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Management of Post-Extubation Dysphagia using the Yale Swallow Protocol

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Abstract

Problem: Post extubation dysphagia (PED) increases the patient's risk for long term complications contributing to increased healthcare cost. Intensive care settings rarely use standardized swallow screening assessments for patients post extubation leading to variation in the evaluation of PED. Variation in the assessment of swallowing post extubation can lead to the missed diagnosis of patients with dysphagia.

Methods: This quality improvement (QI) project was a prospective cohort study implementing an evidence-based swallow screening protocol, the Yale Swallow Protocol (YSP), in an intensive care unit. This study was conducted over four months, which included a pre survey, education, implementation, and post survey. Qualitative and quantitative data was collected from the electronic medical record on the patient responses to the screening. The surveys were distributed via QR code on a flyer and recorded in an Excel sheet via Google Forms.

Results: The total number of YSP screenings was 24 (11 passed (46%), 9 failed (37%), and 4 (17%) were excluded). Seven (78%) of the failed screenings were validated with a fiberoptic endoscopic evaluation of swallowing test (FEES) or modified barium swallow study (MBS) showing mild to moderate dysphagia (*n*=5, 72%), aspiration (*n*=1, 14%), and laryngeal edema (*n*=1, 14%).

Implications for Practice: The YSP provides clinical settings with a swallow screen that identifies extubated patients with an increased risk for dysphagia.

Management of Post-Extubation Dysphagia using the Yale Swallow Protocol

In the United States, out of the 220,000 intubated patients secondary to acute respiratory failure, up to 62% of these patients may experience post extubation dysphagia (PED) (Rassameeiran et al., 2015). Dysphagia is defined as the inability to transfer liquids and food safely from the mouth to the stomach (Macht et al., 2013; Perren et al., 2019). Post extubation dysphagia increases the patient's risk for complications while inpatient and after discharge since patients missed the opportunity for the early interventions to handle these complications. Associated complications of PED are malnutrition with the potential need for a feeding tube, tracheostomy placement, aspiration pneumonia, reintubation leading to prolonged hospitalization, and a decrease in quality of life (Barker et al., 2022; Macht et al., 2013; Perren et al., 2019).

Most intensive care units in the United States do not have a validated swallow screening assessment, which can be administered by nurses to assess for PED. Without a standard swallow screening protocol, nurses may vary in assessing when a patient is ready for oral intake. Variation in the assessment of swallowing is the reason for the large range of incidence (3 to 62%) of post extubation dysphagia (Mansolillo, 2021; Rassameehiran et al., 2015). The gold standard for diagnosing dysphagia in patients is the use of a video fluoroscopic swallowing study (VFSS) or fiberoptic endoscopic evaluation of swallowing (FEES), which can be administered by a speech pathologist (Barker et al., 2022). These can be expensive if the patient must endure multiple VFSS or FEES during their hospital stay increasing their healthcare cost and financial burden. For example, a VFSS can cost between $1200 to $1600 per study (Barker et al., 2022). With the use of a validated nursing bedside swallow screening, patients' ability to swallow can be assessed

prior to oral intake and early indication of speech evaluation can be identified for patients showing signs of PED preventing the need for multiple VFSS or FEES.

The Yale Swallow Protocol (YSP) is a validated, evidence-based swallow screening which can be administered by nurses at the bedside to assess for dysphagia (Warner et al., 2014). Patients must also exhibit criteria of clinical readiness prior to administration of the YSP. Readiness criteria may consist of staying awake for 10 minutes, the ability to follow commands, requirement of less than 60% supplemental FiO2, and no previous history of dysphagia or modifications to diet (Warner et al., 2014).

The purpose of this project is to establish a standardized swallow screening, such as the YSP, prior to the initiation of oral intake and decrease variation in swallow assessments in the designated institution. The PICOT is: “In critically ill patients who have been intubated, does the use of a nurse driven bedside swallow screening identify patients at increased risk for post extubation dysphagia?” The aim is two-fold: 1. provide an algorithm for the utilization of the YSP and educate nurses on the indication and utilization, and 2. standardize the process for safe initiation of oral intake post extubation. The outcomes measured include the number of nurses who were compliant with accurately performing the YSP, the accurate documentation of the YSP utilization, and the number of consults for speech therapy for patients who failed the YSP.

Literature Review

The literature search for this literature review included a total of four search engines: CINAHL, Cochrane Libraries, Medline, and PubMed. The search terms used throughout all four search engines were “dysphagia AND post extubation,” “swallow screen OR yale,” “swallow screen AND yale,” “post extubation AND intensive care unit,” “post extubation,” “post extubation dysphagia,” “intubation AND laryngeal injury,” “ETT size and laryngeal injury,” “delirium AND swallow screen,” and “nurses AND dysphagia screenings.” The number of initial publications generated was 3,768. After establishing inclusion and exclusion criteria, 1,311 articles were generated from the refined search. Inclusion criteria was any article published in 2013 to 2023, with full text available, and English language. Exclusion criteria was any article published prior to 2013, unavailable full text, and articles written in any language other than English. A total of 12 articles were used for the final literature review.

Post extubation dysphagia is a growing concern in the critical care patient population. Post extubation dysphagia affects up to 62% of patients that are extubated, increasing the patient’s risk for complications after discharge as PED is often underdiagnosed. While not a concern until recently, PED has been deemed an unforeseen burden on healthcare cost in the United States, with nearly 10 billion dollars having been spent on patients suffering from complications of post extubation dysphagia (Perren et al., 2019).

