



Efficacy of BSE in Per Oral Decision Making in Acute Care Setting

Hafeez Punjani¹, Ali Punjani², Zoha Asif³, Afshan Memon⁴, Tasneem Ali⁵.

¹, BS-ASLT, Speech Language Therapist, College of Speech Language & Hearing Sciences, Ziauddin University, Karachi, Pakistan

², BS-SLT, Speech Language Therapist, College of Speech Language & Hearing Sciences, Ziauddin University, Karachi, Pakistan

³, BS-ASLT, Speech Language Therapist, College of Speech Language & Hearing Sciences, Ziauddin University, Karachi, Pakistan

⁴, BS-ASLT, Speech Language Therapist, College of Speech Language & Hearing Sciences, Ziauddin University, Karachi, Pakistan

⁵, MS-SLP, Speech Language Pathologist, Via Services, Santa Clara, CA

Abstract:

Objective: What effect of BSE will result in PO decision making for patients with dysphagia?

Goal: What effect of BSE will impact in NPO decision making for patients with dysphagia?

Materials and Methods: 30 types of researches were chosen for the literature review and the data was abstracted from Google Scholar.

Result: the analysis of studies shows that there is a Bed-side Swallow Evaluation is crucial for the decision making process for patients on NPO to start their oral trials. As we are not taking the group impact of a dysphagia intervention into account however, patients who are already enrolled in dysphagia intervention programs were excluded from this study.

Discussion: the existing articles represents that BSE plays decisive role in per oral decision making process in acute care settings.

Conclusion: Per oral decisions make after BSE helps SLPs in identifying the signs and symptoms for aspiration in patients with deglutition problems in acute care setting.

Key words: Bedside Swallow evaluation (BSE), Per Oral (PO), Non-Per Oral (NPO), Water Swallow Test (WST), Flexible Endoscopic Evaluation of Swallowing (FEES), Video-Fluoroscopic Swallow Study (VFSS), Speech Language Therapist (SLP), Dysphagia, Acute Setting

I. Introduction

30% to 65% of acute stroke survivors have dysphagia (Hota, et al., 2021). The incidence of pneumonia in patients hospitalised with acute stroke has been observed to reduce with early dysphagia screening using formal screening (Yoo, et al. 2021). The patient is more likely to suffer from inadequate nutrition and hydration, as well as aspiration-related pneumonia, if they are unable to properly consume enough food and fluids (McGinnis et al, 2019). Patients who have been admitted to acute care are frequently screened for

swallowing by nurses and other non-specialists in the field (Lack, V, 2012). There are a variety of basic screening methods for dysphagia, but they are often conservative, and patients who fail the test must stay nil by mouth until they have had an evaluation by speech and language therapist (Benfield, J. K., Everton, et al, 2020). Additionally, more thorough examinations enable non-specialists to suggest altered oral intake. Little is known regarding the precision, clinical usefulness, and affordability of these tests (Haworth, J. J., Pitcher, et al, 2022). SLPs (Speech-Language Pathologists) are pioneers in diagnosing and treating swallowing issues. They use a variety of instruments or evaluation techniques as part of that therapy to examine and gauge the effectiveness of their therapies (Dungan et al, 2019).

Up to 60% of patients in acute care are at risk for aspiration, according to earlier research. Up to 25% of people aspirate "quietly," showing no symptoms on a clinical examination (McIntyre, M., Doeltgen, et al, 2021). The majority of hospitals use speech-language pathologists (SLPs) to decide when non-oral feeding patients can start eating again. In this demographic, SLPs frequently use bedside evaluations to make feeding recommendations (Dunn, K., Rumbach, et al; 2020; da Silva, P. S., et al, 2022). Hospitals and SLPs may employ different equipment, ranging from straightforward screening tests like the 3-ounce water swallowing test (3-WST) to thorough bedside swallowing examinations (BSE). BSE involves taking the patient's medical history, performing a physical exam, and then determining whether the patient can successfully swallow boluses of various consistencies using instruments like the 3-WST. Gold standard exams like the video-fluoroscopic swallow study (VFSS) and flexible endoscopic swallowing evaluation are not commonly carried out by SLPs (FEES). This is partly because of worries about transferring seriously sick patients safely to radiology for VFSS and a lack of resources or knowledge for FEES (Moss, M., White, et al, 2020).

