part and parcel of the tool. That's probably why they get such good reliability numbers, 'cause there's a full training program for speech pathologists and nurses who are, excuse me, who are administering this screening tool. This is the Massey Bedside Swallow Screen, which, as you can see, includes an assessment of cough, gag, saliva swallows. The screener is asked to make a judgment about whether or not dysarthria is present, whether or not aphasia is present. There's a sort of modified oral mechanism assessment that goes along with this.

And then there are water swallows of a teaspoon to start, followed by a larger volume, 60ccs. This is designed to be an RN-administered tool. It has good reliability, sensitivity, and specificity. But the caveat here is they did not ever compare this to instrumental assessment. They compared it to clinical signs of dysphagia. So in my mind, that's a little problematic. And the sample size was small. This, too, is a stroke screening tool. This is the Modified Mann Assessment of Swallowing Ability. Some of you may be familiar with the MASA, the Mann Assessment of Swallowing Ability, which is a 24-item protocol for standardizing the clinical or bedside swallow evaluation.

What the Modified MASA does is take 12 of those items. Excuse me. It takes 12 of those items so that the tool can be administered more quickly. And those items include assessment of level of alertness, speech and language functions, oral mechanism examination, respiratory and cough measures. So you don't ever administer boluses. They, too, did not compare to instrumental assessment. Instead, they compared to the full MASA, which in the past, in other studies, has been compared to instrumental assessment. So sort of indirectly, perhaps, we can say that the Modified MASA has been compared to instrumental assessment, but not directly. And you can see that the sensitivity and specificity numbers there are not bad. This is a tool that was very specifically developed for use in emergency rooms by emergency physicians. And you

can see that it includes an assessment of vocal quality, some questions to the patient about any swallow difficulties they might be having. There's an assessment of facial asymmetry. There's a very brief assessment of language skills. And then that is followed by water swallow tests with pulse oximetry. This, too, was validated only with stroke patient population and was not compared to instrumental assessment. It was instead compared to the follow-up formal evaluation that the speech pathologist did. So it was compared to the clinical swallow eval that followed it. The sensitivity numbers, you can see, are pretty good. The specificity, in other words, the ability to rule out aspiration, rule out dysphagia, those numbers are not so good. And that's really something we have to think about, particularly in an emergency room setting, I would say. If you go ahead and say, "Yes, you've passed the screen, "and you can go ahead and have that sandwich "or take those medications," we wanna be really sure that you really are safe.

And with this tool, maybe not so much. Part of the problem, I think, was when you look at the study itself, I mean, it was an emergency room. So they weren't always able to control for the amount of time that elapsed between when the screen was administered and then when the formal evaluation by the speech pathologist was administered. In an emergency room, clearly that's difficult to control for. But that was problematic, I think, in terms of some of the results that we're looking at. Because patients, stroke patients in emergency rooms, sometimes look very different from hour to hour.

So I think we have to interpret these results carefully in light of that. This is the Barnes Jewish Hospital Stroke Dysphagia Screen. Just what it sounds like, it has been validated with patients who have sustained a stroke. It is a water test, 90 mLs, plus Glasgow Coma Scale, which is an assessment of alertness. It also includes a assessment of facial, lingual, palatal asymmetry and strength. They did validate this against instrumental assessment. They used fluoroscopic swallow study. And you can see that their ability to rule in aspiration was very high, the ability to rule out aspiration,

perhaps not so high. This tool has been validated for use with nurses. And you can take a look at it. I've given you the link to the actual tool. This one goes back to 1997, so this is an older one. It's the oral pharyngeal and clinical swallowing examination. It was validated with patients who had sustained a stroke. It's an oral mechanism examination. It also includes water swallows in varying volumes, five, 10, and 20 mLs, two times each. It includes laryngeal palpation and assessment of vocal quality following each swallow. They did compare to instrumental assessment. You can see a fluoroscopic swallow study [here](#). And they found, interestingly enough [here](#), they calculated sensitivity by all of the various clinical signs, and they found that dysphonia and dysarthria were the most predictive of dysphagia severity. So whether or not you use this screening tool, that's kind of an important thing to keep in mind as you're doing your clinical assessment, that those changes in voice and changes in speech actually have predictive ability as we are starting to think about the presence of dysphagia and aspiration.