Symptoms of PED include coughing, choking, wet voice quality, drooling and difficulty swallowing during oral intake post removal of the endotracheal tube (Brodsky et al., 2020). Factors contributing to PED include oropharyngeal and laryngeal trauma

from the endotracheal tube, neuromuscular weakness, altered sensation from sedation, gastroesophageal reflux, impaired cognition, inappropriate size of ETT along with increased duration of intubation, and unsynchronized breathing and swallowing (Brodsky et al., 2020; Perren et al., 2019). These factors are often present in critically ill patients and exacerbated by the current and/or past medical history of the patient. Brodsky et al. (2020) asserted that nurse-led screenings of dysphagia play an important role in identifying PED symptoms and assisting with recommendations for management of dysphagia.

Laryngeal injury from intubation is one of the major contributors to post extubation dysphagia and can be decreased by use of the appropriately sized endotracheal tube for the patient and decreased length of intubation (Brodsky et al., 2018; Saeg & Alnori, 2021). Brodsky et al. (2018) conducted a literature review on the signs of laryngeal injury and found that while there was a higher prevalence of self-limiting injuries such as erythema (82%), the most common severe injury was vocal fold immobility (21%). Brodsky et al. (2018) found patients who were intubated for longer than five days had a higher risk of severe injury than those that were intubated for less than five days. Christensen and Trapl (2018) found that patients intubated longer than three days demonstrated increase laryngeal injury and increased risk for post extubation dysphagia, requiring management by speech therapy.

Use of inappropriate endotracheal tube (ETT) size can cause mucosal erosion and acute laryngeal injury leading to long term complications such as post extubation dysphagia (Cao et al., 2021). Intubation is often an emergency procedure performed on patients who are experiencing respiratory distress. Cao et al. (2021) found to decrease

laryngeal trauma, endotracheal tube size should be determined by the patient's height and sex. In prior medical practice, it was common to use a size 9.0mm tube in men and 8.0mm in women regardless of the patient's height (Cao et al., 2021). In the retrospective study, Cao et al. (2021) reported women and patients who were less than 5 feet 2 inches were inappropriately intubated with a larger size ETT (1mm or more) leading to preventable complications such as laryngeal injury. With rapidly accessible knowledge of the patient's height, Cao et al. (2021) recommended the standard use of a 6.0 to 6.5mm ETT be used in women less than 5 feet, 3 inches tall and a 7.0 to 7.5mm ETT in men less than 5 feet, 8 inches to decrease complications of laryngeal injury.

Currently, most intensive care units have no validated swallow screening tool to assess PED leading to variation in nurse driven swallow assessments. Assessing patients for dysphagia post extubation is comparable to a stroke dysphagia screening, which is a universal protocol in institutions. With the use of a nurse driven bedside swallow screen, the swallowing status of patients can be assessed immediately after extubation, prior to oral intake. If indicated, an early indication of speech evaluation can be initiated to patients with potential PED to prevent life-altering complications (Barker et al., 2022: Christensen & Trapl, 2018; Hongo et al., 2022). The use of FEES and VFSS testing can then be prioritized for treatment of PED in patients with noted dysphagia from the bedside swallow screening.

The first step in administering any swallow screen is assessing the "clinical readiness" of the patient to participate (Barker et al., 2022). According to Barker et al. (2022), a patient needs to be clinically ready to participate in the swallow screen. Clinically ready for the extubated patient can include being able to stay awake, follow

commands, speak louder than a whisper, sit with head of bed at 90 degrees, tolerate less than 60% FiO2, and be hemodynamically stable (Barker et al., 2022). Barker et al. (2022) found it useful to exclude patients who have been intubated for greater than two days, have a present tracheostomy, history of multiple intubations, history of dysphagia prior to intubation, been diagnosed with any neuromuscular disorder, vocal cord damage, head and neck cancer or had any head or neck surgery. Christensen and Trapl (2018) found patients who were intubated for greater than three days needed to be excluded and then referred to speech therapy prior to safe initiation of oral intake. Individual patients recover on their own timeline and need to be given the appropriate time after extubation to meet the readiness criteria. Marvin et al. (2019) found that, in all patient participants, waiting a minimum of 24 hours post extubation prior to the assessment of swallow status posed the biggest benefit while Barker et al. (2022) suggested that if the patient is unable to meet the criteria in 24 hours, a speech therapy consult is required prior to oral intake.

Based on versatility and ease of performance, the YSP has been selected as the preferred swallow screen for intensive care units. The YSP is a valid, reliable, and evidence-based swallow evaluation which can be administered by a nurse (Warner et al., 2014). It has been tested in multiple settings such as cardiac, neurological, and medical intensive care units and has been shown to yield the same results when correctly administered properly by nurses when compared to speech therapists (Warner et al., 2014). In a study by Suiter et al. (2014), 25 participants underwent the YSP and a VFSS. When compared to VFSS in identifying aspiration all participants who passed the YSP showed no signs of aspiration during the VFSS (Suiter et al., 2014).