Previous studies looked at how well BSE can identify aspiration (Lundine, J. P., Dempster, et al, 2018). However, those studies either concentrated on stroke patients who were recovering or employed a mixed-group sample. This study aims to evaluate BSE's effectiveness in oral decision-making in the acute care context.

II. Scope and boundaries of study

An acute care patient's swallow screen enables early intervention, lowers morbidity, shortens hospital stays, and lowers hospital costs (Park, K. D., et al, 2020). By reducing problems, decreasing hospital stays, and ensuring that patients receive appropriate nourishment that poses less risks to their lives, increasing the use of the swallow screen on patients would benefit societal change (Thiyagalingam, S., Kulinski, et al, 2021). There is accessible research and advice for a bedside swallow screen, however there is still a practise gap (Wangen, T., Hatlevig, et al, 2019). The speech and language pathologist (SLP) is a medical practitioner with training in dysphagia evaluation, however due to lack of presence or unavailability of SLPs in emergency departments, nurses use to perform the screening and decide of NG placements, which later SLP decides to either continue NPO diet or allow patient for per oral intake along with the type of consistencies of food (Drulia, T., & Hodge, A. (2021). The aim of this study is to provide an insight on decision makings of SLPs, for permitting permission of per oral dietary intake in acute care setting using BSE as an early assessment protocol. The findings can either lead to instant PO permission or in-depth evaluation including VFSS or FEES.

III. Methodology

1. Types of studies

Only evaluation studies utilising the randomised and quasi-randomized clinical trial methods will be taken into consideration. This review will contain all clinical studies that have been published starting at the beginning in any language. All trials that include at least one group obtaining a Bed Side Swallow examination with the goal of either administering the kind, severity, and NPO/type of tube feeding or permitting oral intake are categorised as relevant randomised controlled trials. All clinical studies with a comparable design and known but rigorously random allocation to the control group will be categorised as quasi-randomized clinical trials (i.e., alternative distribution based on the day, the date of birth, or the

medical record number). Only if, data from the first assessment period were reported and used will cross-over trials be included in the evaluation.

2. **Types of participants:**

This review will only cover studies that were carried out in acute health care settings (i.e., any acute hospital ward or unit, including acute medical, respiratory, surgical, neurological, or critical care/intensive care units within an acute hospital or tertiary hospital environment). Any adult participant who is at least 18 years old and of any sex, ethnicity, sickness stage, or degree of surgical, medical, respiratory, or neurological severity will be included. We won't place any restrictions on the duration of intubation and ventilation or the existence of a tracheostomy tube among patients in the critical care trial.

3. **Exclusion criteria:**

Cluster-randomized controlled trials will be omitted since we are not taking the group impact of a dysphagia intervention into account. Treatment studies conducted in outpatient settings, rehabilitation centres, residential care homes (often known as nursing homes), or long-term care facilities will be excluded. Additionally, we will not include any additional evaluations that were carried out within the Per Oral Decision-Making Process, such as VFSS or FEES.

Complete Bed Side Evaluation:

Only SLPs will be allowed to perform BSE on patients admitted in acute care setting. The observation derived from the BSE will be recorded and use in the studies. Studies that contain BSE performed by SLP will be reviewed and their data will be used for comparison.

IV. Data analysis

Selection of studies

Google Scholar will be used to record citations, and duplicates will be eliminated. Studies that don't fit the criteria will be eliminated after being initially assessed according to the title and abstract by the author separately. Discussions will be held to settle disagreements, and if required, a second author will be consulted. After this preliminary phase, the author will independently analyse the complete texts of all remaining papers to determine if they should be included or excluded in the final research.

Data Analysis:

The SLP will get the data from the BSE and carry out the meta-analysis. For the examination of results, the risk ratio (RR) and 95% confidence interval (CI) assessment metrics will be applied.

