Developing and Testing the Diagnostic Accuracy of a Brief Nursing Dysphagia Screen

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Abstract

Purpose: The aim of the study was to develop and test the Groppo-Lawless nurse-initiated screen designed to identify patients diagnosed with pneumonia who are at risk for dysphagia.

Design: This is a two-phase methodological study.

Methods: Phase 1 involved three steps. First, risk factors ($n = 27$) for dysphagia were identified from the literature. Next, frequency of these risk factors was calculated from a chart review of patients diagnosed with pneumonia ($N = 301$). Finally, frequency of risk factors among those patients who failed the 3-oz water trial ($n = 56$) were calculated, and a five-item instrument, the Groppo-Lawless Dysphagia Screen, was constructed. In Phase 2, nurses' results using the screen were compared to blinded results of speech-language pathologists.

Findings: Sensitivity (81.1%), specificity (96.4%), and diagnostic odds ratio (22.43) were calculated.

Conclusions/Clinical Relevance: Given the strong psychometric properties of this screen, its use by nurses may increase the number of appropriate speech-language pathologist referrals among patients diagnosed with pneumonia.

Keywords: Dysphagia; nursing screen tool.

Introduction

Patients diagnosed with pneumonia may be at an increased risk for developing dysphagia. Approximately 1.1 million patients are diagnosed with pneumonia per year, and 50,622 patients die annually from its complications (Hamborsky, Kroger, & Wolfe, 2017; Huang et al., 2011). Currently, patients diagnosed with pneumonia are not routinely screened for dysphagia.

According to the American Speech-Language-Hearing Association, dysphagia is a swallowing disorder that can occur as a result of a variety of medical diagnoses (American Speech-Language-Hearing Association, 2019). Approximately, 6 million adults over the age of 65 years are at an increased risk for developing dysphagia (Sura, Madhavan, Carnaby, & Crary, 2012). Dysphagia can bring with it personal, social, and financial concerns (Almirall, Cabre, & Clave, 2012; Cichero & Clave, 2012). In the general population, dysphagia affects approximately 1 in every 25 adults in the United States (9.44 million), and over 60,000 of those people die from associated complications (Bhattacharyya, 2014; ECRI Health Technology Assessment Group, 1999). In the United States, treatment of dysphagia and related complications costs approximately $547 million per year and increases a patient's hospital length of stay by 1.64 days, on average (Altman, Yu, & Schaefer, 2010; Cichero & Clave, 2012).

Dysphagia has been a cause of research for a long time and co-occurs with other conditions such as stroke, neurological diseases, and head and neck cancer (Langmore et al., 1998; Langmore, Skarupski, Park, & Fries, 2002; Lanspa, Jones, Brown, & Dean, 2013). Common complications from dysphagia, such as aspiration pneumonia, malnutrition, and dehydration, can be fatal and are among the leading causes of death in older adults (Bonilha et al., 2014; Cichero & Clave, 2012; Hines, Kynoch, & Munday, 2016; Wieseke, Bantz, Siktberg, & Dillard, 2008). Dysphagia screening protocols are effective for early identification of dysphagia in high-risk populations. High-risk populations include those patients diagnosed with stroke/

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neurological disease, head and neck cancer, chronic obstructive pulmonary disease (COPD), and congestive heart failure. The purpose of the screening tool is to identify those at high risk of dysphagia and refer them early for further swallow assessments.

Screening Tools

Dysphagia screening protocols are available for early identification of multiple high-risk populations, including stroke and postextubation (Altman et al., 2010; Cichero & Clave, 2012; DePippo, Holas, & Reding, 1994; Johnson et al., 2018; Loeb, McGeer, McArthur, Walter, & Simor, 1999; Logemann, Veis, & Colangelo, 1999; Martino et al., 2009; Perry & Love, 2001; See et al., 2016). When dysphagia and its complications were recognized and treated proactively, risk of death decreased by 40%. Chest infections were also reduced by 32% (Hines et al., 2016). Both assessment and intervention are traditionally provided by speech-language pathologists (SLPs) at the patient's bedside. Speech-language pathologists conduct clinical dysphagia assessments in the acute care setting and evaluate patients at risk for dysphagia.