The YSP has three components which include a 3oz. (90ml) water swallow test, a brief cognitive screen, and oral mechanism examination (Warner et al., 2014). Before the administration of the 3oz. water swallow test, the cognitive screen and oral mechanism exam should be passed by participating patients. According to Warner et al. (2014), with the use of a 3 oz. water swallow screen, the YSP can be 96% effective in predicting aspiration and detecting dysphagia in an acute care setting. There has been concern that bedside swallow screens cannot detect silent aspiration and the only method to accurately detect silent aspiration is the VFSS or FEES (Barker et al., 2022). This theory was proven untrue by prior evidence from Warner et al. (2014) after they reported that silent aspiration was volume dependent, meaning amounts greater than 10ml during a bedside swallow screen would be able to detect silent aspiration. This evidence supports the validation and reliability of the YSP as a beneficial bedside swallow screen.

The Plan-Do-Study-Act (PDSA) is the evidence-based practice model used for this quality improvement (QI) project. The PDSA cycle is used for trialing projects to analyze the impact they have change to a protocol. The four stages of the cycle are: Plan – plan the change, Do – try out the change on a small scale, Study – analyze the data and what has been learned, and Act – reconstruct the change and repeat testing to get the desired effect.

Methods

Design

This QI project was the implementation of an evidence-based swallow screening protocol for the designated institution. A prospective cohort study was conducted over the

course of four months to provide a protocol in identifying patients with symptoms of post extubation dysphagia.

Setting

This setting for this project was a 30-bed intensive care unit (3 floors with 10 bed each) at a local, 400 bed, suburban hospital. The intensive care unit managed patients with surgical, medical, neurological, and cardiac conditions and staffs approximately 100 nursing employees with various years of experience and five critical care physicians who rotate schedules weekly. At this institution, licensed speech therapists assigned to the unit daily performed FEES and MBS.

Sample

Purposive sampling was used for the YSP due to the need to meet specific criteria requirements to participate in the three-month period (see Appendix A). Convenience sampling was used for the pre- and post- survey as any nurse who met the criteria filled out a survey (see Appendix A).

Approvals

For this project, approvals from the Institutional Review Board (IRB) of the designated institution and University of Missouri-Saint Louis (UMSL) were obtained. The necessary IRB forms were completed for the purpose of this quality improvement project. The assigned chairperson approved the project proposal prior to submission to both respective IRB boards. There were no risks or ethical considerations due to the YSP being used for quality improvement since there was no swallow screening prior to assess for PED.

Data Collection and Analysis

In addition to the YSP, nurses completed a pre- and post-survey to demonstrate the comparison of knowledge gained about the YSP before and after implementation. The survey was electronic and distributed via QR code on flyers placed around all three subunits. Responses from survey remained anonymous. Notification to complete the pre- and post-survey was done in the morning staff huddle prior to starting their shift. It included information about the quality improvement project and stated by completing the survey, the nurses were consenting to participate in data collection. The pre- and post-survey consisted of questions about experience, identification of signs and symptoms of dysphagia, and knowledge of key components of the YSP. The desired goal for completion of the pre- and post-survey was at least 50% of the nursing staff. The survey results were analyzed via a paired sample t-test to show the comparison of the answers to the YSP pre- and post- implementation. To analyze the comparison of the pre- and post-survey results, each staff member placed the month of their birth date (two digits) along with the last two digits of the year they joined the institution on the electronic survey (see Appendix B for paper form of survey). Data collected from the swallow screen results did not contain any identifiers (name or date of birth).

The YSP was previously embedded in the documentation system from another institution and was used for this project to document the screening (see Appendix C). The results were retrieved via a report (Slicer Dicer) designed for the swallow screen flowsheet (see Appendix D). In this report, data showed how the patient performed on the YSP. Informed consent to participate in the project was waived as this is part of the patient's treatment plan. The data was entered into an excel spreadsheet and analyzed to

determine if the screening was documented correctly and if the patients who failed the YSP correlated with speech therapy's intervention (that is, thickened liquid consistency or mechanical soft diet). A swallow screen resource binder (containing a FAQ sheet, YSP algorithm, and TIPS sheet for charting) was placed throughout each unit for quick reference of the protocol (see Appendix E for algorithm).

Procedure for Education Plan

Following approval for the project and distribution of the pre-survey, education began in the designated unit. Unit champions were educated via PowerPoint and reviewed how to perform and document the YSP. A PowerPoint presented via voiceover to staff and speech therapy included an explanation of the YSP, why it is being implemented, how to perform it, and practice on documenting the YSP in EPIC. The unit champions assisted with notifying staff to complete the electronic pre-survey (see Appendix B for paper form). After one week of the electronic survey being open, staff began education via two sessions of TEAMS meetings. Attendance was taken to determine staff members present. Staff members who were absent had access to the education on the unit TEAMS education page prior to the implementation date and encouraged to review the materials. There was also a video on how to perform the YSP on the education page.

Following education of the nursing staff on the use of the YSP, the protocol was implemented for three months. For the initial implementation, speech therapy was contacted via secure chat or phone called to assist with performing the protocol at bedside. Data collection occurred for two weeks post implementation with assistance from the third committee chair for this project. Re-education was provided by unit

champions if needed throughout the implementation process. To help determine the impact of the utilization of the YSP, a post-survey (see Appendix B for paper form) was provided to the nursing staff for one week during the two weeks of data collection.

