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Back to Basics: Swallow Screening: How, when, and who

Angela Mansolillo, MA, CCC-SLP, BCS-S

Moderated by:
Amy Natho, MS, CCC-SLP, CEU Administrator, SpeechPathology.com

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Back to Basics: Swallow Screening: How, when, and who

Angela Mansolillo, MA/CCC-SLP, BCS-S

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Learning Outcomes

After this course, participants will be able to:

- Assess available screening tools for validity, sensitivity and specificity
- Choose appropriate screening tool(s) for your setting, client population
- Identify potential roadblocks to comprehensive screening and discuss strategies to facilitate implementation

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First, Let's Define Some Terms…

Assessment:

Consistent with WHO framework…

Identifies and describes:

- Structures and functions affecting swallowing
- Impact of impairments on the individual's activities
- Barriers to or facilitators of successful swallowing and participation for individuals with swallowing impairments

World Health Organization. (2001). *International classification of functioning, disability, and health.* Geneva, Switzerland

- Clinical (or bedside) vs Instrumental

First, Let's Define Some Terms…

Swallow Screening:

- A pass/fail procedure to identify individuals who require a comprehensive assessment of swallowing function or a referral for other professional and/or medical services
- Preferred practice patterns for the profession of speech-language pathology [Preferred Practice Patterns]. Available from www.asha.org/policy.

Why Screening?

- Early identification of individuals with dysphagia
- Accurate referral for full assessment – clinical and/or instrumental
- Identify patients at high risk of aspiration
- Facilitate return to oral feeding, oral medication
- Allow for efficient use of resources, time

Without Early and Accurate Identification…

- Aspiration, choking risk
- Nutritional consequences
- Dehydration
- Reduced ability to participate in rehabilitation

And…

- *Longer hospital stays* (Melgaard et al, 2018; Paranji et al 2017; Patel et al, 2018)
- *Higher mortality* (Melgaard, et al, 2018; Macht et al, 2011; Patel et al, 2018)
- *Pneumonia* (Macht et al, 2011; Paranji et al, 2017)
- *Higher medical costs* (Paranji et al 2017)
- *Higher caregiver burden* (Namasivaya-MacDonald and Shune, 2018; Shune and Namasivaya-MacDonald, 2019)
- *Lower likelihood of discharge to home* (Paranji et al 2017; Patel et al, 2018)

Practice Patterns

Limited information re: practice patterns…

Post-Extubation Patients:

- 41% of facilities surveyed reported using swallow screening
- Screening administered by RNs (66%), SLPs (27%), or a combination (3%)

Macht et al, 2012.

Outcomes Associated with Screening

- Lower pneumonia rates in stroke patients (Titsworth et al, 2013; Lakshminarayan, et al, 2010)
- When combined with oral hygiene program, screening reduced post-stroke pneumonia (Sorensen, et al, 2013)
- More efficient identification of patients in need of instrumental assessment (Mulheren and Gonzalez-Fernandez, 2019)

A Good Screening Tool Should Be…

- Easy to administer
- Relatively quick
- Cost-effective

- And of course…
- Valid
- Reliable

Sensitivity and Specificity

Sensitivity:

The likelihood that a clinical sign will be present given that dysphagia is present; *actual* positives

In other words…ruling in dysphagia

Specificity:

The likelihood that a diagnostic sign will be absent given that dysphagia is absent; *actual* negatives

