

Swallowing Screens After Acute Stroke: A Systematic Review

Sara K. Schepp, David L. Tirschwell, Robert M. Miller and W.T. Longstreth, Jr

Stroke. 2012;43:869-871; originally published online December 8, 2011;

doi: 10.1161/STROKEAHA.111.638254

Stroke is published by the American Heart Association, 7272 Greenville Avenue, Dallas, TX 75231

Copyright © 2011 American Heart Association, Inc. All rights reserved.

Print ISSN: 0039-2499. Online ISSN: 1524-4628

The online version of this article, along with updated information and services, is located on the World Wide Web at:

<http://stroke.ahajournals.org/content/43/3/869>

Data Supplement (unedited) at:

<http://stroke.ahajournals.org/content/suppl/2011/12/08/STROKEAHA.111.638254.DC1.html>

Permissions: Requests for permissions to reproduce figures, tables, or portions of articles originally published in *Stroke* can be obtained via RightsLink, a service of the Copyright Clearance Center, not the Editorial Office. Once the online version of the published article for which permission is being requested is located, click Request Permissions in the middle column of the Web page under Services. Further information about this process is available in the [Permissions and Rights Question and Answer](#) document.

Reprints: Information about reprints can be found online at:
<http://www.lww.com/reprints>

Subscriptions: Information about subscribing to *Stroke* is online at:
<http://stroke.ahajournals.org/subscriptions/>

Swallowing Screens After Acute Stroke

A Systematic Review

Sara K. Schepp, MD, MS; David L. Tirschwell, MD, MSc;
Robert M. Miller, PhD; W.T. Longstreth, Jr, MD, MPH

Background and Purpose—Swallowing screens after acute stroke identify those patients who do not need a formal swallowing evaluation and who can safely take food and medications by mouth. We conducted a systematic review to identify swallowing screening protocols that met basic requirements for reliability, validity, and feasibility.

Methods—We searched MEDLINE and supplemented results with references identified through other databases, journal tables of contents, and bibliographies. All relevant references were reviewed and evaluated with specific criteria.

Results—Of 35 protocols identified, 4 met basic quality criteria. These 4 had high sensitivities of $\geq 87\%$ and high negative predictive values of $\geq 91\%$ when a formal swallowing evaluation was used as the gold standard. Two protocols had greater sample sizes and more extensive reliability testing than the others.

Conclusions—We identified only 4 swallowing screening protocols for patients with acute stroke that met basic criteria. Cost-effectiveness of screening, including costs associated with false-positive results and impact of screening on morbidity, mortality, and length of hospital stay, requires elucidation. (*Stroke*. 2012;43:869-871.)

Key Words: dysphagia ■ evaluation ■ screening ■ stroke ■ swallowing

Dysphagia affects 37% to 78% of patients with acute stroke and is associated with increased risk of aspiration, pneumonia, prolonged hospital stay, disability, and death.¹ Because formal swallowing evaluation is neither possible nor warranted in all patients with acute stroke, the purpose of a swallowing screen is to identify those patients who do not need a formal evaluation and who can safely take food and medications by mouth. In this review, we addressed the following questions about swallowing screens after acute stroke: what standardized protocols have been described; how do protocols compare with respect to reliability, validity, and feasibility as defined by ease of training and administration; and what are the challenges of screening?

Materials and Methods

The search strategy and the inclusion and exclusion criteria for relevant articles identified are detailed in the Online Supplement (<http://stroke.ahajournals.org>). Information on study design, study size, and ease of training, administration, and scoring were sought but not required for inclusion. One of the authors (S.K.S.) conducted the search for articles and evaluated protocols with input from her coauthors. She is a former speech pathologist and current board-certified neurologist.

Results

Results of the search are summarized in the Figure and yielded 35 articles describing protocols. Thirty articles were

excluded because they failed to meet ≥ 1 of the required criteria as detailed in the Online Supplement.