Results

Demographics

The sample size for the swallow screen was 23 (*n*=23), with one patient being rescreened, making the number of total screenings, 24. Of the 23 patients, 13 were female (56.5%) and 10 were male (43.5%) (see Table 1a). For the racial distribution, there were 17 Caucasian (73.9%), five African American (21.7%), and one Indian (4.3%) during the three-month implementation period (see Table 1b). These 23 patients ranged in ages from 30 to 90 with the majority age group being 51 to 70 years (*n*= 10, 43.4%) and mean age of 64 years (*SD* =13.06).

Yale Swallow Screen

The monthly compliance benchmark for the YSP was 75%. Out of the three months, compliance was only met for one month (May). As the trial progressed, compliance increased from 57% (March), 60% (April), and finally 92% (May) (See Figure 2). Of the 24 swallow screenings performed, there were 11 passes (46%), 9 fails (37%), and 4 exclusions (17%). Seven (78%) of the nine patients who failed screenings had a fiberoptic endoscopic evaluation of swallowing test (FEES) or modified barium swallow study (MBS) conducted which showed mild to moderate dysphagia (*n*=5, 72%), aspiration (*n*=1, 14%), and laryngeal edema (*n*=1, 14%). Seven (72%) of the nine patients who failed screenings were intubated for more than three days.

Pre- and Post-Survey

The pre-survey received 38 responses and the post-survey received 14 responses. Via numeric coding, only four respondents were able to be matched for the pre and post survey. The years of intensive care experience for these four respondents was greater than 15 years (*n*=1, 25%), 10 to 15 years (*n*=1, 25%), 6 to 9 years (*n*=1, 25%), and 2 to 5 years (*n*=1, 25%). All four (100%) the respondents reported feeling confident in their ability to assess for dysphagia in patients post extubation, were able to describe the symptoms of dysphagia, and agreed the YSP was easy to perform in the pre-survey and post-survey.

When evaluating all the responses from the pre- and post-survey, the majority years of experience was 6 to 9 years (*n*=13 on pre-survey and *n*=4 on post-survey), confidence (scores of strongly agree and agree) in being able to assess for PED increased from 84% (pre) to 86%(post), and acknowledgment that the YSP is easy to perform and beneficial increased from 71% (pre) to 86% (post). The paired t-test for these three prompts responses were deemed statistically insignificant (see Table 2).

Discussion

This quality improvement project accomplished its purpose of providing the intensive care unit with a swallow screen that identifies increased risk for dysphagia in extubated patients. Seven patients with failed screenings were evaluated with FEES and MBS test, and all displayed some form of dysphagia, indicating 100% validity and reliability of the YSP (Suiter et al., 2014). One patient who initially failed was rescreened 24hrs post extubation and passed. This ability to rescreen and pass supported evidence by Marvin et al. (2019) stating screening patients at the 24-hour increment increases the patient's chance of passing the screening.

Monthly compliance was deemed a barrier in the beginning of the trial due to staff needing more education on qualifying patients given the patient acuity of the unit at the time. This was addressed with an email correspondence to all staff mid trial to state which patients were excluded from the protocol and reiterated the need to still chart these exclusions under the protocol. Following this correspondence, compliance increased from 60% (April) to 92% (May).

Small sample size (n=23) was a limitation to this study but was attributed to the high acuity of the unit during implementation. Another limitation to the study included efforts to provide such a large staff volume with adequate education related to the project implementation. Education was limited to the primary staff, excluding PRN, float, and new staff nurses from learning about the YSP. This created an opportunity for missed YSP screenings. A one-week time constraint was also a limitation for the post survey responses, limiting the number of respondents to be matched via numeric coding.

Recommendations for the future implementation of this protocol, would be the inclusion of additional opportunities to provide adequate education to the entire staff. This can be done at the yearly education session, which all staff are required to attend. This would provide an opportunity to educate new staff, re-educate established staff, and answer any questions that are raised. Education can be provided by unit champions of the YSP, or a speech pathologist educated on the YSP. Another recommendation would be the inclusion of team leads (charge nurses) who participate in daily care rounds to help remind nurses to perform a swallow screen on their post extubated patients. Continuance of tracking monthly compliance can be accomplished with daily auditing on the extubated patients.

Conclusion

This quality improvement project of the YSP initiated in the intensive care unit was successful in identifying patients with an increased risk for dysphagia post extubation. This protocol was proven to be valid and reliable with the support of FEES and MBS performed by speech pathologists. Due to the success of this quality improvement project, the YSP will continue as the protocol for the unit aiding in decreasing complications from PED with future patients.

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Appendix A

Inclusion and Exclusion Criteria for Sampling

Inclusion Criteria	Exclusion Criteria
Intubated patients who have been ventilated for preferably less than 3 days (but consideration will be given to patients intubated for longer than 3 days for sample size)	Patient is lethargic or unable to stay awake for testing
Patients alert for at least 10 minutes post extubation and able to participate in testing	Presence of tracheostomy tube or PEG tube or history of either
Able to follow commands	HOB restriction of <30 degrees
Hemodynamically stable	History of dysphagia from other medical conditions such as stroke
	Patient nothing by mouth for medical procedure/surgery

Inclusion and Exclusion Criteria for Pre- and Post- Survey

Inclusion Criteria	Exclusion Criteria
All Permanent Full-time, Part-time, and PRN nursing staff working through the 3-month period	Float Pool/Central Staffing Office nursing staff as they are temporary and will not be present consistently for the 3 months

Appendix A. These are the inclusion and exclusion criteria for the YSP and the pre- and post-survey.