And in fact, when two or more clinical signs were present, you can see the likelihood that the patient had dysphagia was increasing. And the sensitivity, the ability to rule in aspiration increased. So again, whether or not you think about using this tool, I think there's some really helpful information [here](#) as we proceed through our clinical evaluations. This is the SSA, or the Standardized Swallowing Assessment. This includes an assessment of level of alertness, but also posture, which is something we don't see a lot in screening tools. It also includes an assessment of cough, saliva management, respiration and vocal quality. And it does include water swallows, like a lot of other tools, varying volumes, teaspoon versus cups. It has been validated for use in hospitals. But it is pretty quick and easy to do. And the original research was done with nursing staff. So it may be appropriate for those of you in skilled nursing settings as well. 'Cause in those settings, we're always looking for something that the nurses can do that isn't gonna take a lot of time. And so I think it may be, certainly, appropriate for that setting as well. Sensitivity and specificity numbers looked good,

but again, no instrumental assessment was used in the validation process. So that's always something to consider. And one of the interesting things about this tool is the instructions include discontinuation of the screening if the patient doesn't have sufficient head control and postural stability to sort of sit unsupported and participate. That's not something you see in a lot of screening tools. So if that's something that is of concern in your population, this may be an interesting one to look at. We mentioned pulse oximetry earlier. It's included in a couple of the screening tools that we've looked at. There have been a number of studies that try to find a relationship between a drop in oxygen saturation as measured on the pulse ox and an aspiration event. Which would be really nice if we could say that, wow, when you aspirate, your oxygen saturation drops. Unfortunately, none of the studies were actually able to find that relationship. There were plenty of people who aspirated but did not have a corresponding drop in oxygen saturation. There were people who did experience drops in oxygen saturation that were not related to aspiration events. Excuse me. Sorry about that. Britton et al. have done a really nice review of all this literature.

And you have that reference in your reference list. I'm not saying pulse oximetry doesn't tell us anything. It actually is a really nice way of getting a sense of the work of breathing. How is this person's respiratory system responding to the demands that repeated swallowing is placing on it? What about endurance for feeding? Pulse oximetry, the measurement of oxygen saturation, can give us a lot of good information in that regard. And there's some work that we'll look at in just a minute that demonstrated that that baseline oxygen saturation number is an important one to pay attention to. And so if you have a patient who is being monitored for oxygen saturation, and you've got the pulse ox there, absolutely, there is some good information that we can obtain with it. But be careful not to over-interpret those drops in oxygen saturation. They don't necessarily mean that the patient has aspirated. Steele and Cichero, a few years ago, did a review of all of the available literature around those respiratory factors that we might see as we go through our assessment process or our screening process

that would, in fact, be predictive of aspiration. And you can see the ones that had the most evidence to support them. Rapid respiratory rate, so first, I should say, before we go through those, those of you who work with a pediatric population, none of the research in this particular review included pediatric subjects. So these were all adult subjects. What were the things that were predictive of aspiration in terms of respiratory factors? One was a rapid respiratory rate.

So when the respiratory rate is getting upwards of 25 breaths per minute or more, then the likelihood that the patient is aspirating is likely to increase. There's that low baseline oxygen saturation. So if you have a patient who's got the pulse ox on, and you haven't even started your screening or started your swallow trials, and they're down around 94% oxygen saturation, they've really got nowhere to go but down when you start to impose the demands that swallowing places on the respiratory system. Remember, every time we swallow, we hold our breath. And for those of us with normal respiratory systems, that's not a problem. But if you've got someone who's already compromised, and their oxygen saturation is already low, then there's nowhere to go for them but down when they start to experience repeated swallow apnea. And so the breathing-swallow coordination is going to be impaired, and we're gonna see a higher likelihood of aspiration.