Recent research supports the use of nurse-initiated dysphagia screenings (Cummings et al., 2015; Edmiaston, Connor, Steger-May, & Ford, 2014; Hines et al., 2016). Nurses are routinely at the bedside and can readily conduct an initial screen to determine if risk factors for dysphagia are present and merit further evaluation. A study conducted by Hines et al. (2016) suggests that nurse-initiated dysphagia screening is effective for detecting dysphagia in patients with neurological dysfunction in acute care settings. In the acute care setting, nurses are at the bedside, are frequently present for meals, watch patients swallow medication routinely, and monitor patients for longer periods of time. Their role allows them to see acute changes in patients' swallowing skills or identify concerns that merit further assessment.

There are multiple dysphagia screening tools with acceptable psychometric properties (sensitivity range: 68–100, specificity range: 52–100) designed for use in nursing homes (Park, Bang, Han, & Chang, 2015). A nurse-initiated dysphagia screening tool specific to identifying risk of dysphagia in patients in an acute care setting diagnosed with pneumonia is not available.

Purpose

The purpose of this two-phase study was to develop and test a nurse-initiated screening tool for identifying patients at risk for dysphagia admitted with a primary diagnosis of pneumonia. In Phase 1, the most prevalent risk factors for developing dysphagia among patients diagnosed with pneumonia were identified and a bedside nurse-initiated dysphagia risk screen was developed. In Phase 2, the diagnostic accuracy of the nurse-initiated dysphagia screen (index test) was compared to the SLP clinical swallow evaluation reference standard.

Methods

A two-phase methodological design was used in this study.

Phases 1 and 2

This study was conducted at a 393-bed Magnet redesignated community hospital. A Magnet redesignated community hospital is a hospital that has achieved nursing excellence at the highest level following a continued review. The institutional review board approved the study. Patients were eligible for either Phase 1 or Phase 2 of the study if they were older than 18 years, deemed "alert and able to participate," and had a primary diagnosis of pneumonia. All pathologies of pneumonia were included: community-acquired, hospital-acquired, aspiration, bacterial, and viral pneumonias. Patients with a primary diagnosis of pneumonia who had a tracheostomy tube or had been extubated at any time during their admission were excluded. Patients were also excluded if they were NPO (nothing by mouth), had gastrointestinal issues requiring restrictions with diet, had planned procedures, or were under palliative and/or hospice care. Patients failing to meet inclusion criteria were automatically referred for SLP assessment.

Procedure

Phase 1 Development of the Screen

The goal of Phase 1 was to identify a small number of major risk factors for dysphagia among patients diagnosed with pneumonia in order to develop an effective screen for use in clinical settings. This phase consisted of a comprehensive literature review, chart reviews, patient interviews, hands-on screenings, and frequency counts. Based on the literature review, 27 potential risk factors for dysphagia occurring in patients diagnosed with pneumonia were identified (see Table 1). Three experts in swallowing and swallowing disorders confirmed the 27 risk factors as predictive for dysphagia among patients diagnosed with pneumonia.

Following the literature review and identification of 27 potential risk factors, chart audits on consecutive patients (N = 301), a convenience sample, admitted to the hospital with a diagnosis of pneumonia were conducted. During patient admission to the hospital if pneumonia was diagnosed, an SLP reviewed the chart to determine

Table 1 Risk factors for dysphagia identified from the literature review (n = 27) and chart audit (n = 17) on 301 participants

Risk Factors Identified from the Literature Review (n = 27)	Risk Factors Identified from the Chart Audit on 301 Participants (n = 17)
Water trial	Water trial
History of swallowing problems	History of swallowing problems
Current diet	Current diet
Feeding	Feeding
Oral care	Oral care
Chronic obstructive pulmonary disease	Chronic obstructive pulmonary disease
Congestive heart failure	Congestive heart failure
Central nervous system disease	Central nervous system disease
Weight loss	Weight loss
Delirium	Delirium
Urinary tract infection	Urinary tract infection
Alcohol abuse	Alcohol abuse
Commands	Commands
Oral cleanliness	Oral cleanliness
Dentition health	Dentition health
Secretion management	Secretion management
Choking episode	Choking episode
Age	
Gender	
LACE score	
Admitted from	
History of cerebrovascular accident	
Medicine administration	
Chest X-ray results	
Dementia	
Orientation	
Alertness level	