The Table provides details on 4 protocols described in 4 articles and 1 abstract. Content of all 4 protocols included items previously shown to be important in identifying dysphagia and risk for aspiration.⁸ Two included assessment of mental status,²⁻⁴ whereas the other 2 protocols excluded subjects with diminished consciousness.^{5,6} All protocols included some assessment of oropharyngeal function, such as dysarthria, dysphonia, and asymmetry, or weakness of the face, tongue, and palate. All but one⁴ included assessment of ability to swallow water. The emergency physician screen⁵ included use of pulse oximetry in conjunction with water swallow. Extracts from the articles describing these protocols are included in the Online Supplement, except for the one that was proprietary.⁶

All protocols took place at tertiary care medical centers, although the Toronto Bedside Swallowing Screening Test⁶ was validated in 2 acute care and 2 rehabilitation hospitals. The emergency physician screen⁵ and the Modified Mann Assessment of Swallowing Ability⁴ were self-characterized as preliminary because of small sample sizes of 84 and 150 subjects, respectively. Furthermore, the Modified Mann Assessment of Swallowing Ability⁴ was only validated with administration by 2 neurologists. Training was described as

Received September 3, 2011; accepted September 22, 2011.

From Departments of Neurology (S.K.S., D.L.T., W.T.L.), Speech and Hearing Sciences (R.M.M.), and Epidemiology (W.T.L.), University of Washington, Seattle, Washington.

The online-only Data Supplement is available at <http://stroke.ahajournals.org/lookup/suppl/doi:10.1161/STROKEAHA.111.638254/-/DC1>.

Correspondence to Sara K. Schepp, MD, Department of Neurology, Box 359775, Harborview Medical Center, 325 Ninth Avenue, Seattle, WA 98104. E-mail skschepp@uw.edu

© 2011 American Heart Association, Inc.

Stroke is available at <http://stroke.ahajournals.org>

DOI: 10.1161/STROKEAHA.111.638254

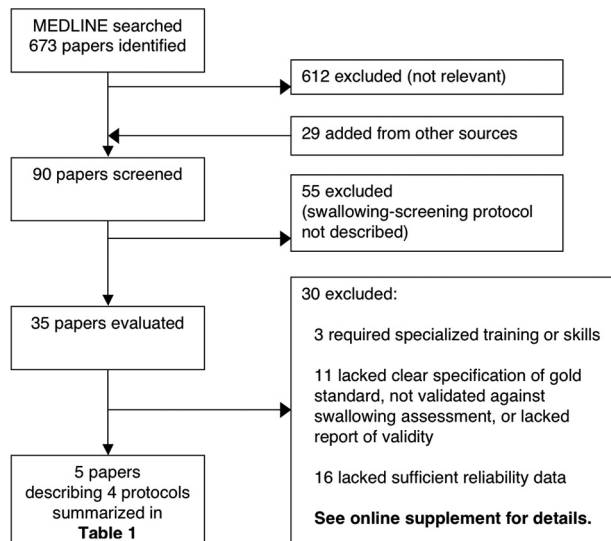


Figure. Selection of swallowing screening protocols for review.

simple and screenings took only minutes. None of the studies examined outcomes of pneumonia, prolonged hospital stay, disability, or death, aside from the study detailing the emergency physician screen, which reported incidence of pneumonia to be 6% in their cohort.⁵

Discussion

In this systematic review, only 4 swallowing screening protocols met basic criteria for reliability, validity, and feasibility. Despite our efforts, we may have missed a relevant article or inappropriately excluded one. This dearth of sound published screening protocols may have adversely

affected broad implementation of early screening for all acute stroke patients.

All 4 screening protocols identified were published within the past 2 years, perhaps motivated by the previous Joint Commission requirement, which was subsequently dropped.⁹ Two of the 4 were promising but preliminary with small sample sizes.^{4,5} Of those remaining, the Barnes Jewish Hospital Stroke Dysphagia Screen (previously titled the Acute Stroke Dysphagia Screen, or ASDS)^{2,3} has 2 advantages over the Toronto Bedside Swallowing Screening Test.⁶ First, the Toronto Bedside Swallowing Screening Test was validated using videofluoroscopic swallowing study in a small random subsample ($n=24$) of those with acute stroke. The Barnes Jewish Hospital Stroke Dysphagia Screen was validated using videofluoroscopy in 225 patients with acute stroke, although these data have been presented only as an abstract thus far.³ Also, the Toronto Bedside Swallowing Screening Test is copyrighted, requiring purchase to be administered. Its purchase includes online training and information on how to implement the screening protocol, which may be desirable for some facilities.