Appendix B

Yale Swallow Protocol Pre- and Post- Survey

This survey is a part of quality improvement project about the Yale Swallow Protocol. The purpose of this project is to provide the intensive care unit with a way to diagnose dysphagia and initiate oral intake safely post extubation. Participation in this survey is voluntary since it is a part of the project and data collection will occur. To keep your answers anonymous, please place in the top right-hand corner, the month of your birth date (two digits) along with the last two digits of the year of your hire date.

Contact Information:
Nicole West: 314-560-0940 or nicole.west@bjc.org
Pamela Hale-David (Chair Committee): pamela.hale-david@bjc.org

1. How many years have you worked in an intensive care unit?
    a. less than 2 years
    b. 2 to 5 years
    c. 6 to 9 years
    d. 10 to 15 years
    e. greater than 15 years

2. How much do you agree with the following statement: “I am confident in my ability to assess if my extubated patient is ready for oral intake”?
    a. Strongly Agree
    b. Agree
    c. Unsure
    d. Disagree
    e. Strongly Disagree

3. How long do you wait post extubation before initiating oral intake on your patient?
    a. 1-2hrs
    b. 2-3hrs
    c. 3-4hrs
    d. No Set Time Frame - When You Feel the Patient is Clinically Ready

4. Which of these symptoms are signs of dysphagia? (Select All That Apply)
    a. Throat Clearing After Taking a Sip of Water
    b. Wet Voice
    c. Coughing After Swallowing
    d. Drooling
    e. Pocketing of Food
    f. Trouble Handling Secretions
    g. Sensation of Food Getting Stuck in Throat
    h. All the Above

5. What is the initial step if a patient shows signs of dysphagia? (Select All That Apply)
    a. Wait a few hours and try food again
    b. Obtain a consult to speech therapy
    c. Make the patient NPO
    d. Discuss with Physician

6. If a patient is too lethargic for the swallow screen, it is ok to rescreen when the patient is more alert.
    a. True
    b. False

7. When performing the 3oz. water test, what is considered a fail? (Select all that Apply)
    a. Coughing before finishing the full amount
    b. Patient being disoriented
    c. Misunderstanding of the instructions
    d. Inability to finish the 3oz. water test without stopping

8. If the patient has preexisting diet modifications, then we can proceed with swallow screen and reorder that diet without a speech consult.
    a. True
    b. False

9. If a patient is unable to pass the swallow screen in 24hrs, what is the next step?
    a. Continue to rescreen the patient until they pass
    b. Obtain a consult to Speech Therapy from the provider
    c. Discuss with Physician

10. How much do you agree with this statement: “I find the Yale Swallow Protocol easy to perform”?
    a. Strongly Agree
    b. Agree
    c. Unsure
    d. Disagree
    e. Strongly Disagree

Appendix B. This pre- and post- survey will be distributed throughout the unit to all the nurse prior to implementation for baseline data and post implementation.