if any risk factors for dysphagia were present. Audits were designed to assess the frequency of the 27 potential risk factors identified from the literature present in patients' charts. If there was insufficient evidence in the chart to determine whether or not a potential risk factor was present for a specific patient, the investigator, an SLP, conducted a clinical assessment at the bedside to retrieve desired information.

The 3-oz water swallow test, a known major predictor of dysphagia (Suiter & Leder, 2007), was also completed at the bedside. Fifty-six patients were identified as likely to develop dysphagia as a result of this test. Following the literature review, chart audits, and a water swallow test, the Groppo-Lawless Dysphagia Screen (GDS) was constructed using the identified risk factors and implemented as standard of care. See Supplemental Digital Content, Appendix A, http://links.lww.com/RNJ/A16.

Phase 2: Testing of the Screen

The goal of Phase 2 was to test the psychometric properties of the GDS among patients diagnosed with pneumonia (n = 178) a sequential convenience sample. Using an online self-guided learning module, nurses (n = 158) were educated on the use of the screen. In addition, they were required to attend a small group education session taught by SLPs and complete a competency-based validation tool before using the screen with patients. The primary investigator trained one or two "super users" for each of the four medical-surgical pilot units to ensure screening consistency among staff. These pilot units were identified based on the high prevalence of pneumonia diagnoses.

The GDS was initiated following admission to the inpatient unit with no specific wait time required before the nurse could complete the screen; however, nurses were urged to complete it as soon as possible upon admission in order to avoid unidentified dysphagia/aspiration before diet orders.

A time frame of 48 hours was allowed between nurse initial GDS screen and SLP independent, blinded, follow-up screen to account for weekend staffing issues. A retrospective review of both screens was conducted. Mean follow-up time during this study was 15.7 hours, with a standard deviation of 12.3 hours. If patients failed the SLP screen, a full clinical swallow evaluation was conducted to further investigate and confirm the presence of dysphagia.

Data Analysis

Phase 1

The initial chart audit (N = 301) produced 27 factors that had potential for being included on a clinically useful

screen. Decisions to select 17 items from the 27 factors found in the literature review were based on clinical expertise and frequency of presence in the charts (see Table 1). In order to further develop the screen, a second chart audit was conducted on 56 of the 301 patients who failed the 3-oz water test. Five factors, the 3-oz water test, history of swallowing problems, diet upon admission, independence with oral care, and independence with self-feeding were selected for the final screen. A history of swallowing problems, diet upon admission, independence with oral care, and independence with self-feeding were present in 35%–57% of those patients who failed the water test (see Table 2).

Although the frequency of the risk factor related to a history of COPD was also between 35% and 57% (35.7%), it was not included in the final screen. Chronic obstructive pulmonary disease was excluded due to the lack of spirometry values confirming obstruction as outlined by the Global Initiative for Obstructive Lung Disease; patients often self-reported "difficulty breathing" or "short of breath" as having COPD; thus, nurses were unable to confidently confirm patient subjective report with objective standards. SPSS statistics software for Windows, Version 21 (IBM Corp., 2012), was used to analyze data in both phases of the study.

Phase 2

Figure 1 shows the flow of participants in Phase 2. There were 58 participants excluded from the study due to the following reasons: incomplete screens by either the nurse or SLP and the follow-up screen by the SLP was after 48 hours. Mean age of the sample (n = 120) was 76 years (SD = 14), and 56% (n = 70) were female. A majority of patients were independent with oral care (90%, n = 108), independent with self-feeding (91.5%, n = 110), and ate a regular diet at the time of admission (89.1%, n = 107). Twenty-seven (22.5%) patients were admitted with a history of swallowing problems; of those 27 patients, 17 subsequently failed the GDS.