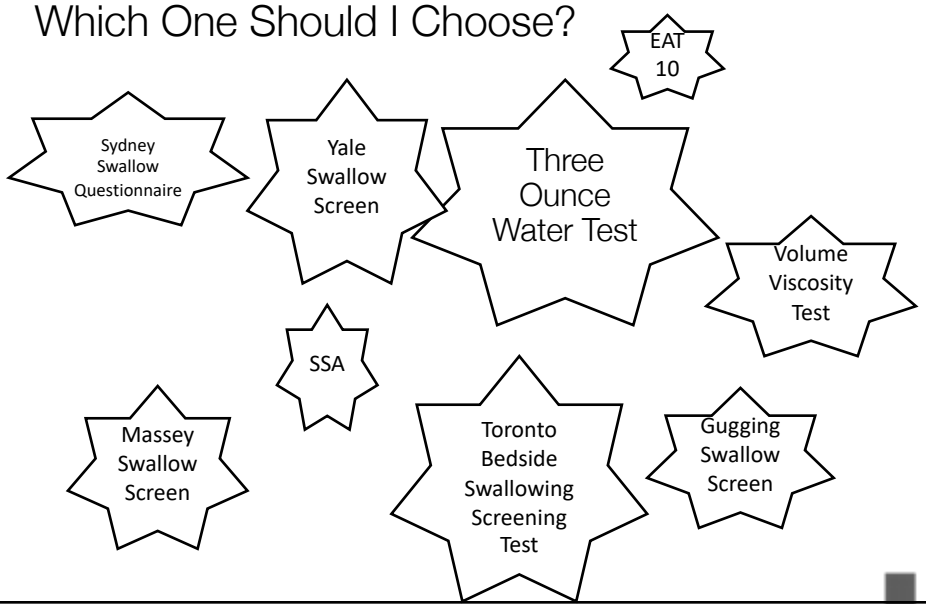
In other words…ruling out dysphagia

Ideally, a screening tool has both

Types of Screening Tools

- Symptom ID
- Questionnaire/Self-report
- Water
- Cough testing

Which One Should I Choose?



Which One Should I Choose?

Based on Your Setting

- ICU/CCU
- Hospital
- SNF

Based on Patient Population

- Stroke
- HNC
- Pediatric
- Elderly

Gugging Swallow Screen

"Indirect" measures – alertness, drooling, vocal changes, saliva swallows combined with…

Solid, thick liquid and thin liquid swallows

- Sensitivity for aspiration = 100%; specificity = 69%
- Compared to FEES
- Validated in a number of languages, countries
- Somewhat labor intensive
- SLP administered
- Results now correlate to IDDSI diet recommendations

Trapl, et al, 2007

https://gussgroupinternational.wordpress.com/home/

Bedside Aspiration Test

- 50 ml water (10 ml at a time) while monitored via pulse ox
- Difficulty with water combined with a 10% drop in oxygen saturation predictive of aspiration on subsequent FEES
- Sensitivity for aspiration = 100%; specificity = 70.8%
- Stroke patients

Lim et al, 2001

Volume Viscosity Test

- Nectar, water, pudding boluses of varying volumes (5, 10, 20 ml)
- Compared to aspiration and residue on VFSS
- Sensitivity = 100% for aspiration; 69% for residue
- Specificity = 28.8% for aspiration; 80% for residue
- Test population = patients with neurologically-based dysphagia

Clave et al, 2008

- Combined with EAT 10 to assess patients at risk for dysphagia secondary to aging, stroke, neurodegenerative disease
- Sensitivity for VVT alone = 91% for aspiration; specificity = 28%
- Inter-rater reliability = 62%

Rofes et al, 2014

Toronto Bedside Swallowing Screening Test (TOR-BSST©)

Includes "voice before" and "voice after", assessment of tongue movements, water swallows

- Very well studied in acute and rehab settings
- Test-retest reliability = 92%
- Sensitivity = 91.3%
- Specificity = 93.3% in acute care; 89.5% in rehab settings
- Large sample size (300+); ***CVA's only***
- Includes full training program for SLPs and other screeners

Martino, et al, 2009
www.swallowinglab.com

Massey Bedside Swallow Screen

Includes assessment of cough, gag saliva swallows, dysarthria/aphasia presence, oral assessment…then, water swallows via tsp, followed by 60cc via cup

- Nurse administered
- Good reliability, sensitivity and specificity when compared to development of clinical signs of dysphagia but…was not validated against instrumental assessment
- Small sample size (n = 25); ***CVA patients***