Appendix C

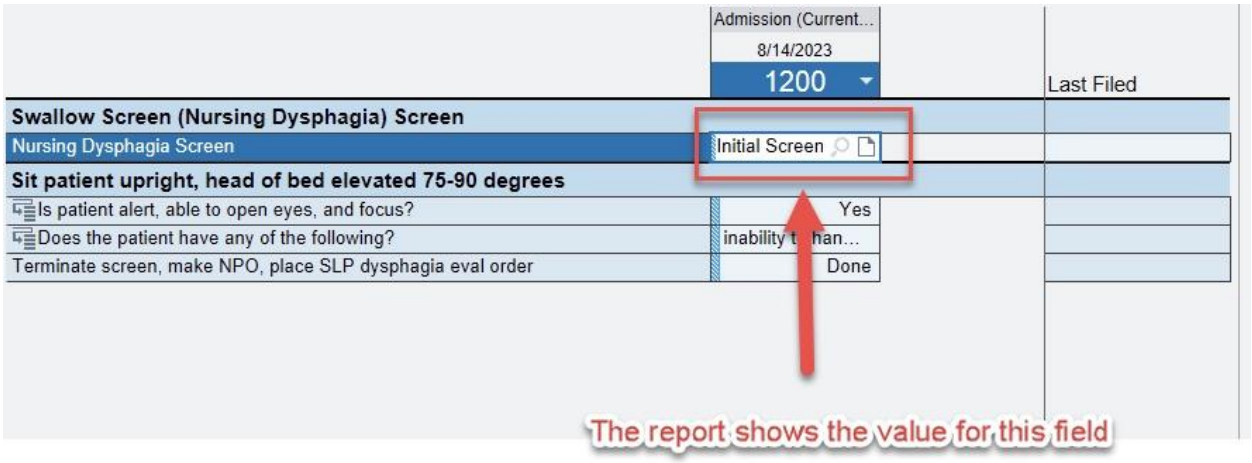
Yale Swallow Protocol in EPIC

Yale Swallow Screen		
Nursing Dysphagia Screen		
Exclusion Criteria: For an answer of "yes" to any of the below questions, please discuss results with the provider, including NPO status and need to place SLP consult vs. re-screen in 24 hours vs. re-screen with noted clinical improvement.		
Is the patient lethargic or unable to stay alert/awake for testing?		
Are they on "No thin liquids due to pre-existing dysphagia?		
Does the patient have HOB restrictions < 30 degrees?		
Does the patient have a tracheostomy?		
Is the patient NPO for medical/surgical reasons?		
Formula for Cascade if all NOs		
Continue to Evaluate (Cascading Groups below) if all NOs above		
Brief Cognitive Screen/Oral-Mechanism Exam: An answer of "no" to any of the below does not exclude patient from the 3 oz water trial. Consider keeping NPO and discuss with the provider if there are safety concerns.		
Is the patient oriented to person, place, and year?		
Without cueing, is the patient able to follow the commands: open mouth, stick out t...		
Can the patient close their lips without noticeable gaps?		
Can patient stick out their tongue and touch each side/corner of their mouth?		
Is the patient's smile and lip pucker symmetrical?		
Does the patient have an absent voice or hoarse vocal quality?		
Is the patient able to manage their secretions?		
Did the patient have prolonged intubation? (Greater than 3 days?)		
Does the patient have a history of head and neck cancer s/p radiation?		
3 oz (90mL) water trial: Provide patient with 3 oz of water and instruct patient, "Drink the entire 3 oz slow and steady WITHOUT stopping.		
Did patient stop drinking part way through the 3 oz?		
Did patient cough during or immediately after the 3 oz?		
Continue to Eval Formula		
Continue to Cascade		

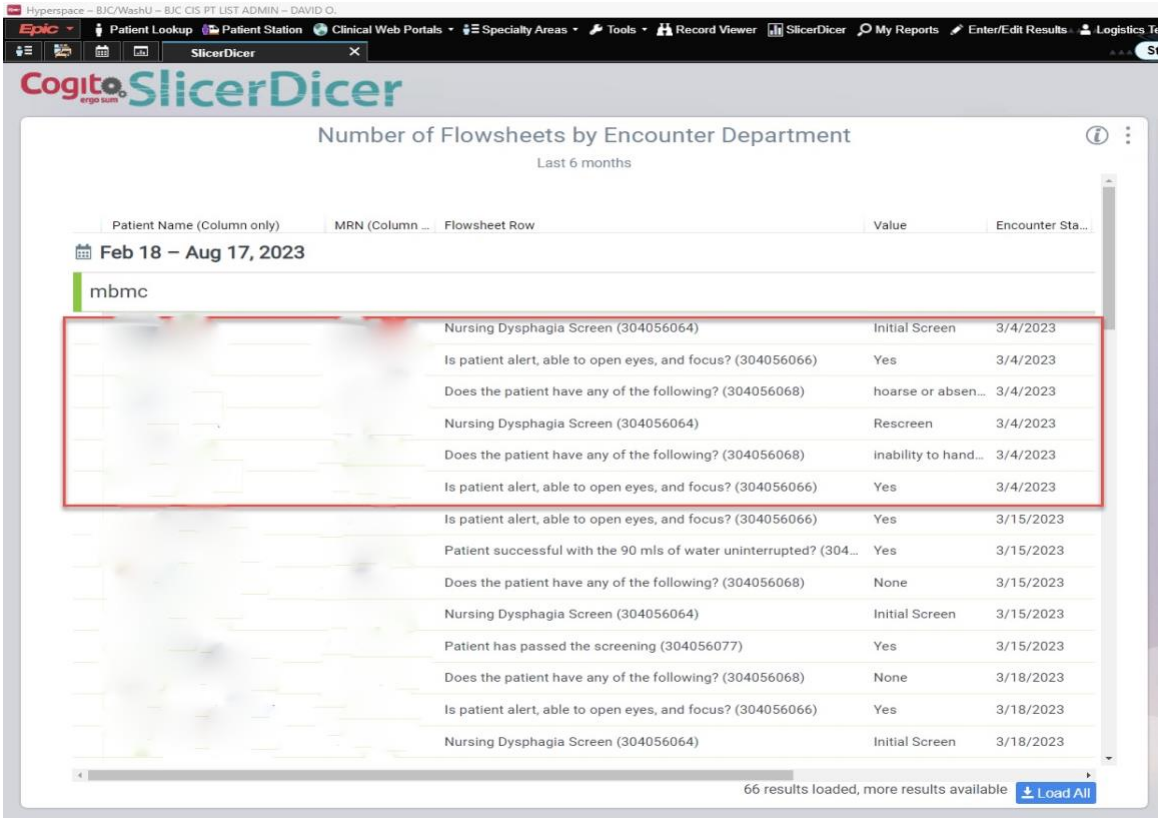
Appendix C. This is how the Yale Swallow screen looks in the charting system. This format is based on responses, which then leads to cascading flowsheets depending on the response.