Sensitivity and specificity of the GDS were calculated (Table 3). If the nurse's use of the GDS with a patient indicated they did not have dysphagia, and the SLP came to the same conclusion, confirming the absence of dysphagia, the result was a *true negative*. If the nurse and the SLP both independently indicated dysphagia was present, the result was a *true positive*. If the nurse's use of the screen indicated that dysphagia was present, but the SLP's screen indicated the absence of dysphagia, the result was a *false positive*. If the nurse's use of the screen indicated an absence of dysphagia, but the SLP's screen indicated the presence of dysphagia, the result was a *false negative*.

Table 2 Risk factors for developing dysphagia when diagnosed with pneumonia

Risk Factors	*n* (%)
Failed 3-oz water trial	56 (100)
History of swallowing problems	30 (53.6)
Diet is mechanically thickened or is NPO on admission	22 (39.3)
Needs assistance feeding	21 (37.5)
Dependent/needs assistance with oral care	26 (46.4)

Note. NPO = nil per os/nothing by mouth.

In this study, *sensitivity*, the ability of a test to correctly identify those individuals with a condition, is defined as the nurses' ability to correctly identify patients with dysphagia using the GDS. The sensitivity for this study was 81.1%, meaning that, using the GDS, nurses correctly identified patients with dysphagia 81.1% of the time. Specificity is the ability of a test to correctly identify those without a condition. For this study, *specificity* is defined as the nurses' ability to correctly identify those patients without dysphagia. The specificity for this study was 96.4%, meaning that nurses, using the screen, correctly identified patients' absence of dysphagia 96.4% of the time.

A diagnostic odds ratio (DOR) describes a measure of the diagnostic test's effectiveness. The DOR is a way of disclosing the chance of a diagnosis versus not having the condition. The DOR in this study describes the proportion of patients with dysphagia who have the condition to those who test positive who are without it (Polit & Beck, 2017). A >1 odds ratio means that the screen performs well. The DOR in this study was 22.43 (95% CI [7.31, 68.88]). A positive predictive value (PPV) measures a screening tool's usefulness, as the probability of the positive test result is correct (Polit & Beck, 2017). In this case, PPV is the probability that patients who nurses identified as having dysphagia do have the condition. The PPV in this study was 90.9 (95% CI [74.5, 97.6]). The negative predictive value (NPV) of a screening tool describes the probability that the negative test result is correct (Polit & Beck, 2017). In this study, NPV is the probability that patients identified as not having dysphagia do not have the condition. The NPV in this study was 92.0 (95% CI [83.6, 96.4]).

Findings from this study support the GDS as having strong predictive validity (sensitivity = 81.1, specificity = 96.4, DOR = 22.43) and may therefore be considered to be an effective diagnostic tool. The results of this study support nurses' use of this screen with patients diagnosed with pneumonia.

Discussion

The purpose of this two-phase study was to develop and test a nurse-initiated dysphagia screening tool for patients