Some other things to pay attention to that this research calls our attention to, inconsistencies in terms of the breathing-swallow pattern, particularly a consistent post-swallow inhalatory pattern. If you're seeing those and shorter-than-typical periods of respiratory pause during the swallow, any of those things increase the likelihood that the patient has aspirated or is aspirating. Here is some of the research around cough testing. Now, the idea here is to try to tap into reflexive cough, right. We know that voluntary cough is different than reflexive cough. When I ask you to cough, that's a different neural pathway than the neural pathway we use when we're coughing more reflexively to protect or clear our airway. So all of this research has been trying to tap



into that reflexive cough pattern rather than voluntary cough. And they do that with an irritant. And you can see the irritant is different in different studies. Some researchers use tartaric acid. Others used citric acid. Others used capsaicin. They took the irritant, dissolved it, and nebulized it, and had the subjects in the study inhale the irritant. And then they assessed the cough response to see, did they get a cough response? How strong was the cough response? And then they would make predictions about whether or not patients were aspirating, whether or not patients were able to protect their airway, based on their cough response to this particular irritant. The research is far from conclusive. There are a lot of variables here, you know. Different researchers use different irritants. They use different concentrations of irritant. Even the ones that used the same irritant used different concentrations of the irritant. As a general trend, we see cough testing sort of over-identifying potential aspirators, so people failing the cough test who, in fact, were able to protect their airway.

So we're not there yet, I guess, is the conclusion here. Most of us don't have access to these irritants anyway in order to dissolve them, and nebulize them, and administer them in the way that they're administered in the research studies. So that's certainly one roadblock in terms of implementing this currently. I worry about the over-identification of aspirators. We're still not at a point yet where we know which irritant is going to be most predictive and which concentration of that irritant is going to be most predictive. The other big question, in my mind, as I look at this cough research, this cough reflex research, is, are we sure that we are testing the right cough? So the cough you cough if I ask you to cough, your voluntary cough, that's a different cough than your reflexive cough. But is the cough you cough in response to an irritant the same cough that you would cough if you were trying to keep something out of your airway? And I'm not convinced that it is. And the research around cough says that it may not, in fact, be the same cough. And so using an irritant may not be getting us where we wanna go in terms of making predictions about whether or not people could protect their airway in response to aspiration. And that may be where the

over-identification of potential aspirators is coming from. I think cough testing certainly has potential, and we will be hearing more and more about it. Cough is a hot topic in the research. So I feel sure that we will be hearing more about this, and hopefully getting to a place where we do have a tool that is easy to use and has good sensitivity and specificity. The 3-ounce water test is probably the best studied of all of the potential screening tools that are out there. You can see that it was originally described in the early '90s as a tool for assessing dysphagia in people who had neurologically-based swallowing impairment. The patient drinks three ounces of water without interruption.

So the instructions to the patient are, here's three ounces of water. Drink it without stopping. If the patient coughs or can't finish, or can't do it without stopping, or has cough or change in vocal quality during or following the administration of the water test, they are considered to have failed the water test. It didn't really catch on when it was first described back in the early '90s, largely because it was being described as a substitute for the clinical or bedside swallow evaluation. And speech pathologists didn't really love that idea. But then we had that mandate that I was talking about earlier from the Joint Commission to screen stroke patients before they had their first meal or their first meds in acute care settings.

So everybody was looking around for validated screening tools at that point, and the 3-ounce water test came back to everybody's attention. Very well-studied, doctors Leder and Suiter did amazing research around this 3-ounce water test. Look at that n, 3,000 people in this study. And they used a wide variety of patient diagnoses, so not just stroke patients but a wide variety of underlying etiologies of dysphagia. And they did the 3-ounce water test followed by FEES. So it was compared to instrumental assessment. What they found was that if you pass the water test, in other words, you can do three ounces of water without stopping, without signs and symptoms of difficulty, then you, in fact, were not aspirating. So that's important for a screening tool,

right. They did, however, find a high false positive rate. So as a screening tool, I'm kind of okay with that. If you come into the emergency room in my facility, and it's three o'clock in the morning, and the nurse has some meds she's gotta get in, or you're asking to eat, and the ED doc or the nurse does a water test and you pass, we need to be sure that that means you're safe, and it does. If you fail, and you have to wait for your medication, or you have to wait for the speech pathologist to come in, and then the speech pathologist comes in and says, "Well, yeah, you can be safe "if you do it this way or that way," I'm pretty comfortable with that as a screening tool, particularly when you look at the 2011 study.