Such studies face many challenges, perhaps explaining the small number of high-quality studies identified in this review. Ensuring that health care providers are sufficiently trained to administer a screen reliably any time of day or night is problematic. Screening that is performed at one time may be compared with a gold standard performed at a later time when dysphagia may have improved. Finally, we have not addressed the reliability of formal evaluations or their validity with respect to pneumonia, prolonged hospital stay, morbidity, and mortality.

Several observational studies suggest that screening may help prevent aspiration pneumonia^{10–12} but cannot distinguish

Table. Comparison of Swallowing Screening Protocols Meeting Basic Criteria

Protocol (N)	Administration	Reliability*	Gold Standard and Validity†
Barnes Jewish Hospital Stroke Dysphagia Screen ^{2,3} N=300 & 225	By nurses, 2 min to administer, 10-min training	K=0.94	Study 1: Dysphagia by MASA score <178, N=300 Sensitivity 91% (95% CI, 82–95), specificity 74% (95% CI, 64–80), PPV 54%, NPV 95% Study 2: Dysphagia on video-fluoroscopy, N=225 Sensitivity 94% (95% CI, 88–98), specificity 66% (95% CI, 57–75), PPV 71%, NPV 93%
Modified Mann Assessment of Swallowing Ability ⁴ N=150	By stroke neurologists, minutes to administer, training time unknown	K=0.76	Dysphagia by MASA score <178 Examiner 1: Sensitivity 93% (95% CI, 82–98), Specificity 86% (95% CI, 78–93), PPV 79%, NPV 95% Examiner 2: Sensitivity 87% (95% CI, 75–95), specificity 84% (95% CI, 75–91), PPV 76%, NPV 92%
Emergency Physician Swallowing Screening ⁵ N=84	By emergency physicians, ≤3 min to administer, training time unknown	K=0.90	Dysphagia on formal swallowing evaluation Sensitivity 96% (95% CI, 85–99), specificity 56% (95% CI, 38%–72), PPV 74%, NPV 91%
Toronto Bedside Swallowing Screening Test ⁶ N=311	By nurses, 10 min to administer, 4-hr training	ICC=0.92	Dysphagia on videofluoroscopy (acute patients) Sensitivity 96% (95% CI, 73–99), specificity 64% (95% CI, 35–85), PPV 77% (95% CI, 53–90), NPV 93% (95% CI, 58–99)

*Inter-rater reliability; K indicates kappa; ICC, intra-class correlation coefficient.

†MASA indicates Mann Assessment of Swallowing Ability;⁷ CI, confidence interval; PPV, positive predictive value; NPV, negative predictive value.

whether lower frequency of pneumonia is attributable to the use of a swallowing screen itself or to other characteristics of a medical center. Also, these studies used a variety of different formal and informal screening techniques. Placebo-controlled randomized trials in high-volume stroke centers may be difficult to conduct now that swallowing screening has become common practice. Alternatively, the effectiveness of different screening strategies could be evaluated.

Further research is particularly needed to evaluate cost-effectiveness of swallowing screening in this population. Potential benefit may be seen not only in terms of pneumonia but also in terms of length of hospital stay, morbidity, and mortality. But screening has risks attributable to false-positive results, which may lead to unnecessary withholding of oral feeding or placement of feeding tubes. The positive predictive values of protocols we reviewed ranged from 54% to 77%. Thus, 23% to 46% of patients screened were falsely identified as having increased risk.

Finally, effective screening depends not only on careful analysis of costs and benefits but also on availability of effective interventions for those identified as being at high risk. Once reliability, validity, and feasibility of swallowing screens and formal swallowing evaluations are established, effectiveness of interventions needs to be addressed. Only through such efforts will the use of swallowing screens in patients after acute stroke be established as evidence-based.

Sources of Funding

S.K.S. received grant support from National Institute of Neurologic Disease and Stroke (5T32NS051171-04).

Disclosures

None.