V. Discussion

Oropharyngeal dysphagia, also known as swallowing issues, is a common condition in acute care and critical care, affecting 62% of critically ill patients who have been intubated and mechanically ventilated for extended periods of time, 50% of acute stroke patients, and 47% of hospitalised frail elderly patients (Duncan, S., Gaughey et al, 2019). Aspiration leading to pneumonia and chest infections, malnutrition, prolonged hospital stays, and re-admission to the hospital are all dysphagia complications (Mohannak, N., Pattison et al, 2019). A patient's medical, neurological, respiratory, and cognitive condition might change day to day in acute and critical care settings, which can have an influence on swallow function (Miles, A., Connor, et al, 2021). Professionals working to actively treat swallowing issues face a hurdle because of this (Datta, N. et al, Derenne, 2020). A lack of functional connection in the brain swallowing network contributes to dysphagia after acute stroke. More than half of these individuals regain swallow function in the first three weeks following a stroke due to neuroplasticity, which allows the unaffected hemisphere to make up for lost functions from lesions in the afflicted hemisphere (Aghaz, A., Hemmati, et al, 2018). Patients with traumatic brain or cervical spine injuries, patients whose neurodegenerative or neuromuscular condition is progressing and necessitating an intensive care or acute care stay, and frail elderly patients hospitalised for acute illness who present with sarcopenia—a loss of skeletal muscle mass and function due to aging—are other people with dysphagia who

may present in these settings (McRae, J., Morgan, et al, 2022). Dysphagia results from this lack of function in the skeletal muscles that control swallowing (Tran, E. K., Juarez, 2020).

A minimally invasive procedure named swallowing screening makes it possible to quickly determine whether dysphagia is likely to be present, whether the patient needs to be referred for additional swallowing assessment, and whether the patient needs to be referred for nutritional or hydration support (Ansari, N. N., Tarameshlu, M., & Ghelichi, L. 2020). With an emphasis on finding overt evidence of aspiration, swallowing screening protocols reveal the existence of clinical signs and symptoms that may be indicative of dysphagia. Both clinical/bedside and video fluoroscopic/videoendoscopic approaches are used to assess individuals suspected of having swallowing difficulties. The clinical/bedside evaluations should preferably come first, then the physiologic tests. For each evaluation, standardised procedures are employed (Speyer, R., Cordier, et al 2022).

Evaluation of swallowing while being observed for overt aspiration and/or dysphagia signs and symptoms. BSEs are carried out as a preliminary assessment of swallowing (Oguchi, N., Yamamoto, et al 2021). Prior to beginning an oral diet, an instrumental examination is undertaken when patients exhibit aspiration signs or symptoms or when further factual information is required (Dobak, S., & Kelly, D. 2021). (White, S. D., et al. 2020; Moss, M.) SLP evaluated the patient's medical file before commencing the BSE and conducted an examination, beginning with the clinician's assessment of the patient's lip movement and seal, tongue movement and strength, volitional cough strength, dentition, voice quality, and degree of feeding assistance needed. The patient was as upright as was physically feasible. Five standard consistencies were then given by the SLP. Boluses were supplied from lowest to highest aspiration risk wherever it was practical: One teaspoon of each of the following: a) water; b) thin liquids; c) pureed solids; d) nectar-thick liquids; and e) solids. After each bolus, the SLP kept an eye out for these five aspiration warning signs:

- Cough: Within 10 seconds, a cough or choking sound.
- Throat clearing: The ability to clear the throat within 10 seconds.
- Vocal quality was divided into two categories: normal and abnormal. Positive results included the development of aberrant voice quality within 10 seconds.
- Gurgling is a low- to medium-pitched rattling sound made during inhaling or expiration. Positive results included the development of gurgling within 10 seconds.
- Stridor: During inhaling or exhale, a loud vibrating sound is produced. Positive results included the development of stridor within 10 seconds.

Two distinct aspiration definitions were used to evaluate the accuracy of the overall BSE (Perren, A., Zürcher, & Schefold, J. C. 2019). The first had a looser definition: patients who suggested any dietary changes, including NPO, had positive BSE for aspiration; those who suggested a "normal diet" (regular meals and thin liquids), on the other hand, had negative BSE. The second definition was stricter: those who were advised to remain NPO had positive BSEs, whereas those who were permitted to eat orally had negative BSEs (Moss, M., White, S. D., 2020).

For tracheotomized patients, the Sheba Medical Center Protocol for Bedside Evaluation of Swallowing Disorders (SMCP-BES) was created by Dr. Freud, Dr. Hamburger, and others in 2022. This examination was created at Sheba Institute. 39 patients who had been admitted had this evaluation, which was done three months following admission. Two evaluations at the bedside make up the exam. As a general rule, the charge nurse deflated the patient's cuff prior to the start of assessments (if medically possible), and suction was started right away to prevent aspiration of secretions. Prior to receiving food, the patient had to cooperate in the simplest way possible by opening their mouth. Second, the patient could sit up straight or at least with a 45-degree recline. Thirdly, the SLP confirmed that the patient may initiate a swallowing reflex by observing self-management of secretions or by having the patient start swallowing saliva on command. Palpation verified