And that's that last bullet on the slide there. They set out to determine, who were these people who had these false positives? Who were the people who failed the water test, couldn't do three ounces of water without some sign or symptom of aspiration but weren't actually aspirating on instrumental assessment? And it turns out they were folks who were deconditioned, who had impaired cognition, and who had low endurance. So those are appropriate referrals to a speech pathology service. So if those are the false positives, then that seems kind of okay to me. They did a smaller study of the 3-ounce water test with a pediatric population. You can see the age range there, two to 18 years. Same study design, they did water tests followed by endoscopic swallow evaluation and got essentially the same results.

So across patient populations, across age groups, across settings, the 3-ounce water test seems to be a good tool. Now, you may be wondering, well, what about silent aspirators? And they were wondering that, too. So they set out to determine what was going on with those folks who were aspirating silently. So they designed a study where every subject in the study was known to be a silent aspirator. So as they identified patients who were silently aspirating on their instrumental assessment, they then did 3-ounce water test. And they found that those folks who were aspirating silently on single bites or single sips weren't so silent when it came to three ounces of water

without stopping. So when you increase the volume to three ounces, when you increase the demand to serial swallows and have a more prolonged period of breath-holding, we can actually identify those patients who would have been silent aspirators on smaller volumes with less respiratory demand. So even if you're not necessarily in the market for a screening tool, although you probably are if you're taking this webinar, but even if you're not necessarily in the market for a screening tool, this is a good adjunct to your clinical assessment. If you wanna walk out of that room and be sure that you haven't missed silent aspiration, use the 3-ounce water test as part of your clinical assessment. This is the same group of researchers from Yale New Haven. They did cognitive assessment, a quick cog screen essentially. They checked orientation and ability to follow directions and then followed that up with instrumental assessment.

And again, you can see high-end, wide variety of diagnoses, wide age range there. The youngest subject was 10. The oldest was 105. And they found that patients who were disoriented, patients who were unable to follow directions, were, in fact, more likely to be aspirating when they did the instrumental assessment. Now, this is not causation, right. We're not saying disorientation and auditory processing difficulties cause aspiration, but it's correlation.

We're saying that those things are often predictive. So those would be important things to keep in mind as you were thinking about a screening tool, or, again, thinking about how this might apply to your own clinical assessment. Same group of researchers did the same kind of study, this time with the oral mechanism examination, to see, they did oral mechanism exam followed by instrumental assessment to see, were there specific components of the oral mech that had higher predictive ability when it came to aspiration? And it turns out, yes. Two things in particular, impaired lingual range of motion and facial asymmetry increased the risk of aspiration. I just noticed that that arrow's in the wrong place on the slide, so I apologize for that. But two things

predicted aspiration in this study. Facial asymmetry was one, and lingual range of motion was another. So again, as you're doing your oral mechanism examination, those are the two things that are going to have the highest predictive ability specific to aspiration. So our friends at Yale took all of that research, all of their research around the water test, the research around silent aspiration, the research around silent mech exam components, the research around cog screen components, and combined that into a tool that is, in fact, the Yale Swallow Screen. So it includes orientation. It includes ability to follow directions. It includes an assessment of lingual and labial range of motion and facial asymmetry.

And it includes the 3-once water test. It has been validated for use with both speech pathologists and nurses. And as you saw, it has been validated with patients with a wide variety of etiologies across age groups. This is some work that was done with patients with head and neck cancer patients. They, too, used a water test. That had varying amounts. You can see that the volumes increased from two to five, to 10, to 20 mLs. They assessed for change in vocal quality, cough, throat clear, followed by instrumental assessment. And you can see their results there in terms of sensitivity and specificity for aspiration and for dysphagia as a whole.