References

1. Martino R, Foley N, Bhogal S, Diamant N, Speechley M, Teasell R. Dysphagia after stroke: incidence, diagnosis, and pulmonary complications. *Stroke*. 2005;36:2756–2763.
2. Edmiaston J, Connor LT, Loehr L, Nassief A. Validation of a dysphagia screening tool in acute stroke patients. *Am J Crit Care*. 2010;19:357–364.
3. Edmiaston J, Connor LT, Ford AL. SWALLOW-3D, a simple 2-minute bedside screening test, detects dysphagia in acute stroke patients with high sensitivity when validated against video-fluoroscopy (abstract). *Stroke*. 2011;42:e352.
4. Antonios N, Carnaby-Mann G, Crary M, Miller L, Hubbard H, Hood K, et al. Analysis of a physician tool for evaluating dysphagia on an inpatient stroke unit: the Modified Mann Assessment of Swallowing Ability. *J Stroke Cerebrovasc Dis*. 2010;19:49–57.
5. Turner-Lawrence DE, Peebles M, Price MF, Singh SJ, Asimos AW. A feasibility study of the sensitivity of emergency physician dysphagia screening in acute stroke patients. *Ann Emerg Med*. 2009;54:344–348.
6. Martino R, Silver F, Teasell R, Bayley M, Nicholson G, Streiner DL, et al. The Toronto Bedside Swallowing Screening Test (TOR-BSST): development and validation of a dysphagia screening tool for patients with stroke. *Stroke*. 2009;40:555–561.
7. Mann G. *The Mann Assessment of Swallowing Ability*. Clifton Park, NY: Singular; 2002.
8. Rosenbek JC, McCullough GH, Wertz RT. Is the information about a test important? Applying the methods of evidence-based medicine to the clinical examination of swallowing. *J Commun Disord*. 2004;37:437–450.
9. Reeves MJ, Parker C, Fonarow GC, Smith EE, Schwamm LH. Development of stroke performance measures: definitions, methods, and current measures. *Stroke*. 2010;41:1573–1578.
10. Odderson IR, Keaton JC, McKenna BS. Swallow management in patients on an acute stroke pathway: quality is cost effective. *Arch Phys Med Rehabil*. 1995;76:1130–1133.
11. Hinchey JA, Shephard T, Furie K, Smith D, Wang D, Tonn S. Formal dysphagia screening protocols prevent pneumonia. *Stroke*. 2005;36:1972–1976.
12. Lakshminarayan K, Tsai AW, Tong X, Vazquez G, Peacock JM, George MG, et al. Utility of dysphagia screening results in predicting poststroke pneumonia. *Stroke*. 2010;41:2849–2854.

ONLINE SUPPLEMENT

Swallowing Screens after Acute Stroke: A Systematic Review

Sara K Schepp, MD, MS, David L Tirschwell, MD, MSc,

Robert M Miller, PhD, WT Longstreth Jr, MD, MPH

Search Strategy

The primary search was conducted through MEDLINE using the terms (swallow* OR dysphagia) AND (screening OR evaluation OR assessment) AND (stroke OR cerebrovascular accident) with no limits through August 12, 2011. Only publications in English were considered. Additional papers were identified through (1) search of CINAHL and EMBASE databases over the same time period using the same search terms, (2) review of relevant papers' references, (3) manual search of the tables of contents for the Journals *Stroke* and *Dysphagia* from January 2005 to August 2011, (4) search of reference lists for guidelines publications, and (5) search of the Cochrane Library.

Supplemental Table 1: Criteria used to evaluate swallowing-screening protocols

	Criterion
1	Must describe a swallowing-screening protocol where screening is defined as a preliminary assessment by a healthcare worker as to whether or not a patient appears safe for oral intake at that moment in time.
2	Must not require specialized skills or training in dysphagia, other than some basic training to carry out the screening protocol.
3	Must include reliability data.
4	Must specify a gold standard measure of dysphagia or aspiration against which the protocol's validity could be evaluated. Only formal swallowing evaluations, as performed by a specially trained therapist, are considered a suitable gold standard, including formal bedside evaluation, video-fluoroscopy, fiberoptic endoscopy, or some combination of these assessments.
5	Must describe the screening protocol in sufficient detail to be replicated.
6	Must have been evaluated in patients with acute stroke.