the swallow. Based on each patient's case history and the SLP's clinical opinion, the SLP then started the test with the safest and most appropriate texture. After finishing the whole process with one type of texture, the SMCP-BES may incorporate textures from IDDSI; however, they need be examined independently to identify the texture that was inhaled. In each consistency, 5 cc teaspoons of blue dye were added. The tracheostomy tube was covered with a speech valve while the patient swallowed; if one wasn't available, the SLP blocked the tube with a finger. The suction catheter or container was used to track blue discharges. Additionally, blue material might spontaneously discharge and be seen surrounding the cannula (for example, during coughing). When blue secretions were discovered, it was assumed that the patient was aspirating, and NPO nourishment was maintained. The patient will be given PO consideration if there were no blue secretions discovered in the suction equipment or visible around the patient's cannula. Therefore, it is advised to use the SBDTP as a viable, inexpensive, and more accurate bedside dysphagia screening, particularly when access to instrumental testing is restricted.

The Sapienza GLOBal Bedside Evaluation of Swallowing after Stroke (GLOBE-3S), developed by Toscano, M., Vigan, et al. in 2019, incorporates laryngeal elevation monitoring and pulse oximetry. The oxygen level between aspirators and non-aspirators was tracked using an oximeter. The 4-finger test was employed to evaluate laryngeal elevation since it may be done quickly and easily at the patient's bedside. Oral motor evaluation was the first step, and IDDSI consistencies were used to determine which consistencies were being aspirated and which were not. After SLP's analysis, PO and NPO decisions will be made. The GLOBE-3S screening test can lower the risk of pneumonia linked to stroke (SAP). The GLOBE-3S may make it possible to identify stroke patients with dysphagia who were overlooked by most current swallowing screening tools and who are thus at a high risk for developing SAP. This is because it has the potential to detect even silent aspirators.

Although there is a small chance that the patient may aspirate while having a bedside swallow test, this procedure is typically safe. Lynch, Y. T., Clark, et al. (2017) concluded that 14% of patients with negative BSE aspiration findings were found to aspirate on FEES, indicating that silent aspiration that was underreported on BSE. According to Farneti, D., Turrone, et al. (2018), we did not discover any evidence that BSE was a reliable indicator of aspiration on FEES. Some of the consistent findings demonstrate greater hyolaryngeal elevation along with BSE signs and symptoms that were later verified on FEES.

VI. Ethical consideration

Management of dysphagia is challenging and necessitates balancing patient preferences, quality of life, and medical implications. Given the intricacy of dysphagia, ethical issues are not uncommon. When addressing dysphagia, professionals must engage in ethical thought and collaborative decision-making. Acknowledging the importance of eating in an individual's life, providing restrictions in the person's life using NPO without explaining the effects and appropriate management and treatment method/strategies is usually seen in acute care setting. To resolve these gaps and considerations, multidisciplinary group which includes doctors, nurses, trained personal staff, SLPs and family will be formed, and therapeutic intervention will be discussed and counselled. Patients interest will be considered and priorities until it will hinder with his/her quality of life. Patient's or guardian's consent must be considered before physically placing or operating feeding tube for NPO feeding.

VII. Conclusion

In routine clinical practice, identifying the potential for aspiration in patients with deglutition problems is a crucial step in preventing complications. Clinical symptoms of aspiration and dysphagia that are closely related to BSE were observed. For instance, gurgling was assessed as a perceptual voice parameter, as was laryngeal elevation taking into account the movements of the larynx during a voluntary swallow (a movement

equal or superior to 2 cm was considered normal), sensation when a probe was lightly pressed against the mouth and pharynx (the patients' response and/or reaction was taken into account), consciousness, alertness, cognitive abilities, and fatigability.