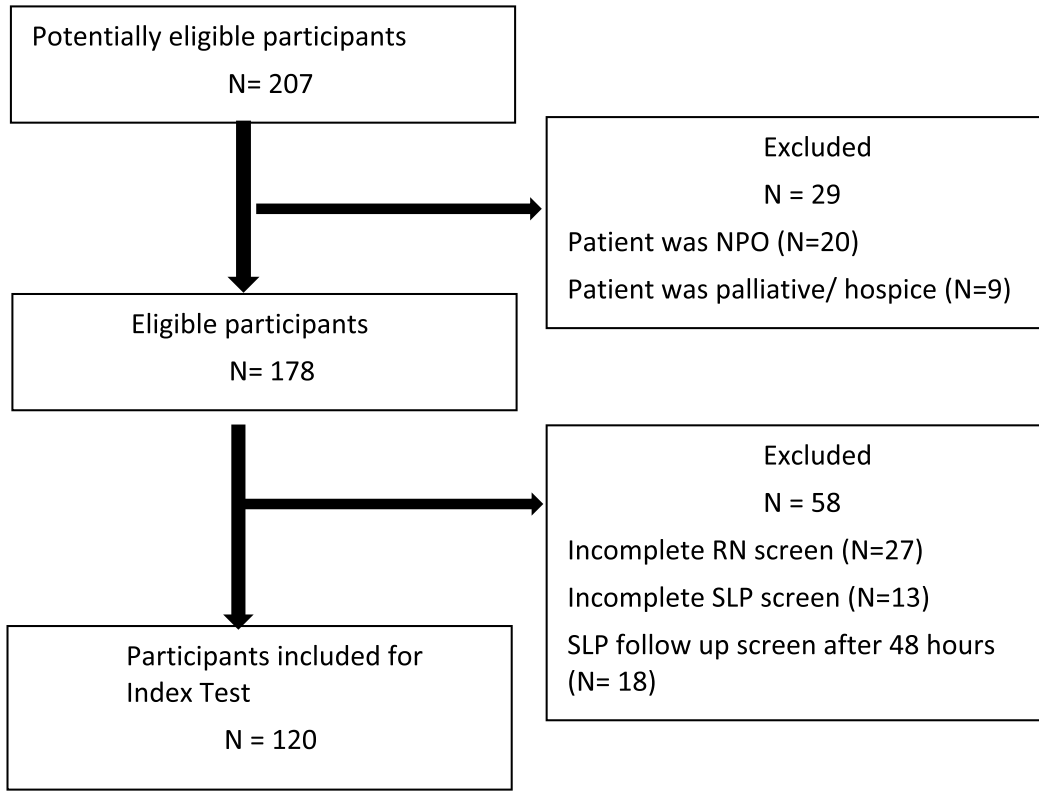

Figure 1. Flow diagram of participants in Phase 2.

at risk for dysphagia who are admitted with a primary diagnosis of pneumonia. In Phase 1, the prevalence of risk factors associated with dysphagia in patients diagnosed with pneumonia was explored. The most prevalent factors were used to develop the GDS.

In Phase 2, a dysphagia screening tool that nurses can initiate at the bedside specific to inpatients diagnosed with pneumonia was tested. The GDS is brief (approximately 2–5 minutes to complete), has clear step-by-step instructions to guide decision-making, and has strong sensitivity and specificity. Use of this tool can assist in predicting dysphagia in this population.

In addition, in the acute care setting, it is both efficient and cost-effective for nurses to screen for dysphagia. A nurse-initiated screening can be completed quickly at the patient's bedside and upon admission to the hospital. As a result, early referrals can be made to the SLP department for further evaluation. Research suggests that this approach to screening can facilitate an improvement in appropriate SLP referrals for dysphagia. Rather than relying on MD referrals through anecdotal patient reports or informal nurses' observations, these screens can lead to immediate care (Hines et al., 2016).

Use of this nurse-initiated dysphagia screen supports acute care SLPs by increasing the number of appropriate dysphagia assessments, getting more timely interventions, and preventing additional complications by earlier referrals. This nurse-initiated dysphagia screen also promotes nurse education for awareness of dysphagia signs, symptoms, and risk factors across multiple populations. Utilizing this dysphagia screen has the potential to enhance collaboration between nurses and SLPs to improve patient outcomes. Further research with nurses implementing the GDS and determining the effect on patient outcomes such as length of stay and cost of dysphagia are recommended.

Nurse-initiated dysphagia screens are available across multiple populations and in multiple settings (Cummings et al., 2015; Edmiaston et al., 2014; Hines et al., 2016).

Table 3 Dysphagia screens by speech-language pathologist and nurses using the Groppo-Lawless Dysphagia Screen

	SLP Assessment Is the Reference Standard ("Gold Standard")	
Nurses Assessment Is the Index Test ("Experimental Assessment")	SLP–Dysphagia Absent	SLP–Dysphagia Present
Nurses–dysphagia present	3 (FP)	30 (TP)
Nurses–dysphagia absent	80 (TN)	7 (FN)
Total	83	37

Note. SLP = speech-language pathologist; FP = false positive; TP = true positive; TN = true negative; FN = false negative.