Relevant papers that were excluded (see Figure 1)

Excluded due to need for specialized training or expertise for administration (n=3)

1. Kagaya H, Okada S, Saitoh E, Baba M, Yokoyama M, Takahashi H. Simple swallowing provocation test has limited applicability as a screening tool for detecting aspiration, silent aspiration, or penetration. *Dysphagia*. 2010;25:6-10
2. Trapl M, Enderle P, Nowotny M, Teuschl Y, Matz K, Dachenhausen A, et al. Dysphagia bedside screening for acute-stroke patients: the Gugging Swallowing Screen. *Stroke*. 2007;38:2948-2952
3. Warnecke T, Teismann I, Meimann W, Olenberg S, Zimmermann J, Kramer C, et al. Assessment of aspiration risk in acute ischaemic stroke--evaluation of the simple swallowing provocation test. *J Neurol Neurosurg Psychiatry*. 2008;79:312-314

Excluded due to unclear description of gold standard criterion, validation against something other than a swallowing assessment, or insufficient reporting of validation (n=11)

1. Courtney BA, Flier LA. RN dysphagia screening, a stepwise approach. *J Neurosci Nurs*. 2009;41:28-38
2. Dangerfield L, Sullivan R. Screening for and managing dysphagia after stroke. *Nurs Times*. 1999;95:44-45
3. Gottlieb D, Kipnis M, Sister E, Vardi Y, Brill S. Validation of the 50 ml³ drinking test for evaluation of post-stroke dysphagia. *Disabil Rehabil*. 1996;18:529-532
4. Massey R, Jedlicka D. The Massey Bedside Swallowing Screen. *J Neurosci Nurs*. 2002;34:252-253, 257-260
5. Perry L. Screening swallowing function of patients with acute stroke. Part two: Detailed evaluation of the tool used by nurses. *J Clin Nurs*. 2001;10:474-481
6. Perry L. Screening swallowing function of patients with acute stroke. Part one: Identification, implementation and initial evaluation of a screening tool for use by nurses. *J Clin Nurs*. 2001;10:463-473
7. Schrock JW, Bernstein J, Glasenapp M, Drogell K, Hanna J. A novel emergency department dysphagia screen for patients presenting with acute stroke. *Acad Emerg Med*. 2011;18:584-589
We could not be sure that all patients received formal swallowing evaluation against which validity could be determined. Nevertheless, this swallowing screen, conducted by emergency department nurses, had many merits. It was simple, consisted of five items, and was evaluated in a sample of 283 patients with acute stroke. Inter-rater reliability was substantial with kappa = 0.69 (95% CI 0.55-0.83). For the heterogeneous gold standard that was used, sensitivity was 95% (95% CI 88-98), specificity was 55% (95% CI 48-62), positive predictive value was 50% and negative predictive value was 95%.
8. Smithard DG, O'Neill PA, Parks C, Morris J. Complications and outcome after acute stroke. Does dysphagia matter? *Stroke*. 1996;27:1200-1204
9. Tanton M. Developing a screening tool and training package to identify dysphagia in all

- settings. *Nurs Times*. 2010;106:18-20
10. Westergren A, Hallberg IR, Ohlsson O. Nursing assessment of dysphagia among patients with stroke. *Scand J Caring Sci*. 1999;13:274-282
 11. Wood P, Emick-Herring B. Dysphagia: a screening tool for stroke patients. *J Neurosci Nurs*. 1997;29:325-329

Excluded due to lack of reliability data (n=16)