VIII. Reference

1. Hota, S., Inamoto, Y., Oguchi, K., Kondo, T., Otaka, E., Mukaino, M. & Saitoh, E. (2021). Outcomes of dysphagia following stroke: Factors influencing oral intake at 6 months after onset. *Journal of Stroke and Cerebrovascular Diseases*, 30(9), 105971.
2. McGinnis, C. M., Homan, K., Solomon, M., Taylor, J., Staebell, K., Erger, D., & Raut, N. (2019). Dysphagia: interprofessional management, impact, and patient-centered care. *Nutrition in Clinical Practice*, 34(1), 80-95.
3. Dungan, S., Gregorio, D., Abrahams, T., Harrison, B., Abrahams, J., Brocato, D., & Carnaby, G. (2019). Comparative validity of the American Speech-Language-Hearing Association's national outcomes measurement system, functional oral intake scale, and G-codes to mann assessment of swallowing ability scores for dysphagia. *American Journal of Speech-Language Pathology*, 28(2), 424-429.
4. Freud, D., Hamburger, A., Kaplan, D., & Henkin, Y. (2022). The Sheba Medical Center Protocol for Bedside Evaluation of Swallowing Disorders Among Tracheotomized Patients. *Dysphagia*, 37(5), 1238-1246.
5. Jannini, T. B., Ruggiero, M., Viganò, A., Comanducci, A., Maestrini, I., Giuliani, G., ... & Di Piero, V. (2022). The role of the Sapienza GLOBal Bedside Evaluation of Swallowing after Stroke (GLOBE-3S) in the prevention of stroke-associated pneumonia (SAP). *Neurological Sciences*, 43(2), 1167-1176.
6. Toscano, M., Viganò, A., Rea, A., Verzina, A., Sasso D'Elia, T., Puledra, F., ... & Di Piero, V. (2019). Sapienza global bedside evaluation of swallowing after stroke: The GLOBE-3S study. *European Journal of Neurology*, 26(4), 596-602.
7. Lynch, Y. T., Clark, B. J., Macht, M., White, S. D., Taylor, H., Wimbish, T., & Moss, M. (2017). The accuracy of the bedside swallowing evaluation for detecting aspiration in survivors of acute respiratory failure. *Journal of critical care*, 39, 143-148.
8. Farneti, D., Turrone, V., & Genovese, E. (2018). Aspiration: diagnostic contributions from bedside swallowing evaluation and endoscopy. *Acta Otorhinolaryngologica Italica*, 38(6), 511.
9. Lack, V. (2012). Managing risk in childhood infectious disease: assessment and treatment of children by non-specialists in primary and urgent care. *Primary Health Care*, 22(10).
10. Benfield, J. K., Everton, L. F., Bath, P. M., & England, T. J. (2020). Accuracy and clinical utility of comprehensive dysphagia screening assessments in acute stroke: A systematic review and meta-analysis. *Journal of clinical nursing*, 29(9-10), 1527-1538.
11. Haworth, J. J., Pitcher, C. K., Ferrandino, G., Hobson, A. R., Pappan, K. L., & Lawson, J. L. (2022). Breathing new life into clinical testing and diagnostics: perspectives on volatile biomarkers from breath. *Critical Reviews in Clinical Laboratory Sciences*, 1-20.
12. McIntyre, M., Doeltgen, S., Dalton, N., Koppa, M., & Chimunda, T. (2021). Post-extubation dysphagia incidence in critically ill patients: A systematic review and meta-analysis. *Australian Critical Care*, 34(1), 67-75.
13. da Silva, P. S., Reis, M. E., Fonseca, T. S., Kubo, E. Y., & Fonseca, M. C. (2022). Postextubation dysphagia in critically ill children: A prospective cohort study. *Pediatric Pulmonology*.
14. Dunn, K., Rumbach, A., & Finch, E. (2020). Dysphagia following non-traumatic subarachnoid haemorrhage: A prospective pilot study. *International Journal of Language & Communication Disorders*, 55(5), 702-711.
15. Moss, M., White, S. D., Warner, H., Dvorkin, D., Fink, D., Gomez-Taborda, S., & Langmore, S. E. (2020). Development of an accurate bedside swallowing evaluation decision tree algorithm for detecting aspiration in acute respiratory failure survivors. *Chest*, 158(5), 1923-1933.
16. Lundine, J. P., Dempster, R., Carpenito, K., Miller-Tate, H., Burdo-Hartman, W., Halpin, E., & Khalid, O. (2018). Incidence of aspiration in infants with single-ventricle physiology following hybrid procedure. *Congenital Heart Disease*, 13(5), 706-712.