So water tests do seem to be the key here. Water tests seem to be, regardless of the one you choose, seems to be the best way to screen for aspiration or screen for dysphagia. This, what you're looking at here is a review of all of the research around water tests that Dr. Brodsky did a couple of years ago. And he found that larger volumes, so in other words, those screening tools that involved serial swallows, were better ruling aspiration, smaller volumes, better at ruling in aspiration, so a good screening tool would probably allow you to use both, and that when the water test was combined with an assessment of vocal quality, that seemed to increase the accuracy of the water test. The next category of screening tools are self-reported swallowing assessments. These are more likely to be diagnosis-specific. And a lot of them, as

you'll see, are either questionnaires or forms that the patient fills out themselves. These are some examples. We're gonna look at these. Whoops, sorry. The DYMUS is the Dysphagia in Multiple Sclerosis tool. It's been validated for people with MS. It's a 10-item tool that, 10 questions about dysphagia with solids, dysphagia with liquids. It's been very well-studied and does seem have a correlation to dysphagia severity. This is the EAT 10. I mentioned this one a few minutes ago, 'cause it's been studied in combination with the volume viscosity test.

But it's also been validated on its own. This is a very quick, very easy-to-understand, very easy-to-administer tool. It's available in a number of languages. There's a pediatric version. And you can see it's been well-studied in a number of populations. This is the Sydney Swallow Questionnaire. This is a little bit longer. It has 17 questions. And most of the questions, with the exception of one, asks patients to rate their symptoms on a visual analog scale. This is not disease-specific. So it can be used across a wide variety of etiologies. And you can see, you have the link there. So you can take a look at it, see if it works for your population. This is the Swallowing Disturbance Questionnaire.

This is 15 questions specific to swallow function. The original research was done with patients with Parkinson's disease. But there's more recent studies with other populations, including head and neck cancer, neuro populations and GI populations. They have correlated their results to instrumental assessment. And so that's an important measure, as we've been saying. This is the SOAL, Swallowing Outcomes After Laryngectomy. As you would imagine, validated for patients who are status post laryngectomy. It can be used with patients who are undergoing radiation and chemo radiation or surgical patients. Either way, 17 questions about functional eating. It has been validated against instrumental assessment. So if this is your population, this is a good self-report tool. There's been a little bit of interest in trying to identify dysphagia before the clinical symptoms are manifesting themselves. This would be specific to an

aging population. And what this group of researchers did is developed a tool for community-dwelling adults that includes questions about reductions in physical function, changes in cognition, increased effort with eating that could help us perhaps to identify those folks who are not experiencing dysphagia per se currently but are sort of on that road, whose skills are deteriorating. So this is, I think, gonna be a really important tool for physicians to include as part of their assessment of patients Or if you're doing some community outreach, and you're doing some education in the community, this would be a good tool for those kinds of health fairs or that kind of thing. So when to screen? Well, early and often is what the research tells us, particularly when we're talking about patients who have undergone stroke. Early screening before 24 hours post CVA seems to be critical to better identification and reduction of pneumonia risk.

In fact, the 2018 stroke guidelines tell us that we should be doing swallow screening early, and that it can be done not just by a speech pathologist but could be done by another trained healthcare professional. So what about nursing screens? Well, this article did a review of all the outcomes associated with RN-administered screens and found that, some really nice outcomes, fewer chest infections and better referrals to speech pathologists. So nurses certainly can and should be part of the screening process. It's not easy to do. You can see some barriers that have been identified here. These are things that nurses report as issues that get in their way. Difficulty finding time, that's the universal problem, right? Difficulty recalling the items. Inconsistent administration of the screening. Problems with interpretation.

So what do we do about that? Well, here's some work that set out to identify facilitators, things that can help nurses do better screening. Certainly, education tools, video training modules, that sort of thing, and good support from administration. But to my mind, that middle bullet is actually the thing that helps the most. That's been the thing that made the biggest difference in my facility was when we had order sets and a

specific swallow screen template build into the EMR. That's when we saw a big difference in my facility in terms of getting the screening done more consistently and getting the screening done more accurately. This is some work that was published recently about this specific hospital, at Waterbury Hospital. They are a certified stroke center, identified some things that got in their way in terms of getting the screening done. Again, problems with documentation, problems with compliance. They also identified some cultural differences there that you might need to address in your facility. Here's some of the new research in terms of swallow screening. Looking at swallow frequency and number of swallows per minute, this is very early days for this kind of research. But it looks like there might be something here. As we calculate number of swallows per minute or how frequently saliva swallows are happening, this may be giving us some additional insight into whether or not dysphagia is occurring.