Massey and Jedlicka, 2002

Modified Mann Assessment of Swallowing Ability

- For *CVA patients*
- Physician administered
- Includes 12/24 MASA items; alertness, speech-language function, oral mechanism exam, respiration, cough
- No boluses
- Compared to full MASA; no instrumental assessment
- Sensitivity = 92.6%; Specificity = 86.3%

Antonios et al, 2010

Emergency Physician Swallowing Screen

- Assessment of vocal quality, patient report of swallowing difficulty, facial asymmetry, and language skills PLUS water swallow test and pulse oximetry
- Stroke patients
- Compared to "formal swallow eval by SLP" and subsequent diet recommendations
- Sometimes prolonged time between screen and formal eval
- Sensitivity = 96%; Specificity = 56%

Turner-Lawrence, et al, 2009

Barnes Jewish Hospital Stroke Dysphagia Screen

- Water test (90 ml) plus GCS, assessment of facial, lingual, palatal asymmetry and/or weakness
- Stroke patients
- Compared to VFSS
- Sensitivity for aspiration = 95%; Specificity = 50%
- Validated for use by RNs

https://www.tabletwise.com/calculators/barnes-jewish-hospital-stroke-dysphagia-screen

Edmiaston et al, 2014

Oral Pharyngeal and Clinical Swallowing Examination

- Stroke patients
- Oral mechanism exam followed by water test in 5, 10, 20 ml administered x2 each
- Laryngeal palpation and vocal quality assessment
- Compared to VFSS
- Sensitivity was calculated by clinical sign with dysphonia and dysarthria being most predictive of dysphagia severity
- When two or more clinical signs were present, sensitivity = 92.3%; specificity = 66.7%

Daniels et al, 1997

Standardized Swallowing Assessment (SSA)

Assesses level of alertness, posture, cough, saliva management, respiration, vocal quality, water swallows via tsp and cup sips

- Good reliability when administered by nurses
- High sensitivity and specificity but only as compared to clinical assessment; no instrumental assessment used in validation process
- *Validated in hospital* but *may be appropriate for SNF* as it is brief and easily administered by nurses
- Screen is discontinued if patient does not exhibit head control, postural stability

Perry, 2001

Pulse Oximetry

- Several studies looking for correlation between changes in Pulse Ox and aspiration - but no reliable correlation found (See Britton, et al for review)
- Better for measurement of "work of breathing", endurance for feeding

But…

- *Low baseline numbers may indicate aspiration risk*

Respiratory Factors Associated with Aspiration

- Rapid RR (>25 bpm)
- Low baseline oxygen saturation (<94%)
- Inconsistent swallow-respiratory pattern
- Post-swallow inhalation
- Short swallow apnea duration

Steele and Cichero, 2014

Cough Reflex Testing

Reflex cough testing via irritant

- Tartaric acid dissolved in water and nebulized - Pneumoflex (Addington, et al 2005)
- Citric acid mist via nebulizer (Wakasugi, et al, 2008; 2012; Miles, et al, 2013; Guillen-Sola et al, 2015; Kalleson et al, 2016; Holmes, 2016; Field et al, 2018)
- Capsaicin via nebulizer compared to aerosolized water (Hegland, et al, 2016)

Cough Reflex Testing

Limitations include access to irritant, tendency toward over-identification of potential aspirators; differences in sensitivity, specificity may be related to concentration of irritant

Which cough response are we testing?

3 Ounce Water Test

- Originally designed for individuals with neurologically based dysphagia
- Patient drinks 3 oz. of water without interruption
- Cough during or for up to one minute after completion or…
- Wet-hoarse vocal quality following completion

DePippo, et al, 1992

CONTINUED

3 Ounce Water Test

- Utilized with wide variety of diagnoses; compared to FEES
- 3000 patients
- Pass = good predictor of ability to tolerate liquids without aspiration
- Fail = high false positive rate
- So…Failure should prompt full assessment
- Most common reasons for failure without aspiration were deconditioning, diminished cognitive status, reduced endurance.