Appendix D

EPIC Report for Data Collection



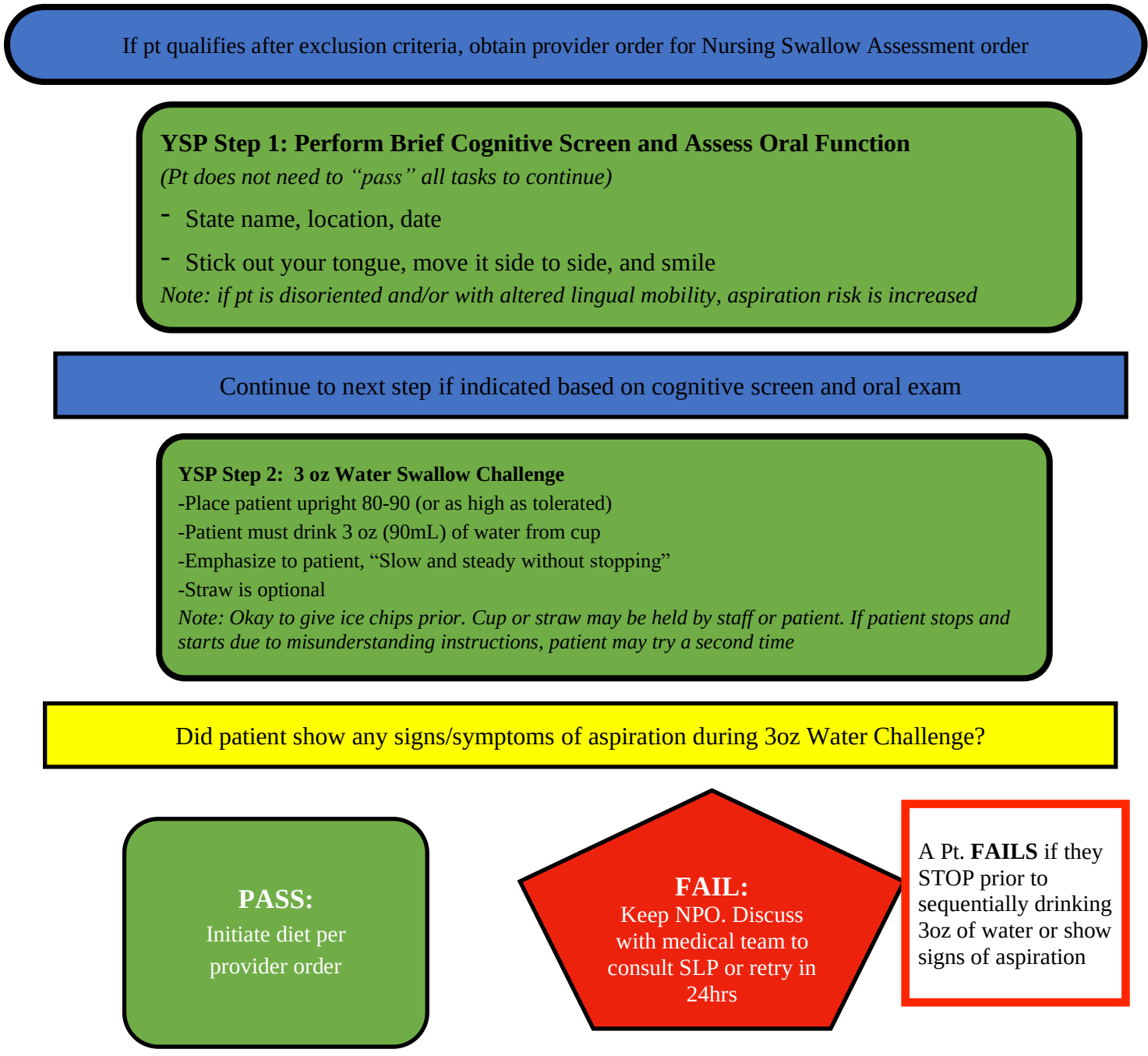
Appendix D1. This is picture of where the report will initially receive its data collection.



Appendix D2. This is an example of what the report will look like once implementation takes place. It will show patient identifiers to the left (which are blurred), then initial or rescreen, the date it was performed, and responses to each of the prompts.

Appendix E

Yale Swallow Protocol Algorithm



Appendix E. This is the Yale Swallow Algorithm, which will be placed throughout each unit as a visual aid of the how the screening should happen.

Table 1a.

Gender Demographics

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	FEMALE	13	56.5	56.5	56.5
	MALE	10	43.5	43.5	100.0
	Total	23	100.0	100.0	

Note. Out of the 23 patients, the majority of screenings were on females (56.5%). Output obtained using IBM SPSS Statistics for Mac, version 29.0

Table 1b.