Key Practice Points

- Early identification of difficulty in swallowing is important in order to diagnose dysphagia in a timely manner.
- Designating nurses to screen patients for dysphagia is an efficient approach in identifying patients at risk for this problem.
- Using the Groppo-Lawless Dysphagia Screen with inpatients diagnosed with pneumonia may increase the number of appropriate speech-language pathologist referrals.
- Utilizing this dysphagia screen has the potential to enhance collaboration between nurses and speech-language pathologists to improve patient outcomes.

It is important for nurses to be aware of a dysphagia screen that is most appropriate for their patient population.

Study Limitations

This study was conducted at one community-based hospital in the southeastern United States. Studies with a larger, more diverse population could provide additional information regarding the use of this screen. In addition, a number of patients ($n = 58$) could not be included in the data analysis due to procedural problems, including missing data and SLP follow-up outside the 48-hour window.

Conclusion

The GDS is the first nurse-initiated screen developed specifically for patients with a diagnosis of pneumonia in the acute care setting. It is a clinically useful, psychometrically sound screen for nurses to use with patients who are at risk for developing dysphagia. Implementing the GDS identifies those at risk for dysphagia early, therefore providing appropriate referrals for SLP assessment and intervention through collaboration.

Conflict of Interest

The authors declare no conflicts of interest.

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References

Almirall, J., Cabré, M., & Clavé, P. (2012). Complications of oropharyngeal dysphagia: Aspiration pneumonia. *Nestle Nutrition Institute Workshop Series*, *72*, 67–76. doi:10.1159/000339989

Altman, K. W., Yu, G. P., & Schaefer, S. D. (2010). Consequence of dysphagia in the hospitalized patient: Impact on prognosis and hospital resources. *Archives of Otolaryngology—Head & Neck Surgery*, *136*(8), 784–789. doi:10.1001/archoto.2010.129

American Speech-Language-Hearing Association. (2019). *Adult dysphagia*. Retrieved from https://www.asha.org/Practice-Portal/Clinical-Topics/Adult-Dysphagia/

Bhattacharyya, N. (2014). The prevalence of dysphagia among adults in the United States. *Archives of Otolaryngology—Head & Neck Surgery*, *151*(5), 765–769. doi:10.1177/0194599814549156

Bonilha, H. S., Simpson, A. N., Ellis, C., Mauldin, P., Martin-Harris, B., & Simpson, K. (2014). The one-year attributable cost of post-stroke dysphagia. *Dysphagia*, *29*(5), 545–552. doi:10.1007/s00455-014-9543-8

Cichero, J., & Clavé, P. (2012). 72nd Nestlé Nutrition Institute Workshop 'Stepping stones to living well with dysphagia.' Concluding remarks. *Nestle Nutrion Institute Workshop Series*, *72*, 127–133. doi:10.1159/000340002

Cummings, J., Soomans, D., O'Laughlin, J., Snapp, V., Jodoin, A., Proco, H., … Rood, D. (2015). Sensitivity and specificity of a nurse dysphagia screen in stroke patients. *Medsurg Nursing*, *24*(4), 219–22, 263.

DePippo, K. L., Holas, M. A., & Reding, M. J. (1994). The Burke dysphagia screening test: Validation of its use in patients with stroke. *Archives of Physical Medicine and Rehabilitation*, *75*(12), 1284–1286.

ECRI Health Technology Assessment Group (1999). Diagnosis and treatment of swallowing disorders (dysphagia) in acute-care stroke patients. *Evidence/Report Technology Assessment (Summary)*, (8), 1–6.

Edmiaston, J., Connor, L. T., Steger-May, K., & Ford, A. L. (2014). A simple bedside stroke dysphagia screen, validated against videofluoroscopy, detects dysphagia and aspiration with high sensitivity. *Journal of Stroke and Cerebrovascular Disease*, *23*(4), 712–716. doi:10.1016/j.jstrokecerebrovasdis.2013.06.030

Hamborsky, J., Kroger, A., & Wolfe, S. (Eds.) (2017). *Epidemiology and prevention of vaccine-preventable diseases* (13th ed.). Washington, DC: Public Health Foundation.