Suiter, D., and Leder, S., 2008

Leder, et al, 2011

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3 Ounce Water Test

- 56 ***children*** aged 2-18 yrs
- Compared to FEES
- Good sensitivity (actual positives); fair/poor specificity (actual negatives)
- Pass seems to = safe swallowing

Suiter, Leder, and Karas, 2009

3 Ounce Water Test

Silent Aspirators?

- Appears to be volume dependent
- Larger volumes (3 oz) elicit cough in those who silently aspirate on smaller volume boluses

Leder, S., et al, 2011

Cognitive Assessment

- Orientation (person, place and year) and ability to follow 1-step direction assessed prior to FEES
- N = 4053 patients, varying diagnoses, aged 10-105 yrs
- Disoriented patients had 31% higher aspiration rate on thin liquids (not on puree)
- Patients unable to follow directions had 57% higher chance of aspirating thin liquids; 48% higher chance of aspirating puree

Leder, Suiter, and Warner, 2009

Oral Mechanism Examination

How important is the oral mechanism examination?

3919 subjects; variety of diagnoses; ages 2-105

- Impaired lingual ROM ⇨ increased risk of facial asymmetry aspiration

Leder, S, et al, 2013

Yale Swallow Screen

- Orientation; following directions
- Oral mechanism exam (lingual, labial ROM; facial symmetry)
- 3 oz. water test
- Validated for use by RNs, SLPs
- Validated with patients with a variety of etiologies

Leder, S., and Suiter, D., 2014

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Water Swallow Screening

Post-Surgical HNC Patients

- Increasingly larger water boluses (2 ml; 5ml; 10ml; 20ml); observed for change in vocal quality, cough, throat clear
- Followed by FEES
- 100% sensitivity for aspiration; 61% specificity
- 96% sensitivity for dysphagia; 82% specificity

Hye et al, 2013

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Water, Water, Everywhere…

Review of water swallow tests

- Compared water screens with smaller (single sips) and larger boluses (3 oz)
- Larger volumes (with serial swallowing) better at ruling out aspiration
- Smaller volumes better at ruling in aspiration
- Combining vocal quality assessment with water test, increases accuracy of water test

Brodsky, et al, 2016

Self-Reported Swallowing Assessments

- More likely to be diagnosis specific
- Allow for assessment of psycho-social burden of dysphagia
- Provide insight into problems with social eating, functional disability

Self-Reported Swallowing Assessments

- DYMUS
- MDADI
- Sydney Swallow questionnaire
- Swallowing disturbance questionnaire
- EAT 10
- Swallowing after total laryngectomy (SOAL)
- Dysphagia screening questionnaire

DYMUS

- Validated with people with MS
- Brief (10 items)
- Focus on physiology rather than social impact
- Questions re: dysphagia for both solids and liquids
- Good correlation to dysphagia severity

Alali et al *2018*
Bergamaschi et al, 2008
Bergamaschi et al, 2009

EAT 10

- Quick to administer; easy to understand
- Available in a number of languages; pediatric version available
- Predictive of aspiration in a variety of patient populations including Head/Neck Cancer (Arrrese et al, 2019); ALS (Plowman et al, 2016); COPD (Regan et al, 2017) and Vocal Fold Paralysis (Zuniga et al, 2018)

- https://www.nestlenutrition-institute.org/docs/default-source/global-dcoument-library/nutrition-tools/eat-10---english-interactive---final-01262018.pdf?sfvrsn=2

Belafsky et al, 2008

Sydney Swallow Questionnaire

- 17 questions
- Visual analog scale (with exception of question re: length of meals)
- Not disease specific

Wallace et al, 2000; Szczesniak et al, 2014

https://stgeorgeswallowcentre.org/sydney-swallow-questionnaire/

Swallowing Disturbance Questionnaire

- 15 questions specific to swallow function: e.g. cough, food sticking, difficulty chewing, difficulty with respiration when eating, etc.
- Originally validated with PD; additional studies with HNC, Neuro, GI populations
- Correlated symptom report to oral mechanism exam results and FEES

Cohen and Manor, 2011

Swallowing Outcomes After Laryngectomy

- Validated with patients s/p laryngectomy both with and without RT, CRT
- 17 questions re: swallowing and functional eating as well as patient's response to the problem, "Does this bother you?"
- Validity: Accurately differentiated dysphagia/non-dysphagia patients; and patient populations by treatment group and by diet texture. Successfully validated against MBS as well
- Test-retest reliability = 0.73

Govender, 2012; Govender et al, 2016

https://www.researchgate.net/publication/291343247_SOAL_Questionnaire

What About *Pre-Clinical* Dysphagia?