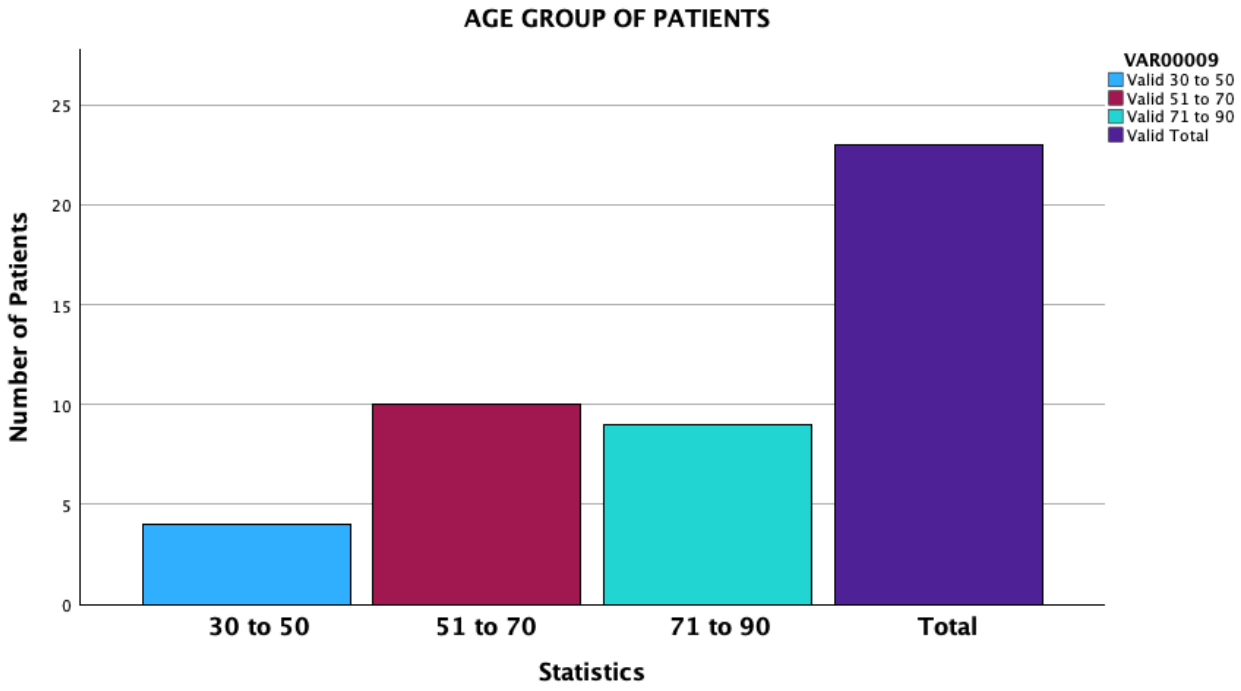
Race Demographics

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	AFRICAN AMERICAN	5	21.7	21.7	21.7
	CAUCASIAN	17	73.9	73.9	95.7
	INDIAN	1	4.3	4.3	100.0
	Total	23	100.0	100.0	

Note. Race demographics showed the majority of screenings as follows Caucasian (73.9%), African American (21.7%), and Indian (4.3%). Output obtained using IBM SPSS Statistics for Mac, version 29.0

Figure 1

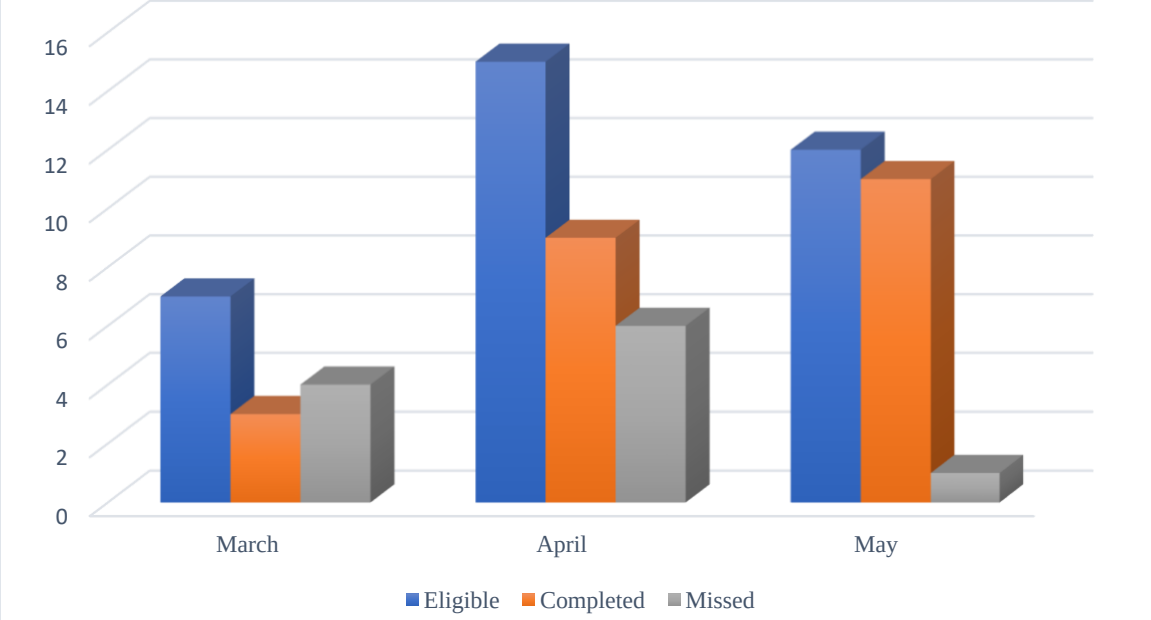
Age Group Distribution on Bar Chart



Note. Chart shows most of the swallow screens were performed on patients aged 50 and above. Output obtained using IBM SPSS Statistics for Mac, version 29.0

Figure 2

Monthly Compliance on Yale Swallow Protocol



Note. Goal for compliance was 75% per month. As we went through the trial, the number of missed screenings decreased, and compliance improved.

Table 2

		N	Correlation	Significance One-Sided p	Significance Two-Sided p
Pair 1	How many years have you worked in the intensive care unit? & How many years have you worked in the intensive care unit?	14	.358	.104	.208
Pair 2	I am confident in my ability to assess if my extubated patient is ready for oral intake? & I am confident in my ability to assess if my extubated patient is ready for oral intake?	14	.171	.280	.559
Pair 3	How much do you agree with this statement: I find the Yale Swallow Screen easy to perform? & How much do you agree with this statement: I find the Yale Swallow Screen easy to perform?	14	.318	.134	.268

Note. This table shows the paired t-test results for the pre and post survey. The correlation was not significant due to the p-values being greater than .05.