Hines, S., Kynoch, K., & Munday, J. (2016). Nursing interventions for identifying and managing acute dysphagia are effective for improving patient outcomes: A systematic review update. *Journal of Neuroscience Nursing*, *48*(4), 215–223. doi:10.1097/jnn.0000000000000200

Huang, S. S., Johnson, K. M., Ray, G. T., Wroe, P., Lieu, T. A., Moore, M. R., … Finkelstein, J. A. (2011). Healthcare utilization and cost of pneumococcal disease in the United States. *Vaccine*, *29*(18), 3398–3412. doi:10.1016/j.vaccine.2011.02.088

IBM Corp (2012). *IBM SPSS statistics for Windows* (Version 21.0). Armonk, NY: Author.

Johnson, K. L., Speirs, L., Mitchell, A., Przybyl, H., Anderson, D., Manos, B., … Winchester, K. (2018). Validation of a postextubation dysphagia screening tool for patients after prolonged endotracheal intubation. *American Journal of Critical Care*, *27*(2), 89–96. doi:10.4037/ajcc2018483

Langmore, S. E., Skarupski, K. A., Park, P. S., & Fries, B. E. (2002). Predictors of aspiration pneumonia in nursing home residents. *Dysphagia*, *17*(4), 298–307.8.

Langmore, S. E., Terpenning, M. S., Schork, A., Chen, Y., Murray, J. T., Lopatin, D., & Loesche, W. J. (1998). Predictors of aspiration pneumonia: How important is dysphagia? *Dysphagia*, *13*(2), 69–81. doi:10.1007/pl00009559

Lanspa, M. J., Jones, B. E., Brown, S. M., & Dean, N. C. (2013). Mortality, morbidity, and disease severity of patients with aspiration pneumonia. *Journal of Hospital Medicine*, *8*(2), 83–90. doi:10.1002/jhm.1996

Loeb, M., McGeer, A., McArthur, M., Walter, S., & Simor, A. E. (1999). Risk factors for pneumonia and other lower respiratory tract infections in elderly residents of long-term care facilities. *Archives of Internal Medicine*, *159*(17), 2058–2064.

Logemann, J. A., Veis, S., & Colangelo, L. (1999). A screening procedure for oropharyngeal dysphagia. *Dysphagia*, *14*, 44–51.

Martino, R., Silver, F., Teasell, R., Bayley, M., Nicholson, G., Streiner, D. L., & Diamant, N. E. (2009). The Toronto Bedside Swallowing Screening Test (TOR-BSST): Development and validation of a dysphagia screening tool for patients with stroke. *Stroke*, *40*(2), 555–561. doi:10.1161/strokeaha.107.510370

Park, Y. H., Bang, H. L., Han, H. R., & Chang, H. K. (2015). Dysphagia screening measures for use in nursing homes: A systematic review. *Journal of Korean Academy of Nursing*, *45*(1), 1–13. doi:10.4040/jkan.2015.45.1.1

Perry, L., & Love, C. P. (2001). Screening for dysphagia and aspiration in acute stroke: A systematic review. *Dysphagia*, *16*(1), 7–18.

Polit, D. F., & Beck, C. T. (2017). *Nursing research: Generating and assessing evidence for nursing practice* (10th ed.). Philadelphia, PA: Lippincott Williams & Wilkins.

See, K. C., Peng, S. Y., Phua, J., Sum, C. L., & Concepcion, J. (2016). Nurse-performed screening for postextubation dysphagia: A retrospective cohort study in critically ill medical patients. *Critical Care*., *20*, 326. doi:10.1186/s13054-016-1507-y

Suiter, D. M., & Leder, S. B. (2007). Clinical utility of the 3-ounce water swallow test. *Dysphagia*, *23*(3), 244–250. doi:10.1007/s00455-007-9127-y

Sura, L., Madhavan, A., Carnaby, G., & Crary, M. A. (2012). Dysphagia in the elderly: Management and nutritional considerations. *Clinical Interventions in Aging*, *7*, 287–298. doi:10.2147/cia.s23404

Wieseke, A., Bantz, D., Siktberg, L., & Dillard, N. (2008). Assessment and early diagnosis of dysphagia. *Geriatric Nursing*, *29*(6), 376–383. doi:10.1016/j.gerinurse.2007.12.001