1. Bravata DM, Daggett VS, Woodward-Hagg H, Damush T, Plue L, Russell S, et al. Comparison of two approaches to screen for dysphagia among acute ischemic stroke patients: Nursing admission screening tool versus National Institutes of Health Stroke Scale. *J Rehabil Res Dev*. 2009;46:1127-1134
2. Caviedes IR, Lavados PM, Hoppe AJ, Lopez MA. Nasolaryngoscopic validation of a set of clinical predictors of aspiration in a critical care setting. *J Bronchol Intervent Pulmonol*. 2010;17:33-38
3. Cichero JA, Heaton S, Bassett L. Triaging dysphagia: nurse screening for dysphagia in an acute hospital. *J Clin Nurs*. 2009;18:1649-1659
4. DePippo KL, Holas MA, Reding MJ. Validation of the 3-oz water swallow test for aspiration following stroke. *Arch Neurol*. 1992;49:1259-1261
5. DePippo KL, Holas MA, Reding MJ. The Burke dysphagia screening test: validation of its use in patients with stroke. *Arch Phys Med Rehabil*. 1994;75:1284-1286
6. Hinds NP, Wiles CM. Assessment of swallowing and referral to speech and language therapists in acute stroke. *QJM*. 1998;91:829-835
7. Huhmann M, Decker RT, Byham-Gray L, Maillet JO, VonHagen S. Comparison of dysphagia screening by a registered dietitian in acute stroke patients to speech language pathologist's evaluation. *Top Clin Nutr*. 2004;19:239-249
8. Kidd D, Lawson J, Nesbitt R, MacMahon J. Aspiration in acute stroke: a clinical study with videofluoroscopy. *Q J Med*. 1993;86:825-829
9. Kopey SA, Chae J, Vargo MM. Does a 3-sip test detect dysphagia in acute stroke rehabilitation patients? *PM R*. 2010;2:822-828
10. Lees L, Sharpe L, Edwards A. Nurse-led dysphagia screening in acute stroke patients. *Nurs Stand*. 2006;21:35-42
11. Odderson IR, Keaton JC, McKenna BS. Swallow management in patients on an acute stroke pathway: quality is cost effective. *Arch Phys Med Rehabil*. 1995;76:1130-1133
12. Suiter DM, Leder SB. Clinical utility of the 3-ounce water swallow test. *Dysphagia*. 2008;23:244-250
13. Wakasugi Y, Tohara H, Hattori F, Motohashi Y, Nakane A, Goto S, et al. Screening test for silent aspiration at the bedside. *Dysphagia*. 2008;23:364-370
14. Weinhardt J, Hazelett S, Barrett D, Lada R, Enos T, Keleman R. Accuracy of a bedside dysphagia screening: a comparison of registered nurses and speech therapists. *Rehabil Nurs*. 2008;33:247-252
15. Zhou Z, Salle JY, Daviet JC, Stuit A, Nguyen CL. Combined approach in bedside assessment of aspiration risk post stroke: PASS. *Eur J Phys Rehabil Med*. 2011;47:1-6
16. Brody RA, Touger-Decker R, VonHagen S, Maillet JO. Role of registered dietitians in dysphagia screening. *J Am Diet Assoc*. 2000;100:1029-1037

Details on how to perform swallowing screens, extracted from the references**Barnes Jewish Hospital Stroke Dysphagia Screen (previously titled the Acute Stroke Dysphagia Screen, ASDS)**

Edmiaston J, Connor LT, Ford AL. SWALLOW-3D, a simple 2-minute bedside screening test, detects dysphagia in acute stroke patients with high sensitivity when validated against video-fluoroscopy (abstract). *Stroke*. 2011;42:e352

Edmiaston J, Connor LT, Loehr L, Nassief A. Validation of a dysphagia screening tool in acute stroke patients. *Am J Crit Care*. 2010;19:357-364

STROKE DYSPHAGIA SCREEN

Date: _____

To be completed on all patients upon admission with diagnosis of stroke.

If any of the following questions are answered with a yes, stop and refer to speech pathology.

	YES	NO
1) Is the Glasgow Coma Scale LESS than 13?	<input type="checkbox"/>	<input type="checkbox"/>
2) Is there Facial Asymmetry/Weakness?	<input type="checkbox"/>	<input type="checkbox"/>
3) Is there Tongue Asymmetry/Weakness?	<input type="checkbox"/>	<input type="checkbox"/>
4) Is there Palatal Asymmetry/Weakness?	<input type="checkbox"/>	<input type="checkbox"/>
5) Are there signs of aspiration during the 3 oz water test?	<input type="checkbox"/>	<input type="checkbox"/>

- If all findings for the first 4 questions are NO, proceed to the 3 oz water test.
- Administer 3 oz of water for sequential drinks, note any throat clearing, cough or change in vocal quality immediately after and 1 minute following the swallow. If clearing, coughing or change in vocal quality is noted, refer to speech therapy.
- If all of the answers to the above questions are NO, then start the patient on a regular diet.

R.N. signature

Modified Mann Assessment of Swallowing Ability (MMASA)

Antonios N, Carnaby-Mann G, Crary M, Miller L, Hubbard H, Hood K, et al. Analysis of a physician tool for evaluating dysphagia on an inpatient stroke unit: the Modified Mann Assessment of Swallowing Ability. *J Stroke Cerebrovasc Dis.* 2010;19:49-57

56

N. ANTONIOS ET AL.

Appendix: Dysphagia Screen

Modified Mann Assessment of Swallowing Ability (MMASA)

INSTRUCTIONS:

Circle the most appropriate clinical findings for each indicator.
Calculate the total score by adding the points for each indicator.