17. Park, K. D., Kim, T. H., & Lee, S. H. (2020). The Gugging Swallowing Screen in dysphagia screening for patients with stroke: A systematic review. *International Journal of Nursing Studies*, 107, 103588.
18. Thiyaalingam, S., Kulinski, A. E., Thorsteinsdottir, B., Shindelar, K. L., & Takahashi, P. Y. (2021, February). Dysphagia in older adults. In *Mayo Clinic Proceedings* (Vol. 96, No. 2, pp. 488-497). Elsevier.
19. Wangen, T., Hatlevig, J., Pifer, G., & Vitale, K. (2019). Preventing aspiration complications: implementing a swallow screening tool. *Clinical Nurse Specialist*, 33(5), 237-243.
20. Drulia, T., & Hodge, A. (2021, November). Clinical Practice Patterns of Speech-Language Pathologists Delivering Dysphagia Services to Persons with COPD: Analysis of Survey Outcomes. In *Seminars in Speech and Language* (Vol. 42, No. 05, pp. 363-383). Thieme Medical Publishers, Inc..
21. Duncan, S., Gaughey, J. M., Fallis, R., McAuley, D. F., Walshe, M., & Blackwood, B. (2019). Interventions for oropharyngeal dysphagia in acute and critical care: a protocol for a systematic review and meta-analysis. *Systematic reviews*, 8(1), 1-8.
22. Mohannak, N., Pattison, G., Hird, K., & Needham, M. (2019). Dysphagia in patients with sporadic inclusion body myositis: management challenges. *International Journal of General Medicine*, 12, 465.
23. Miles, A., Connor, N. P., Desai, R. V., Jadcherla, S., Allen, J., Brodsky, M., & Langmore, S. E. (2021). Dysphagia care across the continuum: a multidisciplinary dysphagia research society taskforce report of service-delivery during the COVID-19 global pandemic. *Dysphagia*, 36(2), 170-182.
24. Datta, N., Derenne, J., Sanders, M., & Lock, J. D. (2020). Telehealth transition in a comprehensive care unit for eating disorders: Challenges and long-term benefits. *International Journal of Eating Disorders*, 53(11), 1774-1779.
25. Aghaz, A., Hemmati, E., & Ghasisin, L. (2018). Types of neuroplasticity and factors affecting language recovery in patients with aphasia: a systematic review. *Archives of Neuroscience*, 5(3).
26. McRae, J., Morgan, S., Wallace, E., & Miles, A. (2022). Oropharyngeal dysphagia in acute cervical spinal cord injury: a literature review. *Dysphagia*, 1-14.
27. Tran, E. K., Juarez, K. O., & Long, J. L. (2020). Stem cell treatments for oropharyngeal dysphagia: Rationale, benefits, and challenges. *World journal of stem cells*, 12(9), 1001.
28. Ansari, N. N., Tarameshlu, M., & Ghelichi, L. (2020). Dysphagia in multiple sclerosis patients: diagnostic and evaluation strategies. *Degenerative neurological and neuromuscular disease*, 10, 15.
29. Speyer, R., Cordier, R., Farneti, D., Nascimento, W., Pilz, W., Verin, E., & Woisard, V. (2022). White paper by the European society for Swallowing Disorders: Screening and non-instrumental assessment for dysphagia in adults. *Dysphagia*, 37(2), 333-349.
30. Oguchi, N., Yamamoto, S., Terashima, S., Arai, R., Sato, M., Ikegami, S., & Horiuchi, H. (2021). The modified water swallowing test score is the best predictor of postoperative pneumonia following extubation in cardiovascular surgery: A retrospective cohort study. *Medicine*, 100(4).
31. Dobak, S., & Kelly, D. (2021). Tough pill to swallow: postextubation dysphagia and nutrition impact in the intensive care unit. *Nutrition in Clinical Practice*, 36(1), 80-87.
32. Moss, M., White, S. D., Warner, H., Dvorkin, D., Fink, D., Gomez-Taborda, S., & Langmore, S. E. (2020). Development of an accurate bedside swallowing evaluation decision tree algorithm for detecting aspiration in acute respiratory failure survivors. *Chest*, 158(5), 1923-1933.
33. Perren, A., Zürcher, P., & Schefold, J. C. (2019). Clinical approaches to assess post-extubation dysphagia (PED) in the critically ill. *Dysphagia*, 34(4), 475-486.
34. Moss, M., White, S. D., Warner, H., Dvorkin, D., Fink, D., Gomez-Taborda, S., & Langmore, S. E. (2020). Development of an accurate bedside swallowing evaluation decision tree algorithm for detecting aspiration in acute respiratory failure survivors. *Chest*, 158(5), 1923-1933.