All of the screens discussed are designed to assess patients with dysphagia symptoms…

Patient Reported Outcome screening tool for Community Dwelling Older Adults

- Includes questions re: factors known to predispose older adults to dysphagia: reduced physical function; cognitive decline; increased effort with eating/swallowing

Madhavan et al, *2018*

When to screen?

- Delays in screening of stroke patients increased incidence of pneumonia by 1% per day of delay (Bray et al, 2016)
- Early screening <24 hours post-admission was associated with decreased risk of Stroke Associated Pneumonia (Eltringham et al, 2018)

So…need a screen that can be administered by a variety of health professionals to avoid delays

2018 Stroke Guidelines (AHA/ASA)

"Swallow screening can be provide by an SLP or other 'trained health-care professional'"

Powers and Rabinstein, 2018

RN Administered Screens

Review of outcomes associated with RN administered screens revealed:

- Reduced number of chest infections
- Increased appropriateness of referrals to SLP

Hines et al, 2016

Implementation Challenges

Screening implementation – Houston, TX VA

RN Identified Barriers

- Difficulty finding time for documentation screening results
- Difficulty recalling screening items
- Inconsistent administration of screening
- Inaccurate interpretation of screening results

Daniels et al, *2013*

Implementation Challenges

RN identified facilitators:

- Education re: dysphagia, screening tool – video training module; review of evidence base for screening tool
- Processes to support screening administration – e.g. pocket guides with screening steps; order sets and templates in EMR
- ED administrator support

Daniels, et al, 2013

Implementation Challenges

Waterbury Hospital; Certified Stroke Center

Barriers:

- Cultural – RN concerns re: "diagnosing" dysphagia; RN concerns re: scope of practice
- Documentation – Variability re: documentation type, location
- Performance – Appropriate amount of water, type of cues utilized, interpretation, etc.
- Compliance

Poskus, *2009*

New Directions in Swallow Screening

Spontaneous Swallowing Frequency

- Swallow Frequency Analysis (SFA)

Lower SFA rates in patients post-stroke were associated with presence of dysphagia and with restricted diet at discharge from hospital

Carnaby et al, 2019

- Swallows per Minute (SPM)

Lower SPM correlated with dysphagia severity

Crary et al, 2013

New Directions

Accelerometry

- Quantifies movement in the body
- Previous applications include gait analysis; fall detection; monitoring post-surgical movement, etc.

Cervical Accelerometry

- Placed on neck in midline just below lower border of thyroid cartilage
- Collected data concurrent with VFSS for thin and thick liquids
- Identified dysphagia with 81.5% sensitivity; 60% specificity

Steele et al, 2019

New Directions

Jaw Opening Force Test

- Jaw opening sthenometer (head splint device) with dynamometer (below chin)
- Measures jaw opening force
- May predict dysphagia

Hara et al, 2014

New Directions

Cervical Auscultation

- Literature review in 2014
- Lack of consensus re: what measures are predictive – e.g # swallows; onset of swallow, etc.
- Lack of consistency re: equipment – microphone quality, filtering techniques, signal isolation

Dudik et al, 2015

New Directions

Medical Mannequins

- RN training tool
- Mannequin controlled by software; delivers “ah”, throat clear, cough
- Used in conjunction with screening tool that included assessment of speech intelligibility, vocal quality, cough strength, water test

Freeland et al, 2016

To Conclude…

Assess potential tools for

- Sensitivity and specificity
- Ease of administration
- Applicability to your patient, setting

Consider screening as stand-alone tool and/or as part of your clinical assessment