Patient Name _____

Date _____

1. Alertness

Task: Observe and evaluate the patient's response to speech, limb movement, or painful stimulation

Grade:

- 10 = Alert
- 8 = Drowsy-fluctuating awareness/alert level
- 5 = Difficult to arouse by speech or movement
- 2 = Coma or nonresponsive

2. Cooperation

Task: Gain patient's attention and attempt to initiate communication or activity

Grade:

- 10 = Cooperative—engages in some form of verbal or nonverbal exchange
- 8 = Fluctuating co-operation
- 5 = Reluctant co-operation
- 2 = No co-operation/response

3. Respiration

Task: Assess status of patient's Task: Assess status of patient's

Grade:

- 10 = Chest clear, no clinical or radiographic evidence of abnormality
- 8 = Sputum in the upper airway or other respiratory condition (e.g., asthma/bronchospasm, chronic obstructive pulmonary disease)
- 6 = Fine basal crepitations/self-clearing
- 4 = Coarse basal crepitations
- 2 = Suspected infection/frequent suctioning/respirator dependent

4. Expressive Dysphasia

Task: Assess for disturbances expression

Grade:

- 5 = No abnormality
- 4 = Mild difficulty finding words/expressing ideas
- 3 = Expresses self in a limited manner/short phrases or words
- 2 = No functional speech sounds or undecipherable single words
- 1 = Unable to assess

5. Auditory Comprehension

Task: Ability to understand basic verbal communication

Grade:

- 10 = No abnormality
- 8 = Follows ordinary conversation with little difficulty
- 6 = Follows simple conversation/instructions with repetition
- 4 = Occasional response if cued
- 1 = No response

6. Dysarthria

Task: Assess articulation

Grade:

- 5 = No abnormality
- 4 = Slow with occasional hesitation and slurring
- 3 = Speech intelligible but obviously defective rate/range/strength/coordination
- 2 = Speech unintelligible
- 1 = Unable to assess

MODIFIED MANN ASSESSMENT OF SWALLOWING

57

7. Saliva

Task: Observe patient's control of saliva; note any escape of secretions from the side of the mouth

Grade:
 5 = No abnormality
 4 = Frothy/expectorated into cup
 3 = Drooling at times, during speech, while side lying or fatigued
 2 = Some drool consistently
 1 = Gross drooling, unable to control drooling

8. Tongue Movement

Task: Assess tongue movement
 Protrusion: Have patient extend tongue as forward as possible, and then retract
 Lateralization: Have patient touch each corner of the mouth, then repeat alternating lateral movements
 Elevation: With mouth wide open, have patient raise tongue up to palate; alternate elevation and depression in this way

Grade:
 10 = Full range of movements/no abnormality detected
 8 = Mild impairment in range
 6 = Incomplete movement
 4 = Minimal movement
 2 = No movement or unable to perform

9. Tongue Strength

Task: Assess bilateral tongue strength
 Have patient push laterally and anteriorly against tongue blade

Grade:
 10 = No abnormality
 8 = Minimal weakness
 5 = Obvious unilateral weakness
 2 = Gross weakness or unable to perform

10. Gag

Task: Contact posterior pharyngeal wall on either side separately

Grade:
 5 = No abnormality
 4 = Diminished bilaterally
 3 = Diminished unilaterally
 2 = Absent unilaterally
 1 = No gag response

11. Cough Reflex

Task: Ask patient to cough as strong as possible
 Observe strength and clarity of cough

Grade:
 10 = No abnormality
 8 = Cough attempted, but hoarse in quality
 5 = Attempt inadequate
 2 = No attempt or unable to perform

12. Palate

Task: Ask patient to produce a strong "AH" several times and sustain each one for several seconds
 Observe for hypernasality and note action of palate elevation

Grade:
 10 = No abnormality
 8 = Slight asymmetry noted; mobile palate
 6 = Unilaterally weak and inconsistently maintained
 4 = Minimal movement, nasal regurgitation, nasal air escape
 2 = No elevation of palate or unable to perform

MMASA SCORE = _____

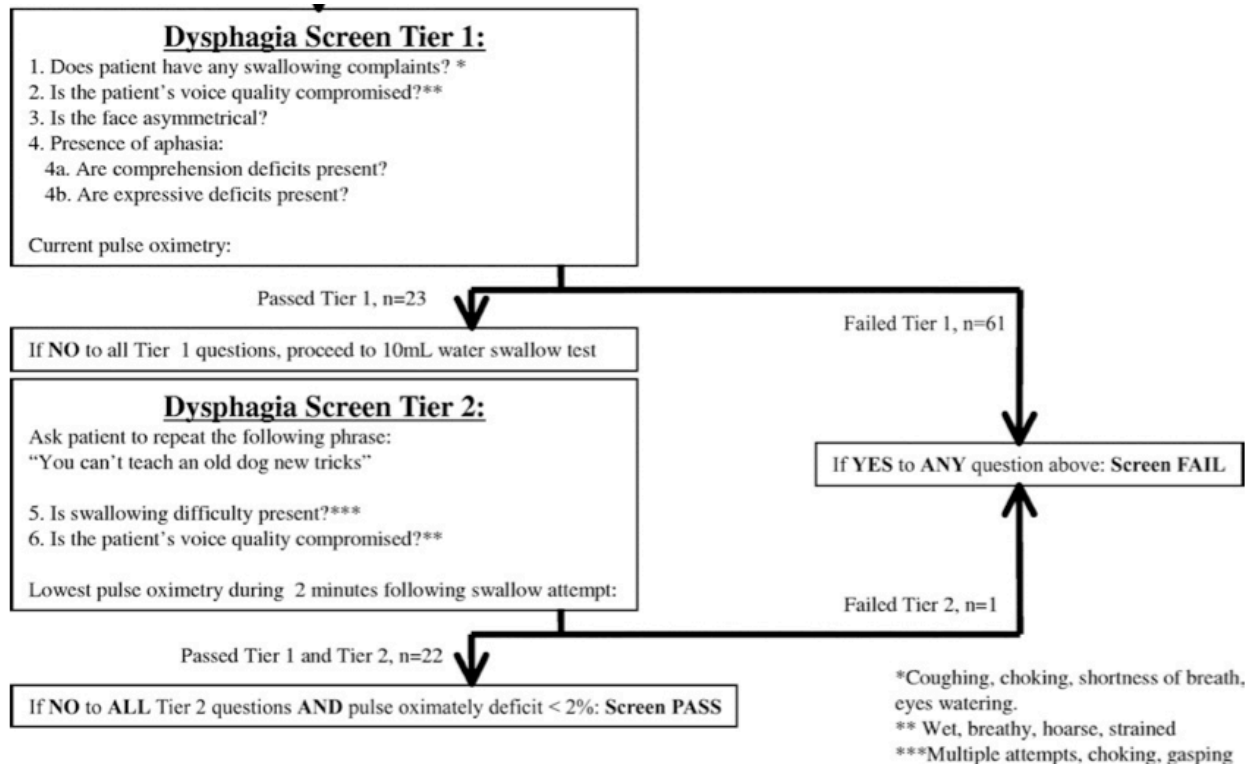
Interpretation

Score \geq 95: Start oral diet and progress as tolerated. Monitor first oral intake and consult SPEECH PATHOLOGY if patient has difficulty eating or drinking.

Score \leq 94: Nothing by mouth and consult SPEECH PATHOLOGY for a formal swallow evaluation.

A swallowing screen conducted by emergency physicians

Turner-Lawrence DE, Peebles M, Price MF, Singh SJ, Asimos AW. A feasibility study of the sensitivity of emergency physician dysphagia screening in acute stroke patients. *Ann Emerg Med.* 2009;54:344-348



Toronto Bedside Swallowing Screening Test (TOR-BSST)

Martino R, Silver F, Teasell R, Bayley M, Nicholson G, Streiner DL, et al. The Toronto Bedside Swallowing Screening Test (TOR-BSST): development and validation of a dysphagia screening tool for patients with stroke. *Stroke*. 2009;40:555-561

Proprietary but items assess vocal quality, tongue movement, water swallow.