So look for more research around that, around this idea of swallow frequency and swallow per minute. There's also some new work being done with accelerometry. Accelerometry quantifies movement in the body. It's used for things like gait analysis and fall detection. But recently, Dr Steele and her group did some work looking at using accelerometry to measure hyolaryngeal excursion. So that may be something that we see come forward with new technology for a screening tool. This is the Jaw Opening Force Test.

They used a sthenometer, which is an instrument that measures muscle strength, as well as a dynamometer, which you're probably more familiar with using. Your OTs and PTs use it to measure grip strength. But they developed a tool to look at jaw opening force. So with new technology, we may be getting some new tools that may help us to better identify those folks who are at risk. You're probably familiar with some of the research around cervical auscultation, listening to swallow sounds. We never really did come to any sort of consensus about what we were hearing, particularly with those of us in the clinic using a stethoscope. Where the accuracy, I think, comes in, if you have



fancier kinds of equipment and better microphone quality and are able to really isolate signals, those are studies that were able to really identify and make predictions based on swallow sounds. But for those of us in the clinic with a stethoscope, we never really got to the point where we had good consensus. Also, in terms of new directions, specific to better training tools for nurses, there's some research showing some good results for using medical mannequins. So that may be something that we may be hearing some more about. Early days on that, I would say. So to kind of pull this all together, as you're considering a tool for your facility, for your patient population, look at the directions. Look at how easy it is to administer. Do you feel like you could get good consistency with it? Does it have good sensitivity and specificity? And I would say think about screening not just as a standalone tool that a speech pathologist does or a nurses does, but also think about some of these screening tools as things that you could incorporate into your own clinical assessment to make your clinical assessment more accurate and more predictive. So it looks like--

- Angela, are you--

- [Angela] Oh, I'm sorry, I was gonna go ahead and look at the questions.

- [Amy] That's okay, I was gonna do the same. We just have one question here currently. If you do have a question for Angela, type it in right now, into the Q & A box. We just have a minute or two here. But Carolina was asking you to reiterate, when you were talking about the cough reflex testing and the irritants, am I correct that you said, "Not only is the irritant itself not standardized, "in that they're trying several different ones, "but they have not really standardized "the concentration either." Is that correct?

- [Angela] That is correct. Different studies, particularly with the citric acid, different studies used different concentrations. So we're not really sure yet what that magic number is yet.

- [Amy] Okay, thank you. Michael is noting that a lot of the screeners that were discussed seemed to be developed for patients with CVA. Would you use those same ones in a home health or SNF setting? Or do you feel that there are others that are more appropriate, or some more appropriate than others in certain settings?

- [Angela] I think that when you're talking about a population outside of the stroke population, outside of the hospital, probably the 3-ounce water test is the one that is best for those populations and those settings. It's the one that really has been looked at most thoroughly outside of the stroke population. And it's pretty easy to administer.

- [Amy] Okay, thank you. And kind of leading from that, Kathleen was asking about the water test and noting that it looks like testing on that included children as young as two years. Do you know what method of liquid delivery they used? Or are those results accurate so use with a bottle, with a straw, with an open cup, a sippy cup?

- [Angela] Yes, that was a good question. So they did not use a bottle. It was open cup or straw.

- [Amy] Okay, very good. And I have one more question here about facilitators to implementation of swallowing screening. And I believe that was on one of your slides, it looks like on page 27 of the handout. So I think that should help answer that question.

- [Angela] Okay.

- [Amy] So it's about six after. I feel like I better close up the classroom to allow everyone to get to their clients, or whatever they need to do. Angela, thanks so much for being here with us. I think this was a great, not just a refresher on swallow

screenings but a lot of new information and up-to-date research. So I really appreciate you being here to present for us today.

- [Angela] Oh, thank you, Amy. It's always a pleasure to be with you.

- [Amy] All right, very good. Well, I hope everybody has a wonderful afternoon. We hope to see you at another webinar again before too long. And we'll see you next time. Buh-bye.

- [Angela] Enjoy the rest of your